

Nicolaus Copernicus University  
in Torun  
Collegium Medicum Ludwik Rydygier  
in Bydgoszcz

Faculty of Pharmacy

## **COURSE SYLABUSES**

FARMACJA studia w j. angielskim  
(PHARMACY)

Long-cycle studies

Bydgoszcz 2020

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## **Course module A**

Biomedical and humanistic basis of pharmacy

## Anatomy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Anatomy</b> (Anatomia)
Unit offering the subject	Faculty of Medicine Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long-cycle
Subject code	1750-F1-ANAT-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	3
Form of crediting	credit for a grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic basis of pharmacy
Total student workload	<p>1. The workload related to activities requiring the direct participation of academic teachers is:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 18 hours,</li> <li>– participation in exercises: 12 hours</li> <li>– consultations with the academic teacher: 3 hours,</li> <li>– practical and theoretical credit: 3 hours.</li> </ul> <p>The workload related to activities requiring the direct participation of academic teachers is 36 hours, which corresponds to 1.44 ECTS points.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 18 hours,</li> <li>– participation in exercises: 12 hours,</li> <li>– preparation for exercises: 12 hours,</li> <li>– reading the indicated literature: 10 hours,</li> <li>– consultations with the academic teacher: 3 hours,</li> <li>– preparation to pass + credit: 17 + 3 = 20 hours</li> </ul> <p>The total student workload is <b>75 hours</b>, which corresponds to <b>3 ECTS</b> credits.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– reading of the indicated scientific literature: 4 hours,</li> <li>– participation in lectures (including research methodology, research results, studies): 4 hours,</li> </ul>

	<ul style="list-style-type: none"> <li>– research and scientific consultations: 2 hours,</li> <li>– participation in classes covered by scientific activity (including research methodology, research results, studies): 4 hours,</li> <li>– preparation for classes covered by scientific activity: 2 hours,</li> <li>– preparation to pass in the field of research and development for the subject: 4 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>20 hours</b>, which corresponds to <b>0.8 ECTS</b> point.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>– preparation to pass + credit: 7 + 3 hours.</li> </ul> <p><b>10 hours</b> in total (<b>0.4 ECTS</b>).</p> <p>5. Time required to undergo compulsory practice - not applicable.</p>
Learning outcomes – knowledge	W1: Knows the correct structure of the human body and basic relationships between the structure and function of the body in conditions of health and disease - K_A.W4
Learning outcomes - abilities	U1: Uses Polish anatomical denomination to describe the state of health - K_A.U4 U2: Skillfully interprets the role of individual organs and systems in the proper functioning of the human body - K_A.U5
Learning outcomes – social skills	K1: shows respect for donor bodies used in the teaching process - K_A.K1 K2: Shows respect for donor bodies used in the teaching process - K_A.K1 K3: Acts in accordance with ethical principles - K5 Has a habit of using objective sources of information - K7 K4: He draws conclusions based on his own experience - K8
Didactic methods	Lecture <ul style="list-style-type: none"> <li>▪ informative lecture (traditional) with a multimedia presentation</li> </ul> <p>Laboratory tutorials:</p> <ul style="list-style-type: none"> <li>• formalin preparations,</li> <li>• anatomical models</li> <li>• preparatory films</li> <li>• charts and anatomical multimedia</li> <li>• slide presentations</li> </ul>
Preliminary requirements	Before starting the student should have the knowledge and skills resulting from teaching the subject biology at the advanced level in the field of high school.
Brief course description	Teaching Human Anatomy aims to master students basic knowledge of normal anatomy and provides the basis for further learning of other general subjects and major subjects.
	The subject is divided into six sections (systems): <ul style="list-style-type: none"> <li>• musculoskeletal system,</li> <li>• cardiovascular system,</li> </ul>

	<ul style="list-style-type: none"> <li>• respiratory system,</li> <li>• digestive system,</li> <li>• urinary and genital system,</li> <li>• nervous system.</li> </ul>
Entire course description	<p>Subject implemented in the form of lectures and laboratory tutorial. Students taking classes have knowledge in the field of biology at the high school level. They know the health and safety rules in force at the Department of Normal Anatomy. The lectures are intended to explain the more difficult issues related to the topic of individual exercises and to introduce them to practical classes that take place in the dissecting-room using bone material, isolated preparations and cadaver. During the lectures, attention will be paid to the characteristics of individual bone connections, systemic, pulmonary and fetal circulation, the structure of the nervous system and the course of the nerve pathways along with symptoms of their damage.</p> <p>Laboratory tutorials are devoted to teaching practical recognition of anatomical structures both in systematic terms (musculoskeletal system, cardiovascular system, respiratory system, digestive system, genitourinary system, nervous system and sensory organs).</p>
References	<p>Primary literature:</p> <ul style="list-style-type: none"> <li>• Samuel Hall and Jonny Stephens. Crash Course Anatomy and Physiology, Edition 5, 2018</li> </ul> <p>Supplementary literature:</p> <ul style="list-style-type: none"> <li>• Moore Keith L. and Dalley Arthur F. Clinically Oriented Anatomy. Lippincott Williams &amp; Wilkins, 7th ed., 2013</li> <li>• Young Paul A. and Young Paul H. Basic Clinical Neuroanatomy. 2nded. Lippincott Williams &amp; Wilkins, 2007</li> </ul> <p>Anatomical atlas:</p> <ul style="list-style-type: none"> <li>• Netter Frank H. Atlas of Human Anatomy. Urban &amp; Partner, 6thed., 2014</li> <li>• Paulsen F. Sobotta Atlas of Anatomy; vol. 1-3 Churchill Livingstone 15thed. 2011</li> </ul>
Methods and criteria of evaluation	<p>Test: K_A.W4, K_A.U4, K_A.U5  Practical performance of tutorials: K_A.W4, K_A.U4, K_A.U5  Exam: K_A.K1, K_B.K1, K_B.K2, K_B.K3  Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 1 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	credit for a grade

Form(s) and number of course hours as well as the form of crediting	Lecture: 18 hours Laboratory tutorials: 12 hours Credit with a grade
Course coordinator(s)	prof. dr hab. n. med. Michał Szpinda
Subject Teachers	Lecture: prof. dr hab. n. med. Michał Szpinda  Laboratory tutorials: mgr Mateusz Badura
Course form (character)	Obligatory
Limit of places available in each group	Lecture: first year students, semester I  Laboratory tutorials: groups of 12-15 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	<a href="https://www.wl.cm.umk.pl/kizap/">https://www.wl.cm.umk.pl/kizap/</a>
Learning outcomes determined for the given course form	Test: K_A.W4, K_A.U4, K_A.U5 Credit with a grade: K_A.W4, K_A.U4, K_A.U5
Methods and criteria of the evaluation for the given course form	Form and conditions of passing the subject: The condition of passing the course is passing lectures and obtaining positive grades from 5 partial tests.  Form and conditions of passing the classes: The student should be prepared for each laboratory tutorial based on the laboratory tutorial program displayed on the Notice Board of the Department and the Department of Normal Anatomy. The condition of passing the laboratory tutorial is obtaining a positive grade from the current material.  Form and conditions of passing the test: Dates of tests are given 2 weeks before the beginning of the semester on the Notice Board of the Department and the Department of Normal Anatomy.  The credit is a theoretical credit and takes place in the winter session: 1) The condition of getting started is passing all the tests with a positive grade. 2) Assessment takes the form of a single-choice test (60 questions); the condition for passing the test is a minimum of 60% of correct answers. 3) Failure to register for a student is subject to the provisions of the Study Regulations (item VIII, § 32). 4) During the course it is forbidden to use any teaching aids and electronic devices enabling communication with other people at a distance (e.g. mobile phone). Student behavior justifying the possession of the aids or devices referred to above, or finding such devices will result in automatic unsatisfactory assessment of passing the credit.



- 5) The occurrence of the circumstances referred to in item 4 may result in a referral to the Disciplinary Board for students.
- 6) Final materials, i.e. the answer card and a copy of the test are the property of the Department and the Department of Normal Anatomy, so it is forbidden for Students to take them.
- 7) Correction credit is determined in a correction session within the time limit set by the Head of the Department and announced on the Notice Board.

Grading scale:

Total points	Grade
> 36	F
36 – 42	E
43 – 48	D
49 – 54	C
55 – 57	B
58 – 60	A

List of topics

Lectures:

1. Anatomical axes and planes. General structure of bones. Classification of junctions and joints. Classification of skeleton. Selected issues in myology.
2. Cardiovascular system. Maternal-fetal circulation. Lymphatic system.
3. Respiratory system. Pleura. Part of the digestive system. Large abdominal glands. Peritoneal development.
4. Genitourinary system (development, structure, defects). Fertilization and human embryo development.
5. Nervous system. Central nervous system.
6. Structure of the spinal nerve. Somatic plexus.
7. Cranial nerves.
8. Autonomic nervous system. Sensory organs. Nerve pathways.

Laboratory tutorials:

1. Axes and body planes. Division of the skeletal system. Structure and types of bones. Types of bone connections. Division of joints. Skull: bones, cranial fossa, connections of the skull bones. Spine: the structure of individual vertebrae. The spine as a whole. Chest structure: ribs, sternum. Spine and chest connections. Upper limb bones and their connections. Lower limb bones and their connections. Division of the muscular system. Head and neck muscles. Chest, back and abdominal muscles. Upper limb muscles. Lower limb muscles. Topographic elements: axillary cavity, axillary fossa, elbow fossa, inguinal canal, popliteal fossa.
2. Colloquium I - musculoskeletal system. Structure and location of the heart. Vascularization of the heart. Heart conduction system. Pericardium. Heart cavity. Skeletotopia of the heart valves and places of auscultation. Tony of heart. Fetal circulation. Arterial system. Venous system. Lymphatic system.

	<p>3. Colloquium II – cardiovascular system Respiratory system. External nose, nasal cavity, throat, larynx, trachea, bronchi, lungs, pleura. Mechanics of breathing. Division of the digestive system. Mouth. Esophagus. Stomach. Small intestine. Large intestine. Liver. Bile ducts. Gallbladder. Pancreas. Peritoneum.</p> <p>4. Colloquium III - respiratory and digestive system Urinary system. Kidney, ureter, bladder, male and female urethra. Structure and topography of male genitalia. Structure and topography of female genital organs. Nipple structure.</p> <p>5. Colloquium IV - Urinary and genital system Nervous system. Brains: anatomical and clinical division, structure, vascularization, brain ventricles, cerebrospinal fluid circulation, meninges. Spinal cord: division, structure, vascularization. Cranial nerves: cranial nerve nuclei and their location in the brainstem, exit from the brain, place of passage through the base of the skull, range of innervation. Spinal nerves. Structure of the spinal nerve. Cervical plexus, brachial plexus, intercostal nerves and lumbosacral plexus (range of innervation, signs of nerve damage) Nerve centers. Types of nerve pathways. Pyramidal and extrapyramidal pathways. The way of superficial and deep feeling. The olfactory, visual, taste, auditory and balance pathways.</p> <p>6. Colloquium V - nervous system Autonomic nervous system, cardiac, visceral and lower abdominal plexus. Endocrine system. Hypothalamic-pituitary axis. Hypothalamus, pituitary gland, thyroid, parathyroid glands, thymus, pancreas, testicle, ovaries, placenta. Eye. The eyeball, extra organs of the eye. Tear apparatus. Pupil reflexes for light and accommodation. The optic nerve. Nerves of extraocular muscles (III, IV, VI). External ear, middle ear and internal ear. Vestibulocochlear nerve. Sound pathway.</p>
Didactic methods	The same as in part A
References	The same as in part A

## Biochemistry

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	Biochemistry (Biochemia)
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1704-F2-BCHEML-J

ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	7
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lecture participation – 30 hours</li> <li>– Tutorials participation – 65 hours,</li> <li>– consultations participation, including scientific and research consultations – 13 hours,</li> <li>– final exam participation – 2 hours</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>110 hours</b>, which corresponds to <b>4.4 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– lecture participation – 30 hours,</li> <li>– laboratories participation – 65 hours,</li> <li>– consultations participation, including scientific and research consultations – 13 hours,</li> <li>– reading the indicated literature – 15 hours,</li> <li>– preparation for laboratories – 15 hours,</li> <li>– preparation for test – 15 hours,</li> <li>– preparation for final exam – 20 hours,</li> <li>– final exam participation – 2 hours</li> </ul> <p>A total work amount: <b>175 hours</b>, which corresponds to <b>7 ECTS point</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– reading the indicated literature -10 hours,</li> <li>– participation in lectures (including methodology of research, research results and scientific studies)- 20 hours,</li> <li>– participation in research-scientific consultations- 5 hours,</li> <li>– participation in laboratories including scientific results: 30 hours,</li> <li>– preparation for laboratories including scientific results: 15 hours,</li> <li>– preparation for final exam including research results and scientific studies in the field of realized subject – 20 hours.</li> </ul> <p>A total student workload related to the conducted research is <b>100 hours</b>, which corresponds to <b>4.0 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– preparation for test – 15 hours,</li> </ul>

	<ul style="list-style-type: none"> <li>– preparation for final exam and taking part in exam – 20+2 = 22 hours</li> <li>– Total time required for preparation and participation in evaluating process: <b>37 hours</b>, which corresponds to <b>1,48 ECTS points</b>.</li> </ul> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>Students:</p> <p>W1: Knows and understands the structure and biological role of carbohydrates, lipids, amino acids, proteins, nucleic acids, hormones and vitamins (K_A.W8).</p> <p>W2: Knows the types and subtypes of lipids and proteins forming biological membranes (K_A.W9). Knows and understands the structure and functions of membrane channels and mechanisms associated with transport across biological membranes (K_A.W9).</p> <p>W3: Knows and understands the mechanisms of signal transduction between cells, as well as between the cell and extracellular matrix (K_A.W10).</p> <p>W4: Knows and understands metabolic processes and regulatory strategies at the molecular, cellular, organ and systemic levels (K_A.W11)</p> <p>–</p>
Learning outcomes - abilities	<p>Student:</p> <p>U1: Is able to use biochemical knowledge to assess physiological and pathological processes occurring in cells and at the level of the whole organism (K_A.U6).</p> <p>U2: Is able to detect and determine amino acids also using thin layer chromatography (K_A.U7).</p> <p>U3: Is able to detect, fractionate and determine proteins using chromatographic techniques and the biuret method (K_A.U7).</p> <p>U4: Is able to perform the characteristic reactions for simple sugars, disaccharides and polysaccharides (K_A.U7).</p> <p>U5: Can detect and determine cholesterol and vitamins in biological material (K_A.U7).</p> <p>U6: Can obtain RNA from yeasts cells (K_A.U7).</p> <p>U7: Is able to determine the concentration of nucleic acids and assess their purity after isolation (K_A.U7).</p> <p>U8: Is able to perform kinetic studies of invertase enzymatic reactions using the reaction of sugars with 3,5-dinitrosalicylic acid (DNS) (K_A.U8).</p>
Learning outcomes – social skills	<p>Student:</p> <p>K1: Is ready to draw conclusions from quantitative and qualitative determinations made during biochemistry classes (K8).</p>
Didactic methods	<p>Lecture:</p> <ul style="list-style-type: none"> <li>▪ informative lecture supported by multimedia techniques,</li> <li>▪ problem lecture with multimedia presentation,</li> </ul> <p>Laboratory tutorials:</p> <ul style="list-style-type: none"> <li>▪ laboratory method, observation, demonstration, exercise method</li> </ul>

Preliminary requirements	Students should have the basic knowledge in the field of <u>general chemistry, organic chemistry and biology</u> .
Brief course description	General purpose of course is to give basic information about properties and biomolecules biosynthesis (proteins, nucleic acids, carbohydrates, lipids); energy obtaining and storing, the basic regulations of cell metabolisms and molecular genetics.
Entire course description	Biochemistry is the basic science for all biological disciplines. The aim of teaching of this subject is to present basic knowledge about the structure of biomolecules and their metabolism, with particular regard to the following issues: 1) connection between proteins conformation and their biological activity; 2) obtaining energy in metabolic processes and its storing; 3) biosynthesis of macromolecules precursors; 4) metabolism integration; 5) basis of molecular genetics. During the laboratory tutorials students will get acquainted with the chemical structure of particular compounds, which build living organism, and their properties, as well as quantification and identification methods. Lectures will deliver knowledge about metabolism of these compounds, methods of regulation and metabolic profile of the most important organs.
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Rodwell VW, Bender D, Botham KM, Kennelly PJ, Weil PA. "Harpers Illustrated Biochemistry", 30th Edition, McGraw-Hell Mecical 2015 (or 31th Edition, 2018)</li> <li>2. Berg J.M., Tymoczko J.L.Stryer L "Biochemistry" W H Freeman &amp; Co, 2015</li> <li>3. Lehninger Principles of Biochemistry: International Edition; 2017</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Baynes J, Dominiczak M "Medical Biochemistry" 5th Edition, -2018</li> <li>2. Devlin T.M. "Textbook of Biochemistry with Cliniacl Ceorrelations" -Willey -2010</li> <li>3. Ferrier DR. Lippincott Illustrated Reviews: Biochemistry, 7th Edition, Wolters Kluwer 2017</li> <li>4. Lieberman M, Peet A. Marks' Basic Medical Biochemistry. A Clinical Approach, 5th Edition, Wolters Kluwer 2018</li> <li>5. Loose-leaf Version for Biochemistry: A Short Course. 2010</li> <li>6. Ronner P. Netter's Essential Biochemistry, Elsevier 2018</li> </ol>
Methods and criteria of evaluation	<p>Laboratory tutorials;</p> <ul style="list-style-type: none"> <li>- Written test: short test of written information at the beginning of the exercise W1-W4, U1-U8, K1: (0-4 points; pass threshold <math>\geq 60\%</math>)</li> <li>- Practical performance of tutorials: Active participation in tutorials :U1,-U8, K1, (0-2 points)</li> </ul> <p>Written tests: passing a grade based on a test (the written test consists of single-choice closed questions and open-ended</p>

	<p>questions) from knowledge gained during lectures, laboratories and exercises. To obtain a positive assessment, it is necessary to get 60% of points.</p> <table border="1"> <thead> <tr> <th>Number of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>29-30</td> <td>Excellent (5.0)</td> </tr> <tr> <td>27-28</td> <td>Very good (4.5)</td> </tr> <tr> <td>24-26</td> <td>Good (4.0)</td> </tr> <tr> <td>21-23</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>18-20</td> <td>Acceptable (3.0)</td> </tr> <tr> <td>0-17</td> <td>Fail (2.0)</td> </tr> </tbody> </table> <p>Exam: The final theoretical exam consists of 50 test questions (single choice answer) regarding the knowledge acquired during lectures, laboratories and exercises. Exam: (0 - 50 points; pass threshold <math>\geq 60\%</math>)</p> <table border="1"> <thead> <tr> <th>Number of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>47-50</td> <td>Excellent (5.0)</td> </tr> <tr> <td>43-46</td> <td>Very good (4.5)</td> </tr> <tr> <td>39-42</td> <td>Good (4.0)</td> </tr> <tr> <td>35-38</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>30-34</td> <td>Acceptable (3.0)</td> </tr> <tr> <td>0-29</td> <td>Fail (2.0)</td> </tr> </tbody> </table>	Number of points	Grade	29-30	Excellent (5.0)	27-28	Very good (4.5)	24-26	Good (4.0)	21-23	Satisfactory (3.5)	18-20	Acceptable (3.0)	0-17	Fail (2.0)	Number of points	Grade	47-50	Excellent (5.0)	43-46	Very good (4.5)	39-42	Good (4.0)	35-38	Satisfactory (3.5)	30-34	Acceptable (3.0)	0-29	Fail (2.0)
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Practical training as part of course	Not applicable according to the educational program																												

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	2 <sup>nd</sup> year, 2 <sup>st</sup> semester (spring)
Form of crediting a subject in the cycle	Lecture: credit Laboratory tutorial: tests
Form(s) and number of course hours as well as the form of crediting	Lecture: 30 hours, Laboratory tutorial: 65 hours Final exam combines lectures and tutorials material.
Course coordinator(s)	Dr hab. Marek Foksiński, prof. UMK
Subject Teachers	Dr hab. Karol Białkowski, prof. UMK Dr. hab. Tomasz Dziaman, prof. UMK Dr. hab. Agnieszka Siomek-Górecka, prof. UMK
Course form (character)	Obligatory
Limit of places available in each group	<b>Laboratories:</b> groups of 8 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	<b>Lecture:</b> W1, W2, W3, W4, U1, K1 <b>Laboratory tutorial:</b> W1, W2, W3, W4, U1-U8, K1

<p>Methods and criteria of the evaluation for the given course form</p>	<p>The basis for passing the General Biochemistry subject is compliance with the principles set out in the Didactic Regulations of the Department and Clinical Biochemistry Department.</p> <p>Laboratory tutorials;</p> <ul style="list-style-type: none"> <li>- Written short test W1-W4</li> <li>- Practical performance of tutorials: Active participation in tutorials: U1,-U8, K1</li> <li>- Attendance at laboratories - any absence must be justified within 14 days.</li> </ul> <p><b>Tests:</b> passing a grade based on a test (the written test consists of single-choice closed questions and open-ended questions) from knowledge gained during lectures, laboratories and exercises. To obtain a positive assessment, it is necessary to get 60% of points.</p> <p>Test: (0 - 30 points; pass threshold <math>\geq 60\%</math>)</p> <table border="1"> <thead> <tr> <th>Number of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>29-30</td> <td>Excellent (5.0)</td> </tr> <tr> <td>27-28</td> <td>Very good (4.5)</td> </tr> <tr> <td>24-26</td> <td>Good (4.0)</td> </tr> <tr> <td>21-23</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>18-20</td> <td>Acceptable (3.0)</td> </tr> <tr> <td>0-17</td> <td>Fail (2.0)</td> </tr> </tbody> </table> <p>Exam:</p> <p>The final theoretical exam consists of 50 test questions (single choice answer) regarding the knowledge acquired during lectures, laboratories and exercises. The student scores one point for every correct answer. You need 30 points (60%) to get a positive grade. Not obtaining the required number of points is tantamount to obtaining an unsatisfactory grade and the need to pass a retake exam.</p> <p>Exam: (0 - 50 points; pass threshold <math>\geq 60\%</math>)</p> <table border="1"> <thead> <tr> <th>Number of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>47-50</td> <td>Excellent (5.0)</td> </tr> <tr> <td>43-46</td> <td>Very good (4.5)</td> </tr> <tr> <td>39-42</td> <td>Good (4.0)</td> </tr> <tr> <td>35-38</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>30-34</td> <td>Acceptable (3.0)</td> </tr> <tr> <td>0-29</td> <td>Fail (2.0)</td> </tr> </tbody> </table> <p>Students must obtain positive grade form all 3 tests, and pass final exam.</p>	Number of points	Grade	29-30	Excellent (5.0)	27-28	Very good (4.5)	24-26	Good (4.0)	21-23	Satisfactory (3.5)	18-20	Acceptable (3.0)	0-17	Fail (2.0)	Number of points	Grade	47-50	Excellent (5.0)	43-46	Very good (4.5)	39-42	Good (4.0)	35-38	Satisfactory (3.5)	30-34	Acceptable (3.0)	0-29	Fail (2.0)
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<p>List of topics</p>	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. The basis of life: the structure and classification of amino acids, peptides and proteins.</li> <li>2. The whole truth about sugar: carbohydrates of physiological significance - structure and biological role.</li> <li>3. Fat is good: simple and complex lipids, steroids, biological membranes.</li> <li>4. Vitamins: their sources, functions, the body's need.</li> </ol>																												

5. The most important molecules in nature: nucleotides and nucleic acids, organization of genetic material.
6. Basic enzymological concepts and catalytic functions of enzymes in the light of their chemical structure.
7. Review of methods for monitoring the progress of enzymatic reaction and determination of enzymatic activity.
8. Factors modulating enzymatic activity.
9. Kinetics of enzymatic reactions.
10. Inhibitors and activators of enzymatic activity.
11. Introduction to cellular metabolism.
12. Carbohydrate metabolism: glycolysis, gluconeogenesis, citric acid cycle.
13. Oxidative phosphorylation, phosphogluconate pathway/pentose phosphate pathway.
14. Glycogen metabolism.
15. Fatty acid metabolism.
16. Metabolism of purines and pyrimidines.
17. Regulatory strategies and signal transduction.
18. Regulation of metabolism.
19. Integration of metabolism.
20. Metabolomics and new techniques used in metabolism studies.
21. Genome and its structure.
22. From genome to transcriptome - stages of RNA synthesis.
23. RNA maturation. Types and functions of RNA in a cell.
24. Genetic code and protein biosynthesis.
25. Regulation of gene expression and epigenetic mechanisms.
26. Genome replication and the way of its regulation.
27. Recombination as a cause of genetic diversity.
28. Types of genetic mutations and ways to repair them.
29. Causes of genetic and cancer diseases.
30. Techniques used in modern genetic engineering and genomic research.

Laboratories:

1. Introductory exercise.  
To familiarize students with health and safety regulations. Learning to correct use devices in the biochemistry laboratory, usage of dispensers and automatic pipettes. To familiarize students with the obligatory scope of material in the theoretical preparation for classes in general biochemistry and methods to check the level of acquisition of the required knowledge.
2. Amino acids - structure, properties and functions.  
Common reactions for all amino acids. Specific reactions with selected amino acids. Thin layer chromatography (TLC) of amino acids on silica gel.
3. Proteins - structure, properties and functions.  
Preparation: methods of protein separation. Protein structure. Chemical and biological properties of proteins. Amphoteric properties of proteins. Protein denaturation. Characteristic reactions of proteins.
4. Methods of protein separation and quantification.



	<p>Gel filtration (dextrin blue 2000, myoglobin, potassium chromate). Application of gel filtration for fractionation and purification of mixtures of substances of different molecular weight. Quantitative determination of protein by the biuret method. Salting out of protein (salt-induced precipitation) using ammonium sulfate.</p> <p>5. Simple sugars and disaccharides - structure, properties and functions. Characteristic reactions to simple sugars: Reduction tests. Color reactions with strong acids. Alcoholic fermentation. Obtaining of osazones from monosaccharides and disaccharides.</p> <p>6. Disaccharides and polysaccharides - structure, properties and functions. Reactions of reducing and non-reducing disaccharides. Hydrolysis of disaccharides. Reaction of starch with iodine. Salting out of starch. Reducing properties and enzymatic hydrolysis of starch. Solubility and hydrolysis of cellulose.</p> <p>7. Kinetics of enzymatic reactions (part I). Determination of reducing sugars with 3,5-dinitrosalicylic acid (DNS) and application of this method to determine invertase activity - plotting a standard curve. Study of the effect of different invertase concentrations on sucrose hydrolysis rate.</p> <p>8. Kinetics of enzymatic reactions (part II). Determination of the initial reaction rates. Determination of the maximum reaction rate (<math>V_{max}</math>). Determination of the Michaelis constant (<math>K_m</math>) for the sucrose hydrolysis catalyzed by invertase.</p> <p>9. Principles of isolation of nucleic acids and nucleoproteins. Isolation of RNA from yeast.</p> <p>10. Nucleic acids - structure, properties and functions. Quantitative determination of yeast RNA by colorimetry with orcin. Chemical analysis of nucleic acid preparations. Nucleic acid spectrophotometry - absorption spectra, determination of purity of nucleic acid preparations.</p> <p>11. Lipids - structure, properties and functions. Detection of glycerol - acrolein test. Saponification of fats. Preparation of insoluble soap. Soap's salting out. Secretion of free fatty acids. Solubility of fats. Aldehydic rancidity - Kreis test. Cholesterol - structure, properties and functions. Cholesterol detection.</p> <p>12. Completion of the course - analysis of obtained grades.</p>
Didactic methods	The same as in part A
References	The same as in part A

## Biology and genetics

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	Biology and genetics (Biologia i genetyka)
Unit offering the subject	Faculty of Medicine Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-F1-BGEN-J
ERASMUS code	
ISCED code	(0916) (Pharmacy)
Number of ECTS points	5
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>– lecture participation – 21 hours,</li> <li>– lab participation – 33 hours,</li> <li>– additional opportunity to consult with the teachers – 10 hours,</li> <li>– conduction of course credit – 2 hours.</li> </ul> <p>The workload associated with classes requiring direct participation of academic teachers is <b>66 hours</b>, which corresponds to <b>2.64 ECTS points</b>.</p> <p>2. Balance of the student workload:</p> <ul style="list-style-type: none"> <li>– lecture participation – 21 hours,</li> <li>– lecture participation – 21 hours,</li> <li>– lab participation – 33 hours,</li> <li>– additional opportunity to consult with the teachers – 10 hours,</li> <li>– preparation and completion of notes – 20 hours,</li> <li>– obligatory material revision – 20 hours,</li> <li>– preparation of report (presentation): 10 hours.</li> </ul> <p>The total student workload is <b>126 hours</b>, which corresponds to <b>5.00 ECTS points</b>.</p> <p>3. Workload related to scientific research:</p> <ul style="list-style-type: none"> <li>– reading of the indicated scientific literature – 10 hours,</li> </ul>

	<ul style="list-style-type: none"> <li>– participation in lectures (including methods in scientific research, results of the research, articles) – 7 hours,</li> <li>– research and scientific consultations – 3 hours,</li> <li>– participation in classes covered by scientific activity (including methods in scientific research, results of the research, articles) – 25 hours,</li> <li>– preparation for classes covered by scientific activity: 10 hours,</li> <li>– preparation to pass in the area of research and scientific aspects for the subject being implemented – 10 hours.</li> </ul> <p>The total amount of student work involved in the research being conducted is <b>65 hours</b>, which corresponds to <b>2.60 ECTS</b> points.</p> <p>4. Time required for the preparation and participation in the evaluating process:</p> <ul style="list-style-type: none"> <li>– preparation for colloquiums – 20 hours,</li> <li>– preparation for the exam – 10 hours,</li> <li>– presence on the exam – 2 hours.</li> </ul> <p><b>32 hours</b> in total (<b>1.28 ECTS</b>).</p> <p>5. Time required for completion of compulsory practical training – not applicable.</p>
Learning outcomes – knowledge	<p>A student knows and understands:</p> <p>W1: the organization of living matter and the interaction of the parasite-host system – K_A.W1</p> <p>W2: the basic concepts of classical, population and molecular genetics – K_A.W2</p> <p>W3: genetic aspects of cell differentiation – K_A.W2</p> <p>W4: monogenic and polygenic inheritance of human traits – K_A.W3</p> <p>W5: genetic polymorphism of human population – K_A.W3</p> <p>W6: the structure and biological functions of nucleic acids – K_A.W2</p> <p>W7: molecular mechanisms of intra- and extracellular signal transduction – K_A.W2</p> <p>W8: functioning of the immune system and mechanisms that control it – K_A.W1</p> <p>W9: recombination and DNA mutation processes which are the basis of individual variability – K_A.W2</p>
Learning outcomes – abilities	<p>A student is able to:</p> <p>U1: name correctly and characterize the relationships between organisms and between organisms and the environment – K_A.U1</p> <p>U2: identify parasites on the basis of morphological features as well as physiological and breeding properties – K_A.U1</p> <p>U3: use knowledge on the genetic basis of organisms differentiation and mechanisms of inheritance to characterize inter-individual variability – K_A.U1</p> <p>U4: assess the human genetic predispositions to the development of diseases – K_A.U2</p> <p>U5: characterize the molecular mechanisms of pathogenic processes – K_A.U2</p>

	U6: interpret correctly the pathophysiology of genetic and parasitic diseases – K A.U2
Learning outcomes – social skills	A student demonstrates: K1: awareness of the social consequences and limitations of the disease and the need to promote health-related behavior – K6 K2: the habit of using the latest IT techniques freely to obtain the necessary information – K7 K3: that draws conclusions correctly based on his own experience – K8 K4: work in a group; it cooperates and interprets and performs its own task correctly – K10
Didactic methods	Lectures: expository teaching methods – informative lecture (traditional) with a multimedia presentation Labs: discovery teaching methods – practical exercises, work with a book, didactic discussion Seminars: not applicable
Preliminary requirements	A student that starts education within “Biology and genetics” course should have knowledge of invertebrate biology, cytology and the basic concepts of biochemistry and genetics at the high school level (advanced level of biology during matriculation exam).
Brief course description	Classes of “Biology and genetics” subject in the field of Pharmacy are carried out in the first semester and include 21 hours of lectures and 33 hours of laboratories. “Biology and genetics” course covers issues that allow to understand the main problems of 21st century medicine and to master the theoretical foundations for further medical study. The main goal of teaching “Biology and genetics” in the field of Pharmacy is to prepare students for their future profession. Knowledge of the basic concepts of the molecular functioning of the organism, genetics, molecular biology and the action of antiparasitic drugs is essential in everyday professional practice. “Biology and genetics” subject together with other basic sciences constitute the foundation which enables the student building its further knowledge and improve practical skills.
Entire course description	Lectures of “Biology and genetics” subject are designed to familiarize students with the basic laws of heredity (Mendel’s laws, chromosomal theory of inheritance, gene cooperation: epistasis, pleiotropy, complementation), inheritance of quantitative and qualitative traits, the concepts of transgression and heritability, as well as with selected defects and chronic diseases with multifactorial etiology. The student get the knowledge about environmental factors and epidemiology of birth defects, dysmorphology and its importance in the diagnosis of birth defects, types of teratogens and mechanisms of their action, as well as classification and prevention of malformations. Definitions and theories of aging are presented: wear and tear theory, accumulative waste theory, cross-linking theory, Hayflick limit theory, error catastrophe theory, telomere theory, somatic mutation theory, mitochondrial decline theory, free radical theory and immunological theory. Lectures of “Biology and genetics”

subject also allow to learn students the basic issues of developmental genetics including concepts of embryology and organogenesis, the action of epigenetic mechanisms, homeotic genes and mechanisms of genetic sex determination. Moreover, lectures of “Biology and genetics” course are designed to familiarize students with the definitions of parasitism, as well as present issues of biocenotic interactions, types of parasites and hosts, evolution of the parasite-host system, the concepts of active and passive invasion and invasive disease. General morphological and anatomical features of protozoa, flatworms, nematodes and arthropods, as well as development of flatworms, nematodes and arthropods are also discussed. The lectures will familiarize students with crustaceans, insects and arachnids of allergenic significance, as well as food product mites and house dust mites. The general principles of testing the material for the presence of parasites will be presented. The lectures aim to familiarize students with the direct and indirect methods of parasite tests, coproscopic methods, blood tests, immunological techniques and parasitological diagnostics using molecular biology methods. They allow to develop the ability to interpret test results correctly. Students will also learn about the factors that affect the spread of parasites and the most common parasitosis.

Labs of “Biology and genetics” subject are partly related to the issues discussed in the lectures. Laboratory classes are designed to familiarize students with program content such as the chemical composition of nucleic acids, the model of DNA structure according to Watson and Crick, the physicochemical properties of nucleic acids, alternative DNA structures, the structure and chemical composition of chromatin, DNA replication in Pro- and Eukaryote. During labs students also get the knowledge about the structure, functions and types of RNA, the genetic code, transcription mechanisms and post-transcriptional processes in pro- and eukaryotic cells, mechanisms and stages of protein biosynthesis, and regulation of gene expression in Prokaryote and Eukaryote. The labs are also designed to familiarize students with the distribution of variability, types of recombination and mutations, mutagenic factors, mechanisms of DNA repair, syndromes associated with disorders of DNA repair, tests for monitoring the effects of environmental pollution and the basic concepts of genetic counseling. Moreover, students learn to diagnose the phenotype, accept initial diagnosis and construct and analyze lineage. The laboratory classes present the basic concepts of monogenic inheritance (classical genetics) regarding normal features and diseases: autosomal and sex-linked inheritance, recessive and dominant. Blood groups are also inherited according to Mendel’s principles – antigens and antibodies of the ABO blood group system, the phenomenon of the Bombay blood group, the Rh blood group system, the serological conflict in the Rh blood group system and other blood group systems are discussed. The definitions of karyotype and karyogram, methods of chromosome testing, the phenomenon of genomic imprinting and the formation and importance of

	<p>uniparental disomy will be discussed. The labs also aim to familiarize students with cytogenetic diagnostic techniques. The criteria for distinguishing gender, sex chromosomes, Lyon theory and syndromes related to the change in the number of heterochromosomes will be discussed. In addition, students acquire the ability to stain oral epithelial cells for the presence of Barr bodies. Laboratories of “Biology and genetics” subject have also practical nature (microscopic observation of selected parasites), as the goal is to familiarize students with the techniques of microscopy and diagnosis of parasites in permanent mounts. Biology, life cycles and pathogenicity of selected protozoa are discussed: <i>Trichomonas vaginalis</i>, <i>Entamoeba histolytica</i>, <i>Entamoeba coli</i>, <i>Giardia lamblia</i>, <i>Balantidium coli</i>, <i>Sarcosystic sp.</i>, <i>Trypanosoma gambiense</i>, <i>Trypanosoma cruzi</i>, <i>Plasmodium vivax</i>, <i>Plasmodium falciparum</i>, <i>Toxoplasma gondii</i>, <i>Naegleria fowleri</i>, <i>Leishmania donovani</i>, <i>Pneumocystis carinii</i>. Students will also learn about biology, life cycles and pathogenicity of selected parasitic flukes: <i>Fasciola hepatica</i>, <i>Schistosoma haematobium</i>, <i>Schistosoma japonicum</i>, <i>Schistosoma mansoni</i>, <i>Clonorchis sinensis</i>, <i>Paragonimus westermani</i>, selected tapeworms: <i>Diphyllobothrium latum</i>, <i>Taenia saginata</i>, <i>Taenia solium</i>, <i>Echinococcus granulosus</i>, and selected nematodes: <i>Enterobius vermicularis</i>, <i>Ascaris lumbricoides</i>, <i>Trichuris trichiura</i>, <i>Toxocara canis</i>, <i>Toxocara cati</i>, <i>Trichinella spiralis</i>, <i>Wuchereria bancrofti</i>, <i>Oncocerca volvulus</i>, <i>Loa loa</i>. There is also discussed biology of selected parasitic arthropods: <i>Sarcoptes scabiei</i>, <i>Ixodes ricinus</i>, <i>Argas reflexus</i>, <i>Blatella germanica</i>, <i>Pediculus humanus</i>, <i>Pthirus pubis</i>, <i>Cimex lectularius</i>, <i>Anopheles maculipennis</i>, <i>Culex pipiens</i>, <i>Musca domestica</i>, <i>Glossina palpalis</i>, <i>Pulex irritans</i>.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Tobias E.S., Connor M., Ferguson-Smith M. Essential medical genetics. 6<sup>th</sup> edition. Wiley-Blackwell, 2011.</li> <li>2. Parasitology for medical students (2<sup>nd</sup> edition). Buczek A. (editor), Koliber Lublin 2007</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Epstein R.J. Human molecular biology: an introduction to the molecular basis of health and disease. Cambridge University Press, Cambridge, 2003.</li> <li>2. Fuller G.M., Shields D. Molecular Basis of Medical Cell Biology. Appleton &amp; Lange, 1998.</li> <li>3. Goodman S.R. Medical Cell Biology. Academic Press, 2007.</li> <li>4. Chomicz L. Guide to Medical Parasitology. (New compedium for medical students). Medical University of Warsaw, 2006</li> <li>5. Ridley J.W – Parasitology for medical and clinical laboratory professionals, Delmar Cengage Learning, 2012.</li> </ol>
Methods and criteria of evaluation	Colloquium: K1, K2, K4, K5, K6, K7, K8, K9, A1, A2, A3, A4, A5, A6, S2

	Exam: W1-W9, U1-U6, K2, K3 Report (presentation to be made at home): W1, W6, W7, W9, K2, K3, K4 Focused observation of the student's activity while performing practical tasks: U1, U4, U5, U6 Extended observation: K1-K4
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	I year, semester I (fall)
Form of crediting a subject in the cycle	Exam
Form(s) and number of course hours as well as the form of crediting	Lectures: 21 hours – ungraded credit Labs: 33 godzin – graded credit
Course coordinator(s)	Dr hab. Celestyna Mila-Kierzenkowska
Subject Teachers	Dr hab. Celestyna Mila-Kierzenkowska, dr hab. Karolina Szewczyk-Golec, dr Paweł Sutkowy, mgr Roland Wesołowski, mgr Marta Pawłowska
Course form (character)	Obligatory
Limit of places available in each group	Lectures: students of I year, semester I Labs: groups up to 12 individuals
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	not applicable
Subject website	not applicable
Learning outcomes determined for the given course form	Lectures: W1-W7, K1, K2, K3 Labs: W1-W9, U1-U6, K1-K4
Methods and criteria of the evaluation for the given course form	Participation in lectures and labs is obligatory. A student who due to legitimate reasons skips a lesson, is obliged to make up for the missed class after consultation with a teacher of the given group. In legitimate cases of skipping two or more classes, it is possible to make up them with the consent of the head of didactic process. Lectures: assessment criteria: written exam in the form of a test. Labs: assessment criteria: passing two written colloquiums (test), passing a report (two presentations on selected issues on medical genetics and parasitology made by the student at home), passing practical tasks during classes (assessment of drawings of parasites made during microscopic examination of the mounts).

	<p>In the case of written tests (colloquiums and exam) the obtained points are converted into grade according to the following scale:</p> <p>The following criteria are used to assess the learning outcomes achieved by a student in the case of oral tests:          Very good: the student mastered the knowledge of all the material and possessed extracurricular information, presents its knowledge in a logical and systematic way, is able to use it in practice.          Good plus: the student mastered issues of all the material of teaching programme, presents its knowledge in a logical and coherent manner.          Good: the student mastered the knowledge of most of the material, supported by an academic teacher can formulate accurate conclusions, presents its knowledge in a logical way.          Satisfactory plus: the student knows the basic issues and mastered the minimum of curriculum, understands the questions asked to its, logically presents its knowledge.          Satisfactory: the student mastered the issues contained in the teaching programme, understands the questions but answers</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Very good</td> </tr> <tr> <td>84-91%</td> <td>Good plus</td> </tr> <tr> <td>76-83%</td> <td>Good</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory plus</td> </tr> <tr> <td>60-67%</td> <td>Satisfactory</td> </tr> <tr> <td>0-59%</td> <td>Unsatisfactory</td> </tr> </tbody> </table> <p>inconsistently in a descriptive manner, confuses the correct terminology, cannot practically apply the acquired knowledge.          Unsatisfactory: the student did not mastered the minimum of curriculum, does not understand questions, gives off-topic answers, does not use basic vocabulary correctly.</p>	Percentage of points	Grade	92-100%	Very good	84-91%	Good plus	76-83%	Good	68-75%	Satisfactory plus	60-67%	Satisfactory	0-59%	Unsatisfactory
Percentage of points	Grade														
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84-91%	Good plus														
76-83%	Good														
68-75%	Satisfactory plus														
60-67%	Satisfactory														
0-59%	Unsatisfactory														
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Classical genetics.</li> <li>2. Multifactorial inheritance.</li> <li>3. Genetic aspects of aging.</li> <li>4. Teratogenic factors, developmental defects.</li> <li>5. Developmental genetics.</li> <li>6. Rules for writing a karyotype.</li> <li>7. Parasitism as an ecological phenomenon.</li> <li>8. Protozoa, flatworms, nematodes, arthropods – construction and development.</li> <li>9. Allergogenic arthropods.</li> <li>10. Foundations of parasitology diagnostics.</li> <li>11. Epidemiology of parasitic infections.</li> </ol> <p>Labs:</p> <ol style="list-style-type: none"> <li>1. Structure and function of nucleic acids. Gene expression in Pro- and Eukaryote and regulation of gene function.</li> <li>2. Variability and mutations. Genetic Counseling.</li> <li>3. Monogenic inheritance in humans. Blood groups.</li> </ol>														



	<p>4. Correct human karyotype. Chromosome aberration syndromes.</p> <p>5. Checking self-study effects. Presentations of the latest research in the field of medical genetics.</p> <p>6. Protozoology part 1. Protozoa of the genitourinary and digestive system.</p> <p>7. Protozoology part 2. Protozoa of blood and tissues.</p> <p>8. Platyhelminthes. Parasites of digestive and blood systems.</p> <p>9. Nematodes. Parasites of digestive and blood systems.</p> <p>10. Medical arachnoentomology.</p> <p>11. Checking self-study effects. Presentations of the latest research in field of parasitology.</p>
Didactic methods	Identical as in part A
References	Identical as in part A

## Molecular biology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	Molecular biology (Biologia molekularna)
Unit offering the subject	Faculty of Medicine Institute of Forensic Medicine Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	3
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. The workload related to activities requiring the direct participation of academic teachers is:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 10 hours,</li> <li>– participation in seminars: 20 hours,</li> <li>– additional opportunity to consult with the lecturers: 2 hours,</li> <li>– course completion: 2 hours.</li> </ul>

	<p>The workload related to activities that require direct participation of academic teachers is <b>34 hours</b>, which corresponds to <b>1.36 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 10 hours,</li> <li>– participation in seminars: 20 hours,</li> <li>– additional opportunity to consult with tutors: 2 hours.</li> <li>– preparing and completing notes: 3 hours,</li> <li>– collecting materials and preparing for classes: 20 hours</li> <li>– repetition of material required: 5 hours,</li> <li>– preparation for the exam: 15 hours,</li> </ul> <p>The total student workload is <b>75 hours</b>, which corresponds to <b>3.00 ECTS credits</b>.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– participation in lectures (including research methodology, research results, studies): 7 hours,</li> <li>– research and scientific consultations: 2 hours</li> <li>– participation in classes covered by scientific activity (including research methodology, research results, studies): 20 hours,</li> <li>– preparation for classes covered by scientific activities: 5 hours,</li> <li>– preparation to pass in the field of research and development for the subject: 20 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>54 hours</b>, which corresponds to <b>2.16 ECTS points</b>.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>– preparation for classes + required repetition of material + preparation for passing and passing - <math>5 + 5 + 20 = 30</math> <b>hours</b> (in total <b>1.2 ECTS point</b>).</li> </ul> <p>5. Time required to undergo compulsory practice: not applicable</p>
Learning outcomes – knowledge	<p>W1: Knows the molecular aspects of the cell cycle - proliferation, apoptosis and tumor transformation - K_A.W14  W2: Knows the problems of recombination and DNA cloning - K_A.W15,  W3: Knows the methods of genome testing and the principles of hybridization and polymerase chain reaction (PCR) - K_A.W16, K_A.W17</p>
Learning outcomes - abilities	<p>U1: Plans research using the isolation, determination and amplification of nucleic acids and modern techniques of genome research - K_A.U10  U2: Plans research using molecular biology techniques in pharmaceutical biotechnology, gene therapy and laboratory diagnostics - K_A.U10</p>
Learning outcomes – social skills	<p>K1: Has a habit of using objective sources of information - K7</p>
Didactic methods	<p>Lecture</p> <ul style="list-style-type: none"> <li>▪ informative lecture (conventional),</li> </ul>

	<ul style="list-style-type: none"> <li>▪ problem lecture,</li> <li>▪ multimedia presentation.</li> </ul> <p>Seminars:</p> <ul style="list-style-type: none"> <li>▪ seeking didactic methods</li> <li>▪ practical exercises,</li> <li>▪ didactic discussion</li> </ul>
Preliminary requirements	To undertake the described subject it is necessary to have prior biology and genetics knowledge. In addition, students should have basic knowledge and skills acquired in the framework of subjects: biology, genetics and biochemistry.
Brief course description	The aim of the course is to familiarize students with the basic knowledge of the structure of the human genome and methods of nucleic acid analysis. The program includes lectures and laboratory tutorials to familiarize students with the basics of classical, population and molecular genetics.
Entire course description	<p>The aim of the course is to familiarize students with the basic knowledge of molecular biology in the context of application in modern medical diagnostics. The lecture program covers issues related to the cell structure and human genome, basic classical, population and molecular genetics. Extraction, quantification of DNA and analysis method such as PCR, hybridization, sequencing. In addition, students acquire knowledge about vectors and enzymes used as molecular biology tools. They will also learn about the possibilities of using molecular biology in the diagnosis of genetic and infectious diseases. They learn strategies and perspectives for genomic analysis and online databases.</p> <ul style="list-style-type: none"> <li>– The laboratories aim to familiarize students with the methods of collecting material for genetic testing, extraction of DNA and assessment of DNA concentration and quality, as well as sequence analysis using various molecular biology techniques. Examples of the use of molecular biology methods in diagnostics, clinical genetics and pharmacogenetics are discussed.</li> </ul>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Brown T A: Genomes 3. BIOS Scientific Publisher, 2006.</li> <li>2. Brown T A: Gene Cloning and DNA Analysis: An Introduction. Wiley-Blackwell, 2010</li> <li>3. Sambrook J, et al.: Molecular cloning: a laboratory manual. Cold Spring Harbor Laboratory 4rd ed., 2012</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Alberts B et al.: Molecular biology of the cell. 5<sup>th</sup> ed., Garland Publishing 2008</li> <li>2. Strachan W: Human molecular genetics 4<sup>th</sup> ed. BIOS Scientific Publisher, 2010</li> </ol>
Methods and criteria of evaluation	The condition of passing the course is: attendance (obligatory attendance at laboratories, two absences are the basis for failing to pass this course) and active participation in didactic classes.

	<p>Laboratory tutorials: assessment criteria: passing two written tests (test), passing a report, passing practical tasks during exercises.</p> <p>Lectures: written exam in the form of a test (single-choice closed questions). The condition of taking the exam is passing laboratories.</p> <p>Exam: passing the exam requires 60% of the points.</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

### C. Course description in the didactic cycle

Space name	Comment				
Didactic cycle	4 <sup>st</sup> year, 7 <sup>st</sup> semester (fall)				
Form of crediting a subject in the cycle	Lecture: exam Seminars: credit				
Form(s) and number of course hours as well as the form of crediting	Lecture: 10 hours – exam Seminars : 20 hours – credit				
Course coordinator(s)	Prof. Dr hab. Tomasz Grzybowski				
Subject Teachers	Lecture: Prof. Dr hab. Tomasz Grzybowski Seminars: Dr hab. Katarzyna Skonieczna, prof. UMK Dr Katarzyna Linkowska				
Course form (character)	Obligatory				
Limit of places available in each group	Lectures - 4 <sup>th</sup> year, 7 <sup>th</sup> semester (fall) Seminars - 4 <sup>th</sup> year, 7 <sup>th</sup> semester (fall) groups of 24 students				
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń				
Number of hours of classes conducted using e-learning methods					
Subject website					
Learning outcomes determined for the given course form	Lectures: W1-W3, U1, U2, K1 Seminars: W1-W3, U1, U2, K1;				
Methods and criteria of the evaluation for the given course form	<p>The condition of passing the course is: attendance (obligatory attendance at laboratories, two absences are the basis for failing to pass this course) and active participation in didactic classes.</p> <ul style="list-style-type: none"> <li>– Laboratory tutorials: assessment criteria: passing two written tests (test), passing a report, passing practical tasks during exercises.</li> </ul> <p>Lectures: written exam in the form of a test (single-choice closed questions). The condition of taking the exam is passing laboratories.</p> <p>Exam: passing the exam requires 60% of the points Points obtained are converted into grades on the following scale:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Grade</td> <td style="width: 50%;">Percentage of points</td> </tr> <tr> <td>Excellent</td> <td>92-100%</td> </tr> </table>	Grade	Percentage of points	Excellent	92-100%
Grade	Percentage of points				
Excellent	92-100%				

	Very good Good Satisfactory Acceptable Fail	84-91% 76-83% 68-75% 60-67% 0-59%
List of topics	Lectures: 1. Cell structure and methods of studying cellular structures. 2. Protein analysis methods. 3. Structure of the human genome. 4. Extraction and quantification of DNA. 5. Enzymes - basic tools of molecular biology. 6. Vectors in molecular biology. 7. PCR and its applications. 8. Hybridization analysis of nucleic acids. 9. DNA sequencing. 10. Human genetic diseases. 11. Cancer against cell cycle disorders. 12. Molecular biology in the diagnosis of genetic diseases. 13. Molecular biology in the diagnosis of infectious diseases. 14. Genomes analysis methods. 15. Databases in molecular biology. Tutorials: 1. Extraction, purification and quantification of DNA 2. Molecular diagnostics of <i>Helicobacter pylori</i> . 3. Detection of genetic resistance to HIV	
Didactic methods	The same as in part A	
References	The same as in part A	

## Botany

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	Botany (Botanika)
Unit offering the subject	Faculty of Pharmacy, Department of Pharmaceutical Botany and Pharmacognosy, Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	9
Form of crediting	Exam
Language of instruction	English

Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>– lectures participation – 30 hours,</li> <li>– laboratories participation – 45 hours,</li> <li>– tutorials participation – 15 hours,</li> <li>– outdoor classes – 10 hours,</li> <li>– consultations – 20 hours,</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>120 hours</b>, which corresponds to <b>4.8 ECTS point</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– student participation in lectures: 30 hours,</li> <li>– student participation in laboratories: 45 hours,</li> <li>– student participation in classes: 15 hours,</li> <li>– student participation in field classes: 10 hours,</li> <li>– preparing a herbarium: 18 hours,</li> <li>– preparation for current classes, repetition of material, supplementing notes: 35 hours,</li> <li>– preparation for tests: 15 hours,</li> <li>– preparation for the exam: 40 hours,</li> <li>– reading the indicated literature: 15 hours,</li> <li>– consultations with the lecturers: 2 hours.</li> </ul> <p>The total student workload is <b>225 hours</b>, which corresponds to <b>9.00 ECTS points</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– reading the indicated literature – 10 hours,</li> <li>– participation in lectures (including research results and scientific studies) – 20 hours,</li> <li>– participation in scientific consultations – 5 hours,</li> <li>– participation in laboratories including research results and scientific studies) – 30 hours,</li> <li>– preparation for laboratories including scientific results – 5 hours,</li> <li>– preparation a herbarium using scientific literature – 5 hours,</li> <li>– preparation for final exam including research results and scientific studies in the field of botany – 30 hours.</li> </ul> <p>A total student workload related to the conducted research is <b>105 hours</b>, which corresponds to <b>4.20 ECTS point</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- test preparation – 15 hours,</li> <li>- exam preparation – 40 hours.</li> </ul>

	<p>Total time required for the preparation and participation in evaluating process: <b>55 hours</b>, which corresponds to <b>2.20 ECTS points</b>.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Is able to characterize the morphological and anatomical structure of fungi, lichens, bryophytes, ferns and seed plants supplying medicinal raw materials –K_A.W24</p> <p>W2: Has basic knowledge of pharmacopoeial and non-pharmacopoeial plant materials – K_A.W24</p> <p>W3: Knows the basics of systematics of plants and fungi and the rules for using keys to determine vascular plants – K_A.W25</p> <p>W4: Knows the rules for making a herbarium, including labeling of herbarium plants – K_A.W26</p>
Learning outcomes - abilities	<p>U1: Identifies and characterizes plant cell structures and plant tissues – K_A.U16</p> <p>U2: Identifies and characterizes the morphological and anatomical structure of plant organs – K_A.U16</p> <p>U3: Recognizes selected families, types and species of plants with particular emphasis on medicinal taxa based on morphological features – K_A.U17</p>
Learning outcomes – social skills	<p>K1: Develops teamwork skills – K3</p> <p>K2: Evaluates the value of various sources of information, preferring objective, reliable and consistent with the state of modern knowledge – K7</p> <p>K3: Draws conclusions from his own observations of plants and measurements of their characteristics – K8</p>
Didactic methods	<p>Lectures: expository teaching methods - informative lecture (conventional), multimedia presentation</p> <p>Laboratories: exploratory teaching methods – practical, classic problem-solving, laboratory, round table</p> <p>Tutorials: multimedia presentation, problem methods</p> <p>Outdoor classes: observation of plants in the Garden of Medicinal and Cosmetic Plants CM Nicolaus Copernicus University and in the Botanical Garden LPKiW in Myślęcinek</p>
Preliminary requirements	A student starting education in the subject of Botany should have basic knowledge in the field of biology.
Brief course description	<p>Botany includes knowledge of cytology, histology, organography and systematics of medicinal plants. The Botany course is realized in lectures, laboratories, tutorials and outdoor classes.</p> <p>Issues related to the anatomical and morphological structure of plants are used at further stages of studies, during the teaching of pharmacognosy and chemical technology of pharmaceuticals.</p>

Entire course description	<p>Lectures in Botany familiarize students with the scope and departments of botany, the importance of plants, plant cell structure, diagnostic elements of plant cells and tissues, basic terms in organography, ecological plant groups, classification of bacteria, cyanobacteria, fungi, lichens, algae, Bryophyta (mosses, liverworts), Pteridophyta (club mosses, horsetails, ferns), gymnosperms and angiosperms (including exotic medicinal and utility plants), and the basics of plant biotechnology, protection of natural resources of plants and fungi.</p> <p>The laboratories include mainly practical issues in the field of structure and function of plant cells and plant tissues, anatomical and morphological structure of vegetative organs, morphological structure of generative organs, as well as classification and morphological features of fungi, lichens, mosses, ferns and seed plants.</p> <p>During the tutorials the student mainly obtains theoretical knowledge about the structure of plant cells and tissues, the anatomical structure of vegetative organs and the morphological structure of vegetative and generative organs.</p> <p>Outdoor classes familiarize students with the morphology and classification of selected families within vascular plants, as well as with the morphological diagnostic features of major medicinal plants.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Khan A.S., Flowering Plants: Structure and Industrial Products. Wiley Chichester, West Sussex UK, 2017.</li> <li>2. Trivedi P. C., Plant morphology and anatomy. Univeristy of Kota, 2019.</li> <li>3. Buvat R., Ontogeny, Cell Differentiation and Structure of Vascular Plants. Springer, Berlin, Heidelberg, 1989.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Wyk B.E., Wink M., Medicinal Plants of the world. CABI Publishing, 2018.</li> </ol>
Methods and criteria of evaluation	<p>Lectures: exam</p> <p>Tutorials: practical performance</p> <p>Laboratories, outdoor classes: 3 written tests</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures: exam
Form(s) and number of course hours as well as the form of crediting	<p>Lectures: 30 hours - exam</p> <p>Tutorials: 15 hours - credit</p> <p>Laboratories: 45 hours - credit</p> <p>Outdoor classes: 10 hours - credit</p>
Course coordinator(s)	dr Dorota Gawenda-Kempczyńska, dr Iwona Paszek
Subject Teachers	dr Dorota Gawenda-Kempczyńska, dr Iwona Paszek



Course form (character)	Obligatory
Limit of places available in each group	Laboratories, outdoor classes: groups of 12 students, Tutorials: groups of 24 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	-
Subject website	-
Learning outcomes determined for the given course form	<p>Lectures:</p> <p>W1: Is able to characterize the morphological and anatomical structure of fungi, lichens, bryophytes, ferns and seed plants supplying medicinal raw materials –K_A.W24</p> <p>W2: Has basic knowledge of pharmacopoeial and non-pharmacopoeial plant materials – K_A.W24</p> <p>W3: Knows the basics of systematics of plants and fungi and the rules for using keys to determine vascular plants – K_A.W25</p> <p>K2: Evaluates the value of various sources of information, preferring objective, reliable and consistent with the state of modern knowledge – K7</p> <p>Tutorials:</p> <p>W1: Is able to characterize the morphological and anatomical structure of fungi, lichens, bryophytes, ferns and seed plants supplying medicinal raw materials –K_A.W24</p> <p>U1: Identifies and characterizes plant cell structures and plant tissues – K_A.U16</p> <p>U2: Identifies and characterizes the morphological and anatomical structure of plant organs – K_A.U16</p> <p>K1: Develops teamwork skills – K3</p> <p>K2: Evaluates the value of various sources of information, preferring objective, reliable and consistent with the state of modern knowledge – K7</p> <p>K3: Draws conclusions from his own observations of plants and measurements of their characteristics – K8</p> <p>Laboratories:</p> <p>W1: Is able to characterize the morphological and anatomical structure of fungi, lichens, bryophytes, ferns and seed plants supplying medicinal raw materials –K_A.W24</p> <p>W2: Has basic knowledge of pharmacopoeial and non-pharmacopoeial plant materials – K_A.W24</p> <p>W3: Knows the basics of systematics of plants and fungi and the rules for using keys to determine vascular plants – K_A.W25</p> <p>W4: Knows the rules for making a herbarium, including labeling of herbarium plants – K_A.W26</p> <p>U1: Identifies and characterizes plant cell structures and plant tissues – K_A.U16</p> <p>U2: Identifies and characterizes the morphological and anatomical structure of plant organs – K_A.U16</p>

	<p>U3: Recognizes selected families, types and species of plants with particular emphasis on medicinal taxa based on morphological features – K_A.U17  K1: Develops teamwork skills – K3  K2: Evaluates the value of various sources of information, preferring objective, reliable and consistent with the state of modern knowledge – K7  K3: Draws conclusions from his own observations of plants and measurements of their characteristics – K8</p> <p>Outdoor classes:  W1: Is able to characterize the morphological and anatomical structure of fungi, lichens, bryophytes, ferns and seed plants supplying medicinal raw materials –K_A.W24  W2: Has basic knowledge of pharmacopoeial and non-pharmacopoeial plant materials – K_A.W24  W3: Knows the basics of systematics of plants and fungi and the rules for using keys to determine vascular plants – K_A.W25  U2: Identifies and characterizes the morphological and anatomical structure of plant organs – K_A.U16  U3: Recognizes selected families, types and species of plants with particular emphasis on medicinal taxa based on morphological features – K_A.U17  K1: Develops teamwork skills – K3  K2: Evaluates the value of various sources of information, preferring objective, reliable and consistent with the state of modern knowledge – K7  K3: Draws conclusions from his own observations of plants and measurements of their characteristics – K8</p>														
<p>Methods and criteria of the evaluation for the given course form</p>	<p>Laboratories, tutorials and outdoor classes: obligatory attendance, correct performance of exercises, passing 2 out of 3 written tests (passing 60% required), making a herbarium, compliance with OHS rules and didactic regulations of the Department of Pharmaceutical Botany and Pharmacognosy.  Exam: written (theoretical) and oral (practical) exam.  The condition of passing the exam is passing both parts - theoretical and practical. The final grade of the subject results from three grades (arithmetic average): from both parts of the exam and the average of tests grades.  The scale of grades used for grading tests and exam:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Very good</td> </tr> <tr> <td>84-91%</td> <td>Good plus</td> </tr> <tr> <td>76-83%</td> <td>Good</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory plus</td> </tr> <tr> <td>60-67%</td> <td>Satisfactory</td> </tr> <tr> <td>0-59%</td> <td>Failed/Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Grade	92-100%	Very good	84-91%	Good plus	76-83%	Good	68-75%	Satisfactory plus	60-67%	Satisfactory	0-59%	Failed/Unsatisfactory
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76-83%	Good														
68-75%	Satisfactory plus														
60-67%	Satisfactory														
0-59%	Failed/Unsatisfactory														
<p>List of topics</p>	<p>Lectures:  1. The scope and departments of botany. The importance of plants.  2. Raw plant material sourcing, basics of plant biotechnology.  3. Plant cell structure. Diagnostic structures of plant cells.</p>														

	<ol style="list-style-type: none"> <li>4. Histology. Diagnostic structures of plant tissues.</li> <li>5. Root, stem and leaf morphology.</li> <li>6. Flower morphology, types of inflorescences.</li> <li>7. Fruits and seeds.</li> <li>8. Plant life-form. Ecological types of plants.</li> <li>9. Plant classification - general issues.</li> <li>10. Characteristics of bacteria and cyanobacteria.</li> <li>11. Fungi and lichens.</li> <li>12. Algae, Bryophytes (mosses, liverworts) and Pteridophytes (club moss, horsetails, ferns).</li> <li>13. Gymnosperms. Angiosperms.</li> <li>14. Exotic medicinal and other utility plants.</li> <li>15. Protection of natural plant resources.       <ul style="list-style-type: none"> <li>Laboratories:           <ol style="list-style-type: none"> <li>1. Plant cell and its diagnostic structures.</li> <li>2. Protection tissues.</li> <li>3. Supporting tissue and vascular tissue.</li> <li>4. Parenchyma and secretory tissue.</li> <li>5. Root anatomy.</li> <li>6. Underground and above-ground stem anatomy.</li> <li>7. Leaf anatomy.</li> <li>8. Seeds and fruits.</li> </ol> </li> <li>9. Classification of fungi, lichens, mosses, pteridophytes and spermatophytes.</li> <li>10. Overview of selected medicinal plants, identification plants by key.           <ul style="list-style-type: none"> <li>Tutorials:               <ol style="list-style-type: none"> <li>1. Subject regulations and health and safety rules (OHS rules).</li> <li>2. Plant cell and plant tissues.</li> <li>3. Vegetative organs and their anatomical structure.</li> <li>4. Morphology of vegetative and generative organs.</li> </ol> </li> </ul> </li> </ul> </li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

## Physiology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Physiology</b> Fizjologia
Unit offering the subject	Faculty of Medicine Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-F2-FIZJ-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	5
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lecture participation – 30 hours</li> <li>– Tutorials participation – 35 hours</li> <li>– Lab report consultations - 2 hours</li> <li>– Midterm tests - 4 hours</li> <li>– Final exam - 1 hour,</li> </ul> <p>Total study hours involving teacher participation – <b>72 hours (2.88 ECTS credits)</b></p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 30 hours,</li> <li>– participation in laboratories: 35 hours,</li> <li>– consultations related to the preparation of reports: 2 hours,</li> <li>– writing exercise reports: 2 hours,</li> <li>– preparation for exercises (including reading the indicated literature): 10 hours,</li> <li>– preparation for tests and participation in tests: 18 + 4 = 22 hours,</li> <li>– preparation for the exam and participation in the exam: 23 + 1 = 24 hours.</li> </ul> <p>The total student workload related to the subject is <b>125 hours</b>, which corresponds to <b>5.00 ECTS points</b>.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– reading of the indicated scientific literature: 10 hours,</li> </ul>

	<ul style="list-style-type: none"> <li>– participation in lectures (including research results and scientific studies): 8 hours,</li> <li>– research and scientific consultations: 5 hours</li> <li>– preparation for classes covered by scientific activity: 5 hours,</li> <li>– participation in activities covered by scientific activity (including research methodology, research results, studies): 30 hours,</li> <li>– preparation to pass in the field of research and development for the subject: 10 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>105 hours</b>, which corresponds to <b>4.2 ECTS points</b>.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>– preparation for the exercises (including reading the indicated literature): 10 hours,</li> <li>– preparation for tests and participation in tests: 18 + 4 = 22 hours,</li> <li>– preparation for the exam and participation in the exam: 23 + 1 = 24 hours.</li> </ul> <p>The time required to prepare and participate in the assessment process is <b>56 hours</b>, which corresponds to <b>2.24 ECTS points</b>.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Describes nervous system physiology and explains mechanisms related to information transfer in nervous system - K_A.W5</p> <p>W2: Characterizes thermoregulatory mechanisms - K_A.W5</p> <p>W3: Explains the physiology of endocrine system and reproductive system, and the mechanisms of hormonal regulation - K_A.W5</p> <p>W4: Explains physiological mechanisms of circulatory, lymphatic, respiratory systems and mechanisms of circulatory-respiratory integration - K_A.W5</p> <p>W5: Describes gastro-intestinal physiology and explains the food intake regulatory mechanisms - K_A.W5</p> <p>W6: Describes urinary system physiology - K_A.W5</p> <p>W7: Characterizes selected pharmacological modulatory effects on physiological processes in nervous, endocrine, circulatory, reproductive, gastro-intestinal, urinary and respiratory systems - K_A.W5</p> <p>W8: Describes sequence of hemostasis and explains the influence of selected pharmacological factors on this sequence - K_A.W5</p>
Learning outcomes - abilities	<p>U1: Describes human adaptive mechanisms to different environmental conditions (high and low ambient temperature, diving, heights) - K_A.U4</p> <p>U2: Describes physiological mechanisms and relationships present among elements of human body - K_A.U4</p> <p>U3: Utilizes the acquired knowledge to analyze functional state of an organism - K_A.U5</p>

Learning outcomes – social skills	K1: Deduces and formulates conclusions from own measurements and observations (K_B.K2) K2: Has the ability to work in a group (K_B.K3)
Didactic methods	Lecture: passive methods - conventional lecture, problem-centered lecture with multimedia presentation Tutorials: active methods - laboratory, observation, classical lab methods: problem solving, discussion, show-and-tell Seminars: not available
Preliminary requirements	Student starting the education in Physiology class should have basic knowledge from the following areas: anatomy and physiology of circulatory, respiratory, nervous, gastrointestinal, endocrine, reproductive systems as well as renal and blood physiology at the extended level, and chemistry at the extended level.
Brief course description	The human physiology class enables student to learn basic terms and understand processes involved in function regulation of organs as well as systems. It also allows for understanding of relationships between human body elements.
Entire course description	<p>The purpose of the Physiology class is familiarizing students with physiological processes and mechanisms responsible for human body homeostasis. Physiology lectures are aimed at presentation and preservation of basic physiology knowledge concerning circulatory, respiratory, endocrine and nervous systems. Student will get to know basic mechanisms of neuron function, properties of neuronal cellular membrane and its role in the genesis of resting potential, action potential and synaptic transmission. Next, student will get to know neurobiological basis of reflexes and the movement control system. The student will also gain the knowledge about circulatory and respiratory function and the regulatory mechanisms for these functions. Student will get familiar with water and electrolyte management mechanisms, and renal physiology including intra-renal regulation. She or he will also learn about physiology and regulation of gastrointestinal system.</p> <p>Tutorials are of laboratory type and are partially related to matters presented during the lectures. Student will get to know the importance of the composition of extracellular fluid for initiation and transfer of information in the nervous system and the function of chemical and electrical synapses. Next, student will learn mechanism of skeletal muscle contraction, types of contractions and regulatory mechanisms for the contraction strength in these muscles. Additionally, during the tutorial student will learn basic physiology of hematopoietic system and basic blood lab parameters. Among the aims of the tutorials is also getting to know ECG examination and arterial blood pressure measurement, also in the context of changing body position and physical exercise.</p>

	<p>Student will learn also about the influence of environmental factors on the function of respiratory system and the importance of spirometry for evaluation of respiratory function. Students will learn about the body composition and the neurohormonal control of body mass. Laboratory format of the tutorials will allow for both individual and team work skills.</p>														
References	<p>Primary literature: J. Kibble, C. Halsey: Medical Physiology: The Big Picture, McGraw-Hill Medical 2009</p> <p>Supplementary literature: J. E. Hall: Guyton and Hall Textbook of Medical Physiology, Saunders 2015; L.S. Costanza: Physiology, Elsevier 2017</p>														
Methods and criteria of evaluation	<p>The basic requirement for passing the Physiology class is following the rules presented in the Departmental Student Code of Conduct.</p> <p>Tutorials: The requirement for passing Physiology is passing all the tutorials, entrance tests and mid-semester tests.</p> <p>Tutorial reports: The condition for report passing (with no grade) is reaching the threshold of 56% of the maximal score.</p> <p>Mid-semester, entrance tests: The condition for these tests passing is reaching the threshold of 56% of the maximal score.</p> <p>In case of mid-semester and entrance tests scores are calculated into grades as shown in the table below:</p> <table border="1"> <thead> <tr> <th>score</th> <th>grade</th> </tr> </thead> <tbody> <tr> <td>92 – 100%</td> <td>very good</td> </tr> <tr> <td>84 – 91%</td> <td>good +</td> </tr> <tr> <td>76 – 83%</td> <td>good</td> </tr> <tr> <td>68 – 75%</td> <td>satisfactory +</td> </tr> <tr> <td>56 – 67%</td> <td>satisfactory</td> </tr> <tr> <td>0 – 55%</td> <td>fail</td> </tr> </tbody> </table> <p>Final exam (theoretical): single choice test composed of 60 questions based on the lectures and tutorials material. Each correct answer yields score of 1. Passing minimum is score of 34 (56%).</p> <p>If the average grade for all the mid-term tests reaches 4,5, student may be relieved from taking final exam.</p> <p>In case of final exam tests scores are calculated into grades as shown in the table below:</p>	score	grade	92 – 100%	very good	84 – 91%	good +	76 – 83%	good	68 – 75%	satisfactory +	56 – 67%	satisfactory	0 – 55%	fail
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0 – 55%	fail														
Practical training as part of course sufficient	Not applicable according to the educational program														

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	2 <sup>nd</sup> year, 3 <sup>rd</sup> semester (fall)
Form of crediting a subject in the cycle	Lectures: exam Tutorial labs: pass/fail with no grade
Form(s) and number of course hours as well as the form of crediting	Lectures: 30 hours - exam Tutorial labs: 35 hours - pass/fail with no grade
Course coordinator(s)	Prof. dr. hab. Małgorzata Tafil- Klawe
Subject Teachers	<p>Lectures:</p> <p>Prof. dr. hab. Małgorzata Tafil- Klawe Dr. Wieńczysława Adamczyk Dr. Katarzyna Dmitruk Dr. Małgorzata Gałązka Dr. Piotr Złomańczuk</p> <p>Lab tutorials:</p> <p>Dr. Wieńczysława Adamczyk Dr. Blanka Dwojaczny Dr. Katarzyna Dmitruk Dr. Małgorzata Gałązka Dr. Piotr Złomańczuk Msc Monika Bejtka</p>
Course form (character)	Obligatory
	Lectures: second year, third semester students



Limit of places available in each group	Tutorials: groups up to 12 students																												
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń																												
Number of hours of classes conducted using e-learning methods	n/a																												
Subject website	n/a																												
Learning outcomes determined for the given course form	Lectures: W1-W8, U1-U3 Tutorials: W1-W7, U1-U3, K1, K2																												
Methods and criteria of the evaluation for the given course form	<p>The basic requirement for passing the Physiology class is following the rules presented in the Departmental Student Code of Conduct.</p> <p>In case of mid-semester and entrance tests scores are calculated into grades as shown in the table below:</p> <table border="1"> <thead> <tr> <th>score</th> <th>grade</th> </tr> </thead> <tbody> <tr> <td>92 – 100%</td> <td>very good</td> </tr> <tr> <td>84 – 91%</td> <td>good +</td> </tr> <tr> <td>76 – 83%</td> <td>good</td> </tr> <tr> <td>68 – 75%</td> <td>satisfactory +</td> </tr> <tr> <td>56 – 67%</td> <td>satisfactory</td> </tr> <tr> <td>0 – 55%</td> <td>fail</td> </tr> </tbody> </table> <p>In case of final exam tests scores are calculated into grades as shown in the table below:</p> <table border="1"> <thead> <tr> <th>score</th> <th>grade</th> </tr> </thead> <tbody> <tr> <td>92 – 100%</td> <td>very good</td> </tr> <tr> <td>84 – 91%</td> <td>good +</td> </tr> <tr> <td>76 – 83%</td> <td>good</td> </tr> <tr> <td>68 – 75%</td> <td>satisfactory +</td> </tr> <tr> <td>56 – 67%</td> <td>satisfactory</td> </tr> <tr> <td>0 – 55%</td> <td>fail</td> </tr> </tbody> </table> <p>Lecture: Written mid-term test - graded, open and closed single choice questions (threshold 0-10 pts. <math>\geq 56\%</math>): W1, W3-W7, U1-U3 Final exam (theoretical) - grading based on the score during exam test (threshold 0-60 pts. <math>\geq 56\%</math>) : W1-W8, U1- U3</p> <p>Laboratory tutorials Written mid-term, entrance tests - graded, open and closed single choice questions (threshold 0-5 pts. <math>\geq 56\%</math>): W1, W3-W7, U1, U3, K1 Lab report pass/fail <math>\geq 56\%</math>): W1, W3-W7, U1, U3, K1, K2 Prolonged observation (0-5 pts.; <math>\geq 50\%</math>): K1</p>	score	grade	92 – 100%	very good	84 – 91%	good +	76 – 83%	good	68 – 75%	satisfactory +	56 – 67%	satisfactory	0 – 55%	fail	score	grade	92 – 100%	very good	84 – 91%	good +	76 – 83%	good	68 – 75%	satisfactory +	56 – 67%	satisfactory	0 – 55%	fail
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0 – 55%	fail																												
List of topics	Lectures: 1. Pathways for signal transfer in the nervous system.																												

	<p>2.Regulation of endocrine system. Importance of hypothalamic-pituitary axis in hormonal regulation.</p> <p>3. Regulation of reproductive function in males and females.</p> <p>4. Hemostatic mechanisms. Balanced and unbalanced hemostatic system.</p> <p>5. Heart electrical activity. Mechanism of the cardiac muscle contraction and regulation of its strength. Regulation of arterial blood pressure.</p> <p>6. Autoregulatory mechanisms in the kidney.</p> <p>7. Central regulation of respiratory system.</p> <p>8. Gastro-intestinal system regulation.</p> <p>Tutorials:</p> <p>1. Basic excitatory processes and conduction in nervous system.</p> <p>2. Resting and active potentials.</p> <p>3. Skeletal and smooth muscle physiology.</p> <p>4. Sensory systems physiology (auditory, gustatory, olfactory, visual).</p> <p>5. Hormonal regulation of blood glucose levels.</p> <p>6. Thyroid hormones and metabolism.</p> <p>7. Hemopoietic system physiology.</p> <p>8. Endogenous activity of cardiac muscle. Calcium ions in cardiac muscle contraction. Influence of autonomic nervous system on circulatory system.</p> <p>9. Physical exercise and circulatory system.</p> <p>10. Electrocardiography.</p> <p>11. Breathing mechanics.</p> <p>12. Spirometry and evaluation of the respiratory system function.</p> <p>13. Water - electrolytes regulation. Urinary system physiology.</p> <p>14. Gastro-intestinal physiology and metabolism.</p> <p>15. Acid-base balance.</p>
Didactic methods	The same as in part A
References	The same as in part A

## History of Philosophy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>History of Philosophy</b> (Historia filozofii)
Unit offering the subject	Faculty of Laboratory for Social Medicine Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-F1-FIL-J
ERASMUS code	

ISCED code	916
Number of ECTS points	2
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>– tutorial participation- 30 hours</li> <li>– consultations- 1 hours</li> <li>– test- 1 hour</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>32 hours</b>, which corresponds to <b>1.28 ECTS point</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– tutorial participation- 30 hours</li> <li>– consultations- 1 hour</li> <li>– reading scientific literature- 10 hours</li> <li>– preparing for test and taking part in test- (8+1) =9 hours</li> </ul> <p>A total work amount: <b>50 hours</b>, which corresponds to <b>2.00 ECTS point</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– reading scientific literature- 8 hours</li> <li>– consultations- 2 hours</li> <li>– preparing for tutorials- 4 hours</li> <li>– taking part in scientific activities- 2 hours</li> <li>– preparing for test- 1 hour</li> </ul> <p>A total student workload related to the conducted research is <b>17 hours</b>, which corresponds to <b>0.68 ECTS point</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– preparing for tutorials (reading scientific literature included)- 4 hours</li> <li>– preparing for test and test- (2+1) 3 hours</li> </ul> <p>Total time required for the preparation and participation in evaluating process: 7 hours, which corresponds to 0,28 ECTS point.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	W1: Knows the directions of development of professional and scientific pharmacy, as well as the development of historical philosophical thought and ethical foundations for resolving moral dilemmas related to the profession of pharmacist and medical professions - K. A.W28

Learning outcomes - abilities	U1: Initiates and supports group activities, influences the formation of attitudes and assistance and remedial actions - K A. U19
Learning outcomes – social skills	K1: Assesses actions and resolves moral dilemmas based on ethical norms and principles – K5
Didactic methods	Tutorials: <ol style="list-style-type: none"> <li>1. analysis of selected fragments of philosophical texts, iconographic and multimedia materials</li> <li>2. didactic discussion</li> </ol>
Preliminary requirements	Secondary school knowledge
Brief course description	Topics of history of philosophy are based on basic philosophical thoughts which involved to the shape of the Western culture. On tutorials are told philosophical conceptions which involved to medicine development.
Entire course description	On tutorials are told and interpreted that philosophical thoughts which had the biggest impact on shaping scientific worldview, including development of philosophy of medicine. In specific, tutorials focus on ethology point of view which looking for harmony between men and the rest of the world. Aim of tutorials is showing philosophy as thing which shaping rational worldview which determined character of the Western civilization showing its limitations and risk. Tutorials show lasting seeking auto description of humanity in related reality.
References	Primary literature: <ol style="list-style-type: none"> <li>1. Bertrand Russell, A History of Western Philosophy, 1967</li> <li>2. Frederick Copleston, A History of Philosophy, Vol. 1: Greece and Rome From the Pre-Socratics to Plotinus, 1993</li> </ol> Supplementary literature: <ol style="list-style-type: none"> <li>1. Nigel Warburton, A Little History of Philosophy, 2012</li> <li>2. John Cottingham, Western Philosophy: An Anthology, 2017</li> </ol>
Methods and criteria of evaluation	The condition of passing the course is: <ol style="list-style-type: none"> <li>1. Participation in discussions conducted during exercises</li> <li>2. Written test in the form of a multiple-choice test</li> <li>3. The rating results from the sum of points obtained: <ol style="list-style-type: none"> <li>a. from the test</li> <li>b. for the paper / presentation</li> <li>c. for participating in discussions</li> </ol> </li> </ol> The maximum number of points that can be obtained is 100 for the test you can get from 0 to 30 points. for a paper / presentation up to 30 points for participating in discussions - up to 40 points The condition of passing the course is to obtain min. 65 points  Grades: 65-71 pkt. - acceptable

	72- 78 pkt - satisfactory 79 -85 pkt - good 86 -92 pkt - very good 93-100 pkt – excellent Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

D. Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, semester 1 (autumn)
Form of crediting a subject in the cycle	Tutorials- grading
Form(s) and number of course hours as well as the form of crediting	Tutorials - 30 hours- credit with grade
Course coordinator(s)	Dr Waldemar Kwiatkowski
Subject Teachers	Mgr Paweł Drygas
Course form (character)	Obligatory
Limit of places available in each group	Tutorials: 25 of students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	N/A
Subject website	N/A
Learning outcomes determined for the given course form	Tutorials: W1, U1, K1
Methods and criteria of the evaluation for the given course form	<p>1. Participation in discussions conducted during exercises 2. Written test in the form of a multiple-choice test 3. The rating results from the sum of points obtained: a. from the test b. for the paper / presentation c. for participating in discussions The maximum number of points that can be obtained is 100 for the test you can get from 0 to 30 points. for a paper / presentation up to 30 points for participating in discussions - up to 40 points The condition of passing the course is to obtain min. 65 points</p> <p>Grades: 65-71 pkt. - acceptable 72- 78 pkt - satisfactory 79 -85 pkt - good 86 -92 pkt - very good 93-100 pkt – excellent</p>
List of topics	<p>1. Philosophy as beginning of ethology reflection. Man and world in ancient Greek philosophers. 2. Philosophical beginnings of scientific reflection. The role of Plato and Aristotle in forming European ideas of science. 3. Modern development of Greek idea of science. Truth as evidence. 4. Science as method.</p>

	<p>5. Body-mind problem. Dualism of the human nature.</p> <p>6. Involve of scientific idea to methods of thinking about medicine- anthropological aspect.</p> <p>7. Ontological and functional aspects of health and illness.</p> <p>8. Contemporary dilemmas of philosophy of medicine and their solves. Anthropology medicine as a try of solve the problem between Hippocrates and Descartes way of practice a medicine.</p>
Didactic methods	The same as in part A
References	The same as in part A

## Immunology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	Immunology (Immunologia)
Unit offering the subject	Department of Immunology Faculty of Pharmacy <b>Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun</b>
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1714-F2-IMMN-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	2
Form of crediting	Credit with a grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>3. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lecture participation – 18 hours</li> <li>– Tutorials participation – 12 hours,</li> <li>– Participation in consultations: 2 hours,</li> <li>– Credit lectures – 1 hours</li> <li>– Credit tutorials – 1 hours</li> </ul> <p>The workload associated with classes requiring direct participation of academic teachers is <b>34 hours</b>, corresponding to <b>1.36 ECTS points</b>.</p> <p>4. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 18 hours</li> <li>– participation in laboratories: 12 hours</li> <li>– participation in consultations: 2 hours</li> <li>– reading the indicated literature: 4 hours</li> </ul>

	<ul style="list-style-type: none"> <li>- preparation for tutorial : 5 hours</li> <li>- preparing for credit the lectures and participation in this credit: 4+1=5</li> <li>- preparation for the colloquium and participation in the colloquium: 3+ 1 = 4 hours</li> </ul> <p>The total student workload related to the implementation of the course is <b>50 hours</b>, which corresponds to <b>2.00 ECTS points</b>.</p> <p>5. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- reading indicated scientific literature: 1 hours</li> <li>- research and scientific consultations: 1 hours</li> <li>- participation in lectures (including research results and scientific studies in the field of immunology): 10 hours</li> <li>- participation in tutorial , covering the methodology of scientific research: 5 hours</li> <li>- preparation for tutorial covered by scientific activity: 2 hours</li> <li>- preparation to pass the course in the field of research and science: 6 hours</li> </ul> <p>The student's work related to the conducted research in the field of immunology is: <b>25 hours</b>, which corresponds to <b>1.00 ETCS</b></p> <p>6. Time required for the practical training completion – not applicable.</p> <ul style="list-style-type: none"> <li>- preparation for the final colloquium from tutorial and participation in the colloquium: <b>3+ 1 = 4 hours</b></li> <li>- preparation for credit the lectures and participation in this credit: 4+1=5</li> </ul> <p>The student's work related to preparation for participation in the assessment process is <b>9 hours</b>, which is <b>0,36 ECTS points</b>.</p> <p>5. Time required for compulsory placement: - not applicable</p>
Learning outcomes – knowledge	<p>W1: Knows the structure of the immune system in terms of all its components, i.e. immune cells, tissues and organs (including the division into central and peripheral organs) - K_A.W12</p> <p>W2: Knows the principles of central and peripheral immune system organs functioning. Knows the differences in the functions of central (primary) and peripheral (secondary) organs. Knows the functions of specific and non-specific response cells - K_A.W12</p> <p>W3: Knows the division of defense mechanisms into innate and acquired. Correctly interprets and understands the differences in the functioning of non-specific and adaptive defense mechanisms - K_A.W12</p> <p>W4: Knows the basic immunodiagnostic methods used in assessing the functioning of the immune system - K_A.W13</p> <p>W5: Knows the basics of immunology of preventive vaccinations, understands how post-vaccine immunity arises - K_A.W13</p> <p>W6: Knows the basic vaccines available on the market, their structure and effect on the immune system, and knows</p>

	<p>preparations used as immunotherapeutics and understands their impact on the immune system - K_A.W13</p> <p>W7: Knows the concepts of probiotic, prebiotic, synbiotic and their effects on the immune system - K_A.W13</p>
Learning outcomes - abilities	<p>U1: Can distinguish between proper and pathological functioning of defense mechanisms - K_A.U9</p> <p>U2: Is able to describe the operation of defense mechanisms in the fight against various pathogens (bacteria, virus, parasite, fungus) - K-A.U9</p>
Learning outcomes – social skills	<p>K1: He is ready to see the need for self-education and update his own knowledge: K1</p> <p>K2: Is ready to promote the legitimacy of the use of preventive vaccinations and immunostimulatory preparations: K6</p>
Didactic methods	<p>Lecture</p> <ul style="list-style-type: none"> <li>▪ informative lecture (conventional),</li> <li>▪ problem-based lecture with multimedia presentation</li> </ul> <p>Laboratory tutorials:</p> <ul style="list-style-type: none"> <li>▪ observation method,</li> <li>▪ practical exercises,</li> <li>▪ exposing methods: film, demonstration, discussion</li> </ul>
Preliminary requirements	Basic knowledge concerning biology, cell biology, biochemistry, anatomy, chemistry and genetics
Brief course description	The subject is conducted in the form lectures and laboratory tutorials. The subject includes: introduction to immunology, characterization of innate and adaptive immunity, the most important aspects of natural and adaptive of immunity in medicine and biology as well as selected issues of immunopathology
Entire course description	<p>In the course of lectures students are going to be familiar with: structure of the immune system in terms of all its components, i.e. immune cells, tissues and organs (including the division into central and peripheral organs); the principles of central and peripheral immune system organs functioning; the differences in the functions of central (primary) and peripheral (secondary) organs; the functions of specific and non-specific response cells; the division of defense mechanisms into innate and acquired. Correctly interprets and understands the differences in the functioning of non-specific and adaptive defense mechanisms</p> <p>hypersensitivity reactions of type I, II, III and IV; mechanisms of their action (especially allergy); skin associated lymphoid tissue (SALT), mucosal associated lymphoid tissue (MALT) - significance of gastro-intestinal tract microflora in immune system regulation; probiotics, prebiotics, synbiotics (definition, significance in immunity); basics of vaccine immunology</p> <p>In the course of tutorial students are going to be familiar with: structure and classification of antigen antibodies and immunological complexes, type of population and subpopulation of leucocytes, characteristics of cytokines, how to prepare cell culture; basics method for immunodiagnosytics : ELISA tests, cell isolation, flow cytometric methods.</p>



References	<p><b>Primary literature:</b></p> <ol style="list-style-type: none"> <li>1. Abul K. Abbas, Andrew H. Lichtman Shiv Pillai: Basic Immunology, Saunders Elsevier; Sixth Edition 2020</li> <li>2. K. Murphy, P. Travers M. Walport Immunobiology 2007</li> </ol> <p><b>Supplementary literature:</b></p> <ol style="list-style-type: none"> <li>1. P. J. Delves, S. J. Martin, D. R. Burton, I. M. Roitt Immunology 2011</li> <li>2. Roderick Nairn, Matthew Helbert: Immunology for medical students, Mosby Elsevier; 2007</li> <li>3. Mark Peakman, Diego Vergani: Basic and clinical immunology, Churchill Livingstone Elsevier; 2009</li> <li>4. Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai: Cellular and molecular immunology, Saunders Elsevier; 2018</li> </ol>
Methods and criteria of evaluation	Presentations: $\geq 60\%$ K1, K2, U2 Practical laboratory exercises: $\geq 60\%$ W4, K1, U1 Colloquium from laboratories: $\geq 60\%$ W4, K1, U1 Colloquium from lectures: $\geq 60\%$ W1, W2, W3, W5, W6, W7
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	2 <sup>nd</sup> year, 2 <sup>st</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures: credit with a grade Tutorial: credit without the grade
Form(s) and number of course hours as well as the form of crediting	Lectures: 18, credit with a grade Tutorial: 12, credit without the grade
Course coordinator(s)	Dr Małgorzata Wiese-Szadkowska
Subject Teachers	Dr Małgorzata Wiese-Szadkowska
Course form (character)	Obligatory
Limit of places available in each group	Lectures : all students Tutorial: group up to 15 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	-
Subject website	-
Learning outcomes determined for the given course form	Lectures: W1-W7, U1, K1, K2 Tutorials: W4, U1, K1, K2
Methods and criteria of the evaluation for the given course form	Laboratories: Presentations: $\geq 60\%$ Practical laboratory exercises: $\geq 60\%$ Colloquium from laboratories: $\geq 60\%$ Colloquium from the laboratory $\geq 60\%$ Colloquium from the lectures $\geq 60\%$

Passing the laboratories:

- At each class, students write admission tickets from the current topic in order to pass the pass, obtain  $\geq 60\%$  points.
- a student receives a negative point (-1) for an unsuccessful entry
- students receive additional points for papers prepared independently for the classes and for oral answers from +1 point. up to -1 (no answer, no paper requested)
- The basis for obtaining credit for the laboratories is the final test in the form of a test (20-25 questions: closed + short open questions);

Criterion of passing the test:

$<60\%$  points - failed

$\geq 60\%$  points - passed

Note: all positive points are added to the points obtained from the colloquium and all negative points obtained by the student during the whole semester (for admission tickets, activities, papers) are deducted - in accordance with the rules described in the didactic regulations of the Department of Immunology.

In the event of failure to complete the test the student is entitled to one amendment (test form, 20-25 questions).

Criterion for passing the resit test:

$<60\%$  points - failed

$\geq 60\%$  points - passed

Note: In the final colloquium settlement, no more points are taken into account. additional.

Lectures:

$\geq 60\%$

The basis for passing the lectures is a positive test result (30-35 closed questions). The test takes place within the set shortest possible time - after the lectures.

Completion of lectures ends with an assessment, according to the following scale:

Percentage of points	Grade
92-100%	excellent
84-91%	very good
76-83%	good
68-75%	satisfactory
60-67%	acceptable
0-59%	fail

If the test is not passed, the student has one oral correction, whose date is set individually with the examiner.

The assessment of oral credit is issued according to the given approximate criterion (with the proviso that the marks: sufficient plus and good plus the decision is made by the examiner).

No of questions	Number of correct answers	Grade
4	4	excellent
4	3	good
4	2	acceptable

	4	1	fail
List of topics	<p><b>Lectures</b></p> <ol style="list-style-type: none"> <li>1. Structure of the immune system in terms of all its components, i.e. immune cells, tissues and organs (including the division into central and peripheral organs);</li> <li>2. The principles of central and peripheral immune system organs functioning; the differences in the functions of central (primary) and peripheral (secondary) organs; the functions of specific and non-specific response cells;</li> <li>3. The division of defense mechanisms into innate and acquired. Correctly interprets and understands the differences in the functioning of non-specific and adaptive defense mechanisms</li> <li>4. Hypersensitivity reactions of type I, II, III and IV; mechanisms of their action (especially allergy);</li> <li>5. Mucosal associated lymphoid tissue (MALT) - significance of gastro-intestinal tract microflora in immune system regulation; probiotics, prebiotics, synbiotics (definition, significance in immunity); Skin associated lymphoid tissue (SALT),</li> <li>6. Basics of vaccine immunology</li> </ol> <p><b>Tutorial</b></p> <ol style="list-style-type: none"> <li>1. The analysis of cell phenotype, the flow cytometry method.</li> <li>2. Cell isolation and culture procedures in immunology. Cell Viability test</li> <li>3. Assessment of cell-mediated cytotoxicity</li> <li>4. Principle of immunoenzymatic methods</li> <li>5. Assessment of cell activity– the evaluation of the function of phagocytic cells.</li> </ol>		
Didactic methods	The same as in part A		
References	The same as in part A		

## Advanced First Aid

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Advanced First Aid</b> Kwalifikowana pierwsza pomoc
Unit offering the subject	<b>Wydział Nauk o Zdrowiu</b> <b>Katedra Medycyny Ratunkowej i Katastrof</b> Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-F2-KPMED-J
ERASMUS code	

ISCED code	(0916) Pharmacy
Number of ECTS points	2
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lecture participation – 20 hours</li> <li>– Tutorials participation – 20 hours,</li> <li>– Consultations participation – 2 hours</li> <li>– Final test participation – 1 hours</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>43 hours</b> which corresponds to <b>1,72 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– Lecture participation – 20 hours</li> <li>– Tutorials participation – 20 hours,</li> <li>– Consultations participation – 2 hours</li> <li>– Final test participation – 1 hours</li> <li>– Preparation for tutorials – 1 hours</li> <li>– Reading the indicated literature – 3 hours</li> <li>– Final test preparation – 3 hours</li> </ul> <p>A total work amount: <b>50 hours</b>, which corresponds to <b>2.00 ECTS points</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– reading the indicated scientific literature: 1 hour,</li> <li>– research and scientific consultations: 1 hour,</li> <li>– participation in lectures on methodology of scientific research: 5 hours,</li> <li>– participation in laboratories covering the methodology of scientific research: 2 hours,</li> <li>– preparation for laboratories covered by scientific activity: 1 hour,</li> <li>– preparation to pass the course in the field of research and science: 1 hour.</li> </ul> <p>A total work amount of scientific research activity: <b>11 hours</b>, which corresponds to <b>0.44 ECTS points</b></p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– Preparation for tutorials + preparation for final test + final test: 1 + 1 = <b>2 hours (0.08 ECTS points)</b></li> </ul> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	W1: Knows how to organize and undertake rescue operations at the place of accident, taking care of the safety of themselves and the victims, including legal conditions for saving health and life in emergencies - K A.W27

	<p>W2: Characterizes the causes of sudden cardiac arrest - K_A.W27</p> <p>W3: Recreates the algorithm for performing basic resuscitation procedures in people of different ages in life-threatening conditions - K_A.W27</p> <p>W4: Discusses and is aware of the risks at the time of first aid and qualified first aid -K_A.W27</p> <p>W5: Knows the rules for providing assistance in the event of life and health hazards - K_A.W27</p> <p>W6: Describes the principles of using an automatic defibrillator (AED) - K_A.W27</p> <p>W7: Knows how to organize and take emergency actions in the event of communication incidents and care of injured persons - K_A.W27</p>
Learning outcomes - abilities	<p>U1: Has the ability to care for own safety and the injured - K_A.U18</p> <p>U2: Is able to properly secure the place of the incident - K_A.U18</p> <p>U3: Properly recognizes the symptoms of a threat to life and health - K_A.U18</p> <p>U4: Properly performs basic resuscitation procedures in people of different ages in health emergency according to the recommended algorithm. Properly supports the automatic external defibrillator - AED - K_A.U18</p> <p>U5: Has the ability to deal with health emergencies of internal origin - K_A.U18</p> <p>U6: Able to deal with victims in the event of a health emergency of traumatic origin - K_A.U18</p> <p>U7: Able to provide assistance in the event of a health hazard of environmental origin - K_A.U18</p>
Learning outcomes – social skills	<p>K1: Acts in accordance with ethical principles - K5</p> <p>K2: Is aware of the conditions determining the possibility of life and health threatening situations - K10</p>
Didactic methods	<p><u>Lectures:</u></p> <ul style="list-style-type: none"> <li>▪ Problem-based lecture</li> <li>▪ Informative lecture</li> <li>▪ Didactic discussion</li> </ul> <p><u>Tutorials:</u></p> <ul style="list-style-type: none"> <li>▪ case studies</li> <li>▪ simulation methods (case study; simulated patient)</li> <li>▪ display methods: film, demonstration</li> </ul>
Preliminary requirements	A student entering education in the subject advanced first aid should have knowledge of physiology in relation to the cardiovascular system, respiratory system and central nervous system (high school range).
Brief course description	Advanced first aid aims to teach a set of rescue operations carried out as a result of a health emergency and to minimize the adverse consequences before specialist medical assistance can be provided.
Entire course description	The lecture aims to acquire and consolidate knowledge in the field of providing extended first aid: to acquire basic knowledge in the field of dealing with various health or life threatening situations and to acquire and systematize knowledge in the field

	of basic resuscitation activities. In addition, the lectures cover issues related to the use of instruments under qualified first aid. Exercises are devoted to acquiring practical skills in the field of management in various states of health threat, including internal, traumatic and environmental origin, as well as acquiring skills in basic resuscitation activities. In addition, exercises are devoted to the use of selected instruments in the field of qualified first aid.
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Polska Rada Resuscytacji: <i>Resuscytacja krążeniowo-oddechowa i automatyczna defibrylacja zewnętrzna - podręcznik do kursu</i>. Wydanie wg Wytycznych ERC 2015.</li> <li>2. Eibl – Eibesfeldt K.,: <i>Opatrunki</i>, ElsevierUrban&amp;Partner 1999</li> <li>3. J. Konieczny, P.Paciorek (red).: <i>Kwalifikowana pierwsza pomoc – wiedza i umiejętności ratownika</i>. Wydawnictwo Garmond, Wrocław 2013</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Jerzy Telak, Tomasz Zalewski, Ewa Zieliński: <i>Bezpieczeństwo i ratownictwo wodne</i>. BSW 2014.</li> </ol>
Methods and criteria of evaluation	Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

#### E. Course description in the didactic cycle

Space name	Comment
Didactic cycle	4 <sup>st</sup> year, 2 <sup>st</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures and practicals: exam
Form(s) and number of course hours as well as the form of crediting	Lecture: 20 hours Tutorials: 20 hours
Course coordinator(s)	
Subject Teachers	<b>dr n.med Ewa Zieliński</b>
Course form (character)	dr Ewa Zieliński
Limit of places available in each group	Lectures: 1th year students of II semester Practicals: groups of 12 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Lectures: Tutorials:
Methods and criteria of the evaluation for the given course form	Lectures: Oral test (0 - 12 points;> 75%): W1 - W7, U3 Written test (0 - 12 points;> 75%): W1 - W7, U3 Final test (0 - 32 points;> 75%): W1 - W7, U3.

	<p>&lt;24 ndst  24 – 26 dst  27 dst+  28 – 29 db  30 db+  31 – 32 bdb</p> <p>Extended observation (0 - 10 points;&gt; 50%): K2</p> <p>Tutorials:</p> <p>Oral test (0 - 12 points; &gt; 75%): W1, W2, W4, W6, W7, U3</p> <p>Written test (0 - 12 points;&gt; 75%): W1, W2, W4, W6, W7, U3</p> <p>Demonstration in simulated conditions (0 - 12 points;&gt; 75%): U1 - U7</p> <p>Practical test (0 - 12 points; &gt; 75%): W1, W6, U1 - U7</p> <p>Test (colloquium) 0 - 20 points; &gt; 75%): W1, W6, U1 - U7</p> <p>Final test (0 - 32 points; &gt; 75%): W1, W2, W4, W6, W7, U3 - U7.</p> <p>&lt;24 ndst  24 – 26 dst  27 dst+  28 – 29 db  30 db+  31 – 32 bdb</p> <p>Extended observation (0 - 10 points; &gt; 50%): K1</p>
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Legal aspects of saving lives.</li> <li>2. Outline of pathophysiology of cardiac arrest, etiology of sudden cardiac arrest in adults and children.</li> <li>3. Launching the "survival chain".</li> <li>4. Types of first aid.</li> <li>5. Safety of the person providing first aid and the rescued person.</li> <li>6. Assessment of basic life functions of a human being in a state of health threat.</li> <li>7. Identification of states of danger to human health or life.</li> </ol> <p>Tutorials:</p> <ol style="list-style-type: none"> <li>1. Tool-less cardiopulmonary resuscitation of adults.</li> <li>2. Tool-less cardiopulmonary resuscitation of children.</li> <li>3. Restoration, maintenance and stabilization of basic life functions, including, above all, respiratory and circulatory functions, protection and stabilization of various areas of the body damaged as a result of external factors.</li> <li>4. Electrotherapy of sudden cardiac arrest.</li> <li>5. Head, torso and limb injuries.</li> <li>6. Rules for resuscitation of injured persons. Immobilization of limbs after injury.</li> <li>7. Superficial wounds and their treatment.</li> <li>8. Stopping external hemorrhage.</li> <li>9. Undertaking qualified rescue operations in special types of environmental hazards.</li> <li>10. Poisoning.</li> <li>11. First aid in traffic accidents.</li> </ol>

Didactic methods	The same as in part A
References	The same as in part A

## Microbiology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Microbiology</b> (Mikrobiologia)
Unit offering the subject	Faculty of Pharmacy, Department of Microbiology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1716-F3-MIKR-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	5
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>– lecture participation – 30 hours</li> <li>– laboratories participation – 50 hours,</li> <li>– consultations participation, including scientific and research consultations – 2 hours,</li> <li>– final exam participation – 1 hours</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>83 hours</b>, which corresponds to <b>3.32 ECTS point</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– lecture participation – 30 hours,</li> <li>– laboratories participation – 50 hours,</li> <li>– consultations participation, including scientific and research consultations – 2 hours,</li> </ul>



	<ul style="list-style-type: none"> <li>- final exam participation – 1 hours</li> <li>- reading the indicated literature – 7 hours,</li> <li>- preparation for laboratories – 10 hours,</li> <li>- preparation for test – 10 hours,</li> <li>- preparation for final exam – 15 hours.</li> </ul> <p>A total work amount: <b>125 hours</b>, which corresponds to <b>5 ECTS point</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>- reading the indicated literature -7 hours,</li> <li>- participation in lectures (including research results and scientific studies in the field of microbiology) - 15 hours,</li> <li>- participation in scientific consultations - 2 hours,</li> <li>- participation in laboratories (including research methodology, experiment planning and results interpretation) - 26 hours,</li> <li>- preparation for laboratories including scientific results - 5 hours,</li> <li>- preparation for final exam including research results and scientific studies - 10 hours.</li> </ul> <p>A total student workload related to the conducted research is <b>65 hours</b>, which corresponds to <b>2.6 ECTS point</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- preparation for test – <b>10 hours</b>,</li> <li>- preparation for final exam – <b>20 hours</b>.</li> </ul> <p>Total time required for the preparation and participation in evaluating process: <b>30 hours</b>, which corresponds to <b>1.2 ECTS point</b>.</p> <p>5. Time required for the practical training completion – <b>not applicable</b>.</p>
Learning outcomes – knowledge	<p>Student:</p> <p>W1: Knows the general characteristics, growth conditions and biochemical properties of clinically important microorganisms (viruses, bacteria, fungi) pathogenic for humans, lists their virulence factors - K_A.W18</p> <p>W2: Knows the principles and methods of microbiological diagnostics (biochemical, serological, genetic) and their application in the diagnosis of selected viral, bacterial and fungal infections - K_A.W18</p> <p>W3: Knows methods for assessing the sensitivity of microorganisms to antibiotics and methods for detecting mechanisms of antibiotic resistance - K_A.W18</p> <p>W4: Knows and understands the processes of microbial genetic variability and basic mechanisms of the immune response to infection - K_A.W19</p> <p>W5: Knows the pathogenesis and epidemiology of selected local and systemic infections - K_A.W19</p>

	<p>W6: Knows and understands the types of antimicrobial activities, the principles of aseptics, antiseptics and the effect of disinfectants and antiseptics on microorganisms K_A.W20</p> <p>W7: Knows the criteria for the division of antimicrobial drugs, explains the mechanisms and scope of their action and the principles of antibiotic therapy - K_A.W20</p> <p>W8: Knows the methods of testing the microbiological purity of the environment and pharmacopoeial requirements and methods of testing the microbiological purity of pharmaceuticals and medical materials - K_A.W22</p> <p>W9: Knows the definition of alarm pathogens, their threats and problems of nosocomial infections - K_A.W21</p> <p>W10: Knows microbiological methods of drug testing - K_A.W23</p>
Learning outcomes - abilities	<p>Student:</p> <p>U1: Is able to choose appropriate microbiological media, perform sowing to grow microorganisms and perform and evaluate microscopic preparations K_A.U11</p> <p>U2: Is able to identify microorganisms based on the assessment of their morphology, physiological, breeding and biochemical properties - K_A.U12</p> <p>U3: Is able to use biochemical and serological methods and propose the use of molecular biology methods in microbiological diagnostics for the detection and identification of microorganisms - K_A.U13</p> <p>U4: Is able to determine, in accordance with the recommendations, the antibiotic sensitivity of bacteria and fungi, taking into account methods for detecting drug resistance mechanisms, and interpret the result obtained - K_A.U14</p> <p>U5: Is able to assess the impact of physico-chemical factors on microorganisms, assess the microbiological purity of the environment and test the effectiveness of disinfection and sterilization - K_A.U14</p> <p>U6: Is able to carry out microbiological control of drugs in accordance with pharmacopoeial methods K_A.U15</p>
Learning outcomes – social skills	<p>Student:</p> <p>K1: Is ready to recognize and recognize his own limitations, make self-assessments of deficits and educational needs in order to be ready to continue learning - K2</p> <p>K2: Is ready to cooperate with other team members during practical classes and to cooperate with representatives of other medical professions - K3</p> <p>K3: Takes care of promoting healthy behaviors by taking care of the use of rational antibiotic therapy - K6</p> <p>K4: Draws conclusions from research and own observations carried out during classes - K8</p>
Didactic methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>▪ expository teaching methods – informative lecture (conventional) with a multimedia presentation</li> <li>▪ problem lecture</li> <li>▪ conversational lecture</li> </ul>

	<p>Laboratories:</p> <ul style="list-style-type: none"> <li>▪ observation method</li> <li>▪ practical exercises</li> <li>▪ analysis of microbiological test results</li> <li>▪ exposing methods: film, demonstration</li> <li>▪ classical problem-based method</li> <li>▪ discussion</li> </ul>
Preliminary requirements	To implement the subject Microbiology it is necessary to have basic knowledge in the field of cell biology and physiology. In addition, students should have knowledge and skills acquired in the subjects of chemistry, biochemistry, anatomy, histology and physiology.
Brief course description	Subject Microbiology takes into account the characteristics of human natural microbiota and its most common pathogens, including their morphology, biochemical properties, pathogenicity and antibiotic susceptibility. It includes lectures and laboratories aimed at familiarizing students with methods and identification of microorganisms and assessing their antibiotic sensitivity and antibiotic resistance mechanisms, principles of asepsis, antiseptics and principles of work in a microbiological laboratory. During the course, students become acquainted with the etiology, epidemiology and diagnostics of selected systemic infections and the methods of microbiological control of drugs.
Entire course description	<p>Lectures:</p> <p>The aim of the lectures is to familiarize the student with the history of microbiology, morphology, virulence factors of viruses, bacteria and fungi of the genera: <i>Staphylococcus</i>, <i>Streptococcus</i>, <i>Enterococcus</i>, <i>Corynebacterium</i>, <i>Mycobacterium</i>, <i>Bacillus</i>, <i>Clostridium</i>, from the family <i>Neisseriaceae</i> and order <i>Enterobacteriales</i> non-fermentable bacteria and fungi, methods of microbial testing, infectious immunology, immunoprophylaxis, genetic processes occurring between microorganisms, characteristics of antibiotics, antibiotic resistance mechanisms of microorganisms and methods of their detection, disinfectants and aseptics, human microbiota, selected viruses, pathogenic and facultative pathogenic bacteria and fungi for humans, etiological factors of human systemic infections, principles of infection prevention.</p> <p>Laboratories:</p> <p>The laboratories are partly related to the issues discussed in the lectures and are aimed at: familiarizing with biological properties and methods of culture, identifying and assessing the antibiotic susceptibility of microorganisms, developing the ability to microscope slides preparations, cultures, describing the biochemical and immunological methods used in microbiological diagnostics, presentation of the main groups of microorganisms and their pathogenicity, familiarization</p>

	with the methods of microbiological diagnostics used to identify the etiological factors of selected systemic human infections, familiarization with the methods of testing the microbiological purity of drugs, developing the skills of individual and team work.														
References	<p>Primary literature</p> <ol style="list-style-type: none"> <li>1. Murray P, Rosenthal K, Pfaller M: Medical Microbiology, Philadelphia, Elsevier, 8th ed., 2015</li> </ol> <p>Supplementary literature</p> <ol style="list-style-type: none"> <li>1. Recommendations for antibiotic susceptibility of bacteria and susceptibility of fungi to antifungal drugs from the website <a href="http://www.eucast.org">www.eucast.org</a></li> </ol>														
Methods and criteria of evaluation	<p>The basis for passing the subject of Microbiology is compliance with the principles set out in the Didactic Regulations of the Department and Department of Microbiology.</p> <p><b>The final theoretical exam</b> consists of 60 questions: test (one-choice answer) regarding knowledge gained during lectures (up to 50% of questions) and laboratories. For each correct answer, the student receives one point. 36 (60%) points are required to obtain a positive grade.</p> <p>A student may be released from the exam with a very good final grade if his average grade (weighted average calculated from grades for: activity [x1], tests [x1], colloquia [x3]) is a minimum of 4.50.</p> <p><b>Final theoretical exam, colloquia, written tests:</b> passing a grade based on a test (written test: single choice closed questions) from knowledge gained in lectures and laboratories.</p> <p>In the case of written tests (at admission cards, colloquia and exam), the points obtained are converted into degrees according to the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>excellent</td> </tr> <tr> <td>84-91%</td> <td>very good</td> </tr> <tr> <td>76-83%</td> <td>good</td> </tr> <tr> <td>68-75%</td> <td>satisfactory</td> </tr> <tr> <td>60-67%</td> <td>acceptable</td> </tr> <tr> <td>0-59%</td> <td>fail</td> </tr> </tbody> </table> <p>Theoretical final exam: <math>\geq 60\%</math> (W1-W10 )  Colloquia, tests (written tests): <math>\geq 60\%</math> (W1-W10, U1-U6)  <b>Reports / work cards:</b> <math>\geq 60\%</math> (W1-W3, W5-W10, U1-U6, K1-K4)  <b>Prolonged observation / Activity</b> (1-3 points; 3 points = excellent grade) (W1-W3, W5-W10, U1-U6, K1-K4)</p>	Percentage of points	Grade	92-100%	excellent	84-91%	very good	76-83%	good	68-75%	satisfactory	60-67%	acceptable	0-59%	fail
Percentage of points	Grade														
92-100%	excellent														
84-91%	very good														
76-83%	good														
68-75%	satisfactory														
60-67%	acceptable														
0-59%	fail														

Practical training as part of course	Not applicable according to the educational program
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B) Course description in the didactic cycle

Space name	Comment														
Didactic cycle	3 <sup>rd</sup> year, 5 <sup>th</sup> semester (fall)														
Form of crediting a subject in the cycle	Lectures: exam Laboratories: exam														
Form(s) and number of course hours as well as the form of crediting	Lectures: 30 hours - exam Laboratories: 50 hours - credit														
Course coordinator(s)	Dr hab. inż. Krzysztof Skowron, prof. UMK														
Subject Teachers	Dr hab. n. med. inż. Krzysztof Skowron, prof. UMK Dr n. med. Tomasz Bogiel Dr n. med. Joanna Kwiecińska-Piróg Dr n. med. Patrycja Zalas-Więcek														
Course form (character)	Obligatory														
Limit of places available in each group	Lecture: 3 <sup>rd</sup> year, 5 <sup>th</sup> semester Laboratories: groups of maximal 12 students														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods	N/A														
Subject website	N/A														
Learning outcomes determined for the given course form	Lecture: W1-W10, U2, U4, K1, K3 Laboratories: W1 -W10, U1-U6, K1-K4														
Methods and criteria of the evaluation for the given course form	<p><b>Credit conditions for the course and assessment criteria:</b></p> <p>In the case of written tests (at admission cards, colloquia and exam), the points obtained are converted into degrees according to the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>excellent</td> </tr> <tr> <td>84-91%</td> <td>very good</td> </tr> <tr> <td>76-83%</td> <td>good</td> </tr> <tr> <td>68-75%</td> <td>satisfactory</td> </tr> <tr> <td>60-67%</td> <td>acceptable</td> </tr> <tr> <td>0-59%</td> <td>fail</td> </tr> </tbody> </table> <p>Lecture:</p> <ul style="list-style-type: none"> <li>- <b>Colloquia:</b> assessment based on tests (written tests: open and closed single-choice questions) - credit <math>\geq</math> 60% (W1 - W10, U1 - U6)</li> <li>- <b>Final exam theoretical part</b> - credit for the grade on the basis of tests (written tests, single choice closed questions) - credit <math>\geq</math> 60% (W1 - W10, U1 - U6)</li> </ul> <p>Laboratories:</p>	Percentage of points	Grade	92-100%	excellent	84-91%	very good	76-83%	good	68-75%	satisfactory	60-67%	acceptable	0-59%	fail
Percentage of points	Grade														
92-100%	excellent														
84-91%	very good														
76-83%	good														
68-75%	satisfactory														
60-67%	acceptable														
0-59%	fail														

	<ul style="list-style-type: none"> <li>- <b>Colloquia, tests (written tests):</b> credit with grade based on tests results (written tests: open and closed single choice questions) - passing <math>\geq 60\%</math> (W1-W10, U1-U6)</li> <li>- <b>Reports / work cards:</b> <math>&gt; 60\%</math> (W1-W3, W5-W10, U1-U6, K1-K4)</li> <li>- <b>Prolonged observation / Activity</b> (<math>\geq 50\%</math> or 1-3 points; 3 points = excellent grade) (W1-W3, W5-W10, U1-U6, K1-K4)</li> </ul>
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. History of microbiology. Microbiology as a science and its branches. Taxonomy: microbial classification and naming.</li> <li>2. Procaryota and Eucaryota.</li> <li>3. Microbial morphology and its significance.</li> <li>4. Conditions for the growth of microorganisms.</li> <li>5. Factors of microbial virulence.</li> <li>6. Genetics and microbial variability.</li> <li>7. Human defense mechanisms against infections.</li> <li>8. Microbicidal activities.</li> <li>9. Antibacterial drugs - classification, characteristics, mechanisms of action.</li> <li>10. Antifungal drugs - distribution, characteristics, mechanisms of action.</li> <li>11. Mechanisms of microbial resistance to antibiotics - detection methods.</li> <li>12. Characteristics of selected Gram-positive bacteria.</li> <li>13. Characteristics of selected Gram-negative bacteria.</li> <li>14. Characteristics of selected viruses.</li> <li>15. Characteristics of selected fungi.</li> </ol> <p>Laboratories:</p> <ol style="list-style-type: none"> <li>1. Presentation of the laboratories organization and work safety regulations. Morphology of microorganisms (part I). Staining methods (simple and complex). Microscopy techniques.</li> <li>2. Morphology of microorganisms (part II). Bacteria culture and identification methods.</li> <li>3. Microbicidal activities. Antiseptics, disinfection, sterilization - process control. The influence of physico-chemical factors on microorganisms. Microbiological control of the environment.</li> <li>4. Methods for assessing the susceptibility of microorganisms to antibiotics. Principles of antibiotic therapy.</li> <li>5. Detection of antibiotic resistance mechanisms (phenotypic and genetic methods) - interpretation of results.</li> <li>6. Colloquium I. Diagnosis of anaerobic bacteria and <i>Bacillus</i> spp.</li> <li>7. Diagnosis of Gram-positive granulomas: <i>Staphylococcus</i> spp., <i>Streptococcus</i> spp., <i>Enterococcus</i> spp.</li> <li>8. Diagnostics of <i>Enterobacterales</i> and non-fermenting rods.</li> <li>9. Diagnostics of <i>Haemophilus</i> spp., <i>Neisseria</i> spp., <i>Moraxella</i> spp., <i>Corynebacterium</i> spp. and</li> </ol>

	<p><i>Mycobacterium</i> spp. Prevention of infections. Colloquium II. Fungi diagnostics.</p> <p>10. Respiratory tract infections. 11. Gastrointestinal and urinary tract infections. 12. Microbes as a medicine - probiotics and prebiotics, psychobiotics. Microbiological control of drugs. The role of a microbiologist and hospital pharmacist in constructing a hospital prescription and their role in combating hospital infections. 13. Colloquium III.</p>
Didactic methods	The same as in part A.
References	The same as in part A.

## Pathophysiology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pathophysiology</b> (Patofizjologia)
Unit offering the subject	Faculty of Pharmacy, Department of Pathophysiology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1755-F3-PATO-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	5
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy

Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>– lecture participation – 30 hours</li> <li>– laboratories participation (including the analysis of case studies, clinical and randomized test results) – 40 hours,</li> <li>– consultations participation, including scientific and research consultations – 3 hours,</li> <li>– final exam participation – 2 hours</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>75 hours</b>, which corresponds to <b>3.00 ECTS point</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– lecture participation – 30 hours,</li> <li>– laboratories participation (including the analysis of case studies, clinical and randomized test results) – 40 hours,</li> <li>– consultations participation, including scientific and research consultations – 3 hours,</li> <li>– final exam participation – 2 hours</li> <li>– reading the indicated literature – 10 hours,</li> <li>– preparation for laboratories – 10 hours,</li> <li>– preparation for test – 15 hours,</li> <li>– preparation for final exam – 15 hours.</li> </ul> <p>A total work amount: <b>125 hours</b>, which corresponds to <b>5 ECTS point</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– participation in lectures (including research results and scientific studies in the field of pathophysiology)- 20 hours,</li> <li>– participation in scientific consultations- 2 hours,</li> <li>– reading the indicated literature -10 hours,</li> <li>– participation in laboratories (including case studies, results of clinical and randomized studies, planning studies involving humans and animals) - 25 hours,</li> <li>– preparation for laboratories including scientific results - 6 hours,</li> <li>– preparation for final exam including research results and scientific studies in the field of pathophysiology - 6 hours.</li> </ul> <p>A total student workload related to the conducted research is <b>69 hours</b>, which corresponds to <b>2.76 ECTS point</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– preparation for test – 10 hours,</li> <li>– -preparation for final exam – 15 hours,</li> </ul> <p>Total time required for the preparation and participation in evaluating process: <b>25 hours</b>, which corresponds to <b>1 ECTS point</b>.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	Student:



	<p>W1: explains the role of the inflammatory process in etiopathogenesis and course of selected diseases - K_A.W6</p> <p>W2: knows the etiopathogenesis, clinical course of selected diseases - K_A.W6</p> <p>W3: presents the pros and cons of the latest therapeutic strategies for selected diseases - K_A.W6</p> <p>W4: classifies and critically evaluates modifiable and unmodifiable, as well as endo- and exogenous pathogenic factors - K_A.W7</p>
Learning outcomes - abilities	<p>Student:</p> <p>U1: analyses the pathomechanism and clinical consequences of cardiovascular, respiratory, nervous, endocrine, genitourinary, hematopoietic diseases and digestive, including lifestyle diseases- K_A.U5</p> <p>U2: is able to plans the diagnostic and therapeutic algorithm of selected diseases. – K_A.U5</p> <p>U3: correlates images of tissue and organ damage with the clinical symptoms of disease and the results of subjective and physical examination – K_A.U5</p>
Learning outcomes – social skills	<p>Student:</p> <p>K1: presents the pathophysiology of selected disease based on objective sources of information. - K7</p> <p>K2: Draws conclusions based on the analysis of clinical cases and critically assesses them. - K8</p>
Didactic methods	<p>Lectures:</p> <p>Expository teaching methods – informative (conventional) lecture, participatory lecture, problem-based lecture</p> <p>Laboratories:</p> <p>Exploratory teaching methods – practical, experimental, classic problem-solving, laboratory, round table, presentation of a paper, case study.</p> <p>Expository teaching methods – discussion, description</p> <p>Observation/demonstration teaching methods – display, simulation (simulation games)</p>
Preliminary requirements	<p>A student starting education in the subject of Pathophysiology should have knowledge of anatomy in the field of topography of individual organs and systems; physiology in the field of functions of individual organs and systems; biochemistry in the field of metabolic processes, including metabolic pathways: carbohydrates, lipids, proteins, as well as nucleic acid metabolism.</p>
Brief course description	<p>Pathophysiology is a preclinical subject, which describes aetiology and origins of mechanisms for functional disorders within an organism in various pathological stages. It covers cellular pathophysiology, pathophysiology of organs and systems, issues in relation to changes in adaptation and functions of organisms, disorders of organism's regulatory functions, metabolic disorders and pathophysiology of malignant diseases.</p>
Entire course description	<p>Lectures:</p> <p>The aim of the lectures is to familiarize the student with the detailed mechanisms of disorders in systems and organs, expanding the student's knowledge of clinical symptoms,</p>

	<p>diagnostics and the latest therapeutic strategies of most common diseases. During lectures the student discusses the etiopathogenesis of cardiovascular, endocrine and haematological disorders.</p> <p>Laboratories: Laboratories will equip students with the detailed mechanisms of systemic and specific disorders. Students will gain knowledge of mechanisms responsible for causing the disorders in cells, organs and systems level. Students will be able to connect specific dysfunction with clinical symptoms and test results. Students will analyse clinical cases, plans diagnostic and therapeutic algorithms, discuss the etiopathogenesis of internal diseases and analyses the pros and cons of available diagnostic procedures and therapeutic options.</p>														
References	<p>Primary literature</p> <ol style="list-style-type: none"> <li>1. McPhee SJ, Ganong WF: Pathophysiology of Disease: An Introduction to Clinical Medicine. International Edition. McGraw-Hill, 2006, 5<sup>th</sup> edition.</li> <li>2. Copstead L, Banasik J: Pathophysiology. Elsevier, 2013, 5<sup>th</sup> edition.</li> </ol> <p>Supplementary literature</p> <ol style="list-style-type: none"> <li>1. Prawon D, Singer CRJ, Baglin T: Oxford handbook of Clinical Haematology. Oxford University, 2004.</li> <li>2. Klatt EC, Kuman V: Robbins and Cotran Review of Pathology. W. B. Saunders Company, 2009, 3<sup>rd</sup> edition.</li> </ol>														
Methods and criteria of evaluation	<p>Lectures: <b>Written test:</b> W1-W4, U1-U3, K1, K2.</p> <p>Laboratories: - preparation of project/multimedial presentation (1-2 points): W1-W4, U1-U3, K1-K2 - activity in laboratories (extended observation: 1-3 points): K1, K2. - 4 written tests (descriptive): W1-W4, U1-U3, K1, K2</p> <p>Exam: In the case of written tests (exam, colloquium), the points obtained by students are converted into grades on the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Excellent</td> </tr> <tr> <td>84-91%</td> <td>Very good</td> </tr> <tr> <td>76-83%</td> <td>Good</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory</td> </tr> <tr> <td>60-67%</td> <td>Acceptable</td> </tr> <tr> <td>0-59%</td> <td>Failed/Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Grade	92-100%	Excellent	84-91%	Very good	76-83%	Good	68-75%	Satisfactory	60-67%	Acceptable	0-59%	Failed/Unsatisfactory
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92-100%	Excellent														
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76-83%	Good														
68-75%	Satisfactory														
60-67%	Acceptable														
0-59%	Failed/Unsatisfactory														
Practical training as part of course	Not applicable according to the educational program														

B) Course description in the didactic cycle

Space name	Comment										
Didactic cycle	3 <sup>st</sup> year, 1 <sup>st</sup> semester (fall)										
Form of crediting a subject in the cycle	Lectures: exam Laboratories: exam										
Form(s) and number of course hours as well as the form of crediting	<b>Lectures:</b> 30 hours - exam <b>Laboratories:</b> 40 hours - credit										
Course coordinator(s)	Prof. dr hab. Ewa Żekanowska										
Subject Teachers	Prof. dr hab. Ewa Żekanowska Dr hab. Barbara Ruszkowska-Ciastek Dr hab. Artur Słomka Dr Joanna Boinska Dr Inga Dziembowska										
Course form (character)	Obligatory										
Limit of places available in each group	<b>Lecture:</b> 3 <sup>st</sup> year, V semester <b>Laboratories:</b> groups of 12 students										
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń										
Number of hours of classes conducted using e-learning methods	N/A										
Subject website	N/A										
Learning outcomes determined for the given course form	Lecture: W1-W4, U1-U3, K1, K2 Laboratories: W1-W4, U1-U3, K1, K2										
Methods and criteria of the evaluation for the given course form	<p>Credit conditions for the course and assessment criteria:</p> <p><b>Lectures:</b></p> <ul style="list-style-type: none"> <li>- exam (written, descriptive covering the full material of the subjects including lectures, laboratories and additional materials).</li> <li>- attendance at lectures - any absence from the lecture must be justified within 14 days.</li> </ul> <p><b>Laboratories:</b></p> <ul style="list-style-type: none"> <li>- positive grades from four partial tests.</li> <li>- attendance at laboratories - every absence must be justified and made up in a manner agreed by the person conducting the laboratory.</li> <li>- positive grade from tutors (average of all grades obtained by the student during the laboratories and activity during the classes).</li> </ul> <p>In the case of written tests (exam, colloquium), the points obtained by students are converted into grades on the following scale:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Very good</td> </tr> <tr> <td>84-91%</td> <td>Good plus</td> </tr> <tr> <td>76-83%</td> <td>Good</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory plus</td> </tr> </tbody> </table>	Percentage of points	Grade	92-100%	Very good	84-91%	Good plus	76-83%	Good	68-75%	Satisfactory plus
Percentage of points	Grade										
92-100%	Very good										
84-91%	Good plus										
76-83%	Good										
68-75%	Satisfactory plus										

	60-67%	Satisfactory
	0-59%	Failed/Unsatisfactory
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. General view on disease and pathogenic factor. Inflammations.</li> <li>2. Pathogenesis of atherosclerosis. Coronary heart disease.</li> <li>3. Pathogenesis of hypertension. Pathomechanism of oedema and cyanosis.</li> <li>4. Obesity. Metabolic syndrome.</li> <li>5. Pathomechanism of heart failure. Pathomechanism of shock.</li> <li>6. Pathomechanism of acute kidney injury and chronic kidney disease. Cardiovascular pathophysiology tests.</li> <li>7. Water-electrolyte disorders.</li> <li>8. Plasma proteins in selected diseases. Renal and digestive systems pathophysiology test.</li> <li>9. Hormonal regulation and its disorders. Disorders of carbohydrate metabolism.</li> <li>10. Pathophysiology of cancer.</li> <li>11. Pathophysiology of anaemia. Endocrinology system pathophysiology test.</li> <li>12. Haematopoietic proliferative disorders.</li> <li>13. Platelet, vascular and plasma haemostasis. Fibrinolytic system.</li> <li>14. Pathomechanism of plasma, platelet and vascular haemorrhagic diathesis. Thrombosis pathomechanism.</li> <li>15. Drugs used in haemostasis disorders. Hematologic and haemostatic disorders test.</li> </ol> <p>Laboratories:</p> <ol style="list-style-type: none"> <li>1. Pathological changes in ECG. Heart rhythm disorders. Valvular heart disorders.</li> <li>2. Pathophysiology of myocardial infarction.</li> <li>3. Pathophysiology of respiratory system.</li> <li>4. Pathophysiology of acute renal injury and chronic kidney disease.</li> <li>5. Acid-base disorders.</li> <li>6. Pathophysiology of the digestive system disorders. Pathology of the liver.</li> <li>7. Pathophysiology of the pituitary gland disorders.</li> <li>8. Pathophysiology of adrenal glands disorders.</li> <li>9. Pathophysiology of thyroid gland disorders and parathyroid glands disorders. Osteoporosis.</li> <li>10. Pathophysiology of diabetes.</li> <li>11. Pathophysiology of haemostasis. Pathophysiology of thrombosis.</li> <li>12. Pathophysiology of anaemia.</li> <li>13. Pathophysiology of myeloproliferative neoplasms.</li> <li>14. Pathophysiology of neurodegenerative diseases.</li> <li>15. Circadian rhythm disorders. Insomnia.</li> </ol>	
Didactic methods	The same as in part A.	
References	The same as in part A.	

## Psychology

### A. General description

Space name	Comment
Subject name (in English and in Polish)	Psychology (Psychologia)
Unit offering the subject	Faculty of Health Sciences Chair of Clinical Neuropsychology <b>Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun</b>
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-F1-PSYCH-J
ISCED code	(0916) Pharmacy
ERASMUS code	
Number of ECTS points	1
Form of crediting	Graded credit
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher</p> <ul style="list-style-type: none"> <li>– Class participation: 15 hours,</li> <li>– Consultations participation: 2 hours</li> <li>– Final credit participation: 1 godzina.</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>18 hours</b>, which corresponds <b>0.72 ECTS</b>.</p> <p>2. Student workload balance</p> <ul style="list-style-type: none"> <li>– Class participation: 15 hours</li> <li>– Consultations participation: 2 hours</li> <li>– Preparation for classes: 2 hours</li> <li>– Repetition of course material: 2 hours</li> <li>– credit participation: 4 hours</li> </ul> <p>Total student workload balance: <b>25 hours</b>, which corresponds <b>1.00 ECTS</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– Participation in classes (including methodology of psychological research, and research results in field of psychology): 15 hours</li> <li>– Reading scientific literature: 2 hours</li> <li>– Preparing for classes involving scientific activity: 2 hours</li> </ul>

	<p>Total workload related to conducting research: <b>19 hours</b>, which corresponds <b>0.76 ECTS</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- Preparation for classes + repetition of course material + preparation for test – 2+2+4 = <b>8 hours (0.32 ECTS)</b>.</li> </ul> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the principles of interpersonal communication with the patient and other healthcare professionals. K_A.W29</p> <p>W2: Is aware of the psychological conditions and restrictions resulting from the disease and the need to promote behavior supporting mental health. K_A.W30</p> <p>W3: Knows the problems of group work and its support. K_A.W31</p>
Learning outcomes - abilities	<p>U1: has the ability to initiate and support group, help and remedial activities, influence attitude development and lead a team; K_A.U19</p> <p>U2: Has the ability to efficiently communicate within group and with the patient. K_A.U19</p>
Learning outcomes – social skills	<p>K1: is ready to establish relationships with a patient and colleagues based on mutual trust and respect; K1</p> <p>K2: is able to propagate health-promoting behaviours; K6</p>
Didactic methods	<p>Classes:</p> <ul style="list-style-type: none"> <li>▪ Simulational exercises</li> <li>▪ Discussion in groups,</li> <li>▪ Expert tables method</li> </ul>
Preliminary requirements	None
Brief course description	The aim of the course is to equip students with knowledge and skills in group and patient communication, psychological determinants of health and illness, including those related to stress and coping with it.
Entire course description	<p>The course aims to:</p> <ul style="list-style-type: none"> <li>- familiarize students with the basic group processes, principles of group communication</li> <li>- equip them with the ability to communicate effectively in a group and with a patient;</li> <li>- familiarize students with the problems of stress</li> <li>- equip students with the ability to recognize and cope with other stress symptoms;</li> <li>- familiarize students with mental health issues</li> <li>- equipping students with behavior supporting mental health and the ability to promote such behavior.</li> </ul>
References	<p>Obligatory literature</p> <ol style="list-style-type: none"> <li>1. Zimbardo P., Gerrig R. Psychology and Life, Pearson</li> <li>2. Aronson E. et al. Social Psychology, Pearson</li> </ol>
Methods and criteria of evaluation	<p><b>Test:</b> W1, W2, U1, U2</p> <p><b>Classroom activity:</b> U1, U2, K1, K2</p>

Professional practice	Not applicable according to the educational program
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B) Course description in the didactic cycle

Space name	Comment														
Didactic cycle	<b>Year I semester II</b>														
Form of crediting a subject in the cycle	<b>Graded credit</b>														
Form(s) and number of course hours as well as the form of crediting	Classes, 15 hours, graded credit														
Course coordinator(s)	<b>Prof. dr hab. Alina Borkowska</b>														
Subject Teachers	<b>Ćwiczenia:</b> Dr n. med. Maciej Bieliński Dr n. med. Marcin Jaracz Dr n. med. Małgorzata Piskunowicz														
Course form (character)	<b>Obligatory</b>														
Limit of places available in each group	<b>Groups up to 30</b>														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods	N/A														
Subject website	N/A														
Learning outcomes determined for the given course form	<b>Classes: W1, W2, U1, U2, K1, K2</b>														
Methods and criteria of the evaluation for the given course form	The condition of passing the course is active participation in didactic classes and obtaining the appropriate number of points. <b>Classes: written test</b> <table border="1"> <thead> <tr> <th>Points percentage</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>88-100%</td> <td>bdb</td> </tr> <tr> <td>81-87%</td> <td>db+</td> </tr> <tr> <td>74-80%</td> <td>db</td> </tr> <tr> <td>67-73%</td> <td>dst+</td> </tr> <tr> <td>60-66%</td> <td>dst</td> </tr> <tr> <td>0-59%</td> <td>fail</td> </tr> </tbody> </table>	Points percentage	Grade	88-100%	bdb	81-87%	db+	74-80%	db	67-73%	dst+	60-66%	dst	0-59%	fail
Points percentage	Grade														
88-100%	bdb														
81-87%	db+														
74-80%	db														
67-73%	dst+														
60-66%	dst														
0-59%	fail														
List of topics	<ol style="list-style-type: none"> <li>1. Psychological concepts of the man.</li> <li>2. Interpersonal communication</li> <li>3. Assertiveness</li> <li>4. Group processes</li> <li>5. Psychology of health and disease</li> <li>6. Psychosomatics</li> <li>7. Psychological stress and coping</li> <li>8. Emotions and motivation.</li> </ol>														
Didactic methods	Identical as in Part A														
References	Identical as in Part A														

## Sociology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	Sociology (Socjologia)
Unit offering the subject	Faculty of Laboratory for Social Medicine Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-F1-SOCJ-J
ERASMUS code	
ISCED code	(916) Pharmacy
Number of ECTS points	1
Form of crediting	Grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Education module A</b> Biomedical and humanistic foundations of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>- tutorials – 15 hours,</li> <li>- consultations – 1 hour</li> <li>- colloquium - 1 hour</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>17 hours, which corresponds to 0.68 ECTS point.</b></p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>- taking part in tutorials - 15 hours</li> <li>- preparation for colloquium and colloquium – (4+1)= 5 hours</li> <li>- project preparation – 2 hours</li> <li>- reading scientific papers – 2 hours</li> <li>- taking part in consultations – 1 hour</li> </ul> <p>A total work amount: <b>25 hours, which corresponds to 1.00 ECTS point.</b></p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>- reading scientific papers - 5 hours</li> <li>- preparing for tutorials – 7 hours</li> <li>- preparing for passing the tutorial in scientific aspect – 2 hours</li> </ul>



	<p>A total student workload related to the conducted research is <b>14 hours</b>, which corresponds to <b>0.56 ECTS point</b>.</p> <p>4. Time required for the preparation and participation in evaluating process: - preparing for colloquium and colloquium – (4+1)=5 hours</p> <p>Total time required for the preparation and participation in evaluating process: <b>5 hours</b>, which corresponds to <b>0,2 ECTS point</b>.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>Student:</p> <p>W1: understands the social determinants (inequality, education, social background) of human knowledge (K_A.W30)</p> <p>W2: understands the social dimension of health and illness, the impact of social environment and social inequality on a person's health based on sociological data (K_A.W30).</p> <p>W3: has knowledge of the principles of interpersonal communication (barriers with communication, solving problems with difficult patient/situation) (K_A.W30)</p> <p>W4: has knowledge of the functioning of group activities (support groups, associations, foundations) (K_A.W30)</p>
Learning outcomes - abilities	<p>U1: is able to identify the social dimension of medical decisions and to recognize his/her own socially determined presumptions based on his/her sociological knowledge (K_A.U21)</p> <p>U2: is able to apply in simulated conditions the basic rules of interpersonal communication (K.AU19, K_A.U21)</p>
Learning outcomes – social skills	<p>K1: is aware of the need to promote healthy behaviors (K6)</p> <p>K2: is ready to accept the responsibilities associated with decisions taken as part of his professional activity (K10)</p>
Didactic methods	<p><u>Tutorials:</u> Expository teaching methods – informative (conventional) lecture, participatory lecture, problem-based lecture, ideas exchange, exposing methods; film, presentation</p>
Preliminary requirements	none
Brief course description	The main aim of the sociology is to familiarize students with social aspects of medicine and pharmacy. Students will learn about relations between medicine and social dimension of well-being and knowledge.
Entire course description	<ol style="list-style-type: none"> <li>1. What is sociology?</li> <li>2. Basic sociological conception</li> <li>3. Sociology of medicine as a part of sociology of science</li> <li>4. Relevant sociological data</li> <li>5. Medicine, society and well-being</li> </ol>

References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Ian Hacking, The Social Construction of What?, 2000.</li> <li>2. Richard Wilkinson. Kate Pickett, The Spirit Level: Why Greater Equality Makes Societies Stronger, 2011.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Rose Weitz, The Sociology of Health, Illness, and Health Care: A Critical Approach, 2017</li> <li>2. Sarah Nettleton, Sociology of Health and Illness, 2013</li> </ol>
Methods and criteria of evaluation	Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

### B. Course description in the didactic cycle

Space name	Comment						
Didactic cycle	1 <sup>st</sup> year, 1 <sup>st</sup> semester (autumn)						
Form of crediting a subject in the cycle	Tutorials: grading						
Form(s) and number of course hours as well as the form of crediting	Tutorials: 15 hours- grading						
Course coordinator(s)	Dr Waldemar Kwiatkowski						
Subject Teachers	Mgr Paweł Drygas						
Course form (character)	Obligatory						
Limit of places available in each group	Tutorials: groups of 25 students						
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń						
Number of hours of classes conducted using e-learning methods	N/A						
Subject website	N/A						
Learning outcomes determined for the given course form	Tutorials: W1, W2, W3, W4, U1, U2, K1, K2						
Methods and criteria of the evaluation for the given course form	<p>Tutorials:  Colloquium &gt; 60%  Project &gt; 60%  Participation in didactic discussion in groups  Credit: the average of the single-choice test and additions and of the project presentation</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>excellent</td> </tr> <tr> <td>84-91%</td> <td>very good</td> </tr> </tbody> </table>	Percentage of points	Grade	92-100%	excellent	84-91%	very good
Percentage of points	Grade						
92-100%	excellent						
84-91%	very good						

	76-83%	good	
	68-75%	satisfactory	
	61- 67%	acceptable	
	0-60%	fail	
List of topics	Tutorials: 1. Behavior in health and disease- social-cultural aspects 2. Social inequalities. Social system of supporting on an examples of family system, support group, foundations and associations 3. Communication with client-patient (correct communication, barriers to communication with the patient, difficult patient - difficult situations) 4. Individual's functioning in a health risk society 5. Process of social inequalities, fashion, media, medicalization and pharmacologization		
Didactic methods	The same as in part A		
References	The same as in part A		

**Course module B**  
Physicochemical basis of pharmacy

## Biophysics

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Biophysics</b> (Biofizyka)
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1755-F1-BFIZ-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	4
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory <b>Course module B</b> Physicochemical basis of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>– lecture participation – 15 hours</li> <li>– laboratories participation – 27 hours,</li> <li>– consultations participation, including scientific and research consultations – 8 hours,</li> <li>– final exam participation – 2 hours</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>52 hours</b>, which corresponds to <b>2.08 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– lecture participation – 15 hours,</li> <li>– laboratories participation – 27 hours,</li> <li>– consultations participation, including scientific and research consultations – 8 hours,</li> <li>– final exam participation – 2 hours</li> <li>– reading the indicated literature – 10 hours,</li> <li>– preparation for laboratories – 13 hours,</li> <li>– preparation for test – 10 hours,</li> <li>– preparation for final exam – 15 hours.</li> </ul> <p>A total work amount:, which corresponds to <b>4.00 ECTS points</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– reading the indicated literature - 6 hours</li> <li>– participation in lectures (including the methodology of scientific research, research results, studies) - 8 hours,</li> <li>– participation in scientific consultations - 5 hours,</li> <li>– participation in laboratories (including the methodology of scientific research, research results, studies): 13 hours,</li> <li>– preparation for laboratories including scientific results: 10 hours,</li> </ul>

	<ul style="list-style-type: none"> <li>– preparation for final exam including research results and scientific studies in the field of biophysics - 8 hours.</li> </ul> <p>A total student workload related to the conducted research is 50 hours, which corresponds to <b>2.00 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– preparation for final exam and exam 12 hours,</li> </ul> <p>Total time required for the preparation and participation in evaluating process: 15 hours, which corresponds to 0.48 ECTS point.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>Student:</p> <p>W1: knows physical basis of physiological processes (circulation, nerve impulse transmission, gas and substance exchange, movement) occurring in human body - K_B.W1</p> <p>W2: characterises effect of physical factors of the environment (changing pressure, temperature, ionizing and nonionizing radiation, electric and magnetic fields) on human organism - K_B.W2</p> <p>W3: knows the methodology of physical quantities measurements -K_B.W3</p> <p>W4: knows biophysical basics of diagnostic and therapeutic techniques using in medicine - K_B.W4</p>
Learning outcomes - abilities	<p>Student:</p> <p>U1: is able to use simple laboratory apparatus to measure physical and biophysical properties of substances and on the basis of performed calculations interprets results of measurements and describes the occurring phenomena- K_B.U1, K_B.U2</p> <p>U2: evaluates the effects of sound waves, ionizing and nonionizing radiation, electric and magnetic field on human organism - K_B.U2</p> <p>U3: describes and analyses physical phenomena related to diagnostics methods (ultrasonography, electrocardiography) and disease therapy using ionizing radiation - K_B.U3</p>
Learning outcomes – social skills	<p>In the scope of social competencies the graduate is ready to:</p> <p>K1: use objective sources of information – K7</p> <p>K2: draw conclusions based on their measurements or observation – K8</p>
Didactic methods	<p>Lectures:</p> <p>informative lecture (conventional)</p> <p>problem – oriented lecture</p> <p>Laboratory tutorials:</p> <p>participation in laboratory tutorials</p> <p>observation</p> <p>theoretical calculations</p>
Preliminary requirements	<p>Before starting the course the student should have the knowledge, skills and competencies resulting from the teaching of physics and mathematics at secondary school level</p>
Brief course description	<p>Presentation of the physical basis enabling the description of the body's functioning, determining the influence of the</p>

	environment on the human body and learning the principles of medical diagnostics and therapy.
Entire course description	<p>The course includes biophysics of human and elements of medical physics. In general it is an interdisciplinary branch of science which develops at the border of physics, chemistry, biology and medical sciences. It employs physical methods and techniques to study phenomena taking place in living organisms at all levels of their organization, from the micro to the macro scale, from molecules to cells and whole organisms. Medical physics means application of physical phenomena and physical methods and techniques (e.g. ultrasounds, light, laser, ionizing radiation, nuclear resonance) in medical diagnosis and therapy.</p> <p>Among the topics covered during the tutorials prominent place takes physical phenomena used in the diagnostic work, for example electrocardiograph or ultrasound equipment. Students measure also physical properties of substances as absorption and viscosity. The aim of the series of classes realized in this course is to develop in students the ability to apply the acquired knowledge, the ability to analyze and interpret results of measurements or experiments and the ability to critically evaluate the results of the measurements.</p>
References	<p><b>Primary literature:</b></p> <ol style="list-style-type: none"> <li>1. Davidovits P.: Physics in Biology and Medicine, Academic Press</li> <li>2. Giancoli D.C.: Physics. Principles with applications, Pearson Education, Inc.</li> </ol> <p><b>Supplementary literature:</b></p> <ol style="list-style-type: none"> <li>1. Kirk T.: Physics for the IB diploma, Oxford University Press</li> <li>2. Tsokos K.A.: Physics for the IB diploma, Cambridge University Press</li> </ol>
Methods and criteria of evaluation	<p>Laboratories:  <b>Test:</b> W1-W4  Practical performance of tutorials, preparing a report:U1-U3; K1, K2  Lectures:  <b>Exam:</b> W1-W4, U1-U3  Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	3 <sup>st</sup> year, 1 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Lectures: exam Laboratories: credit
Form(s) and number of course hours as well as the form of crediting	Lectures: 15 hours - exam Laboratories: 27 hours - credit
Course coordinator(s)	Prof. dr hab. Stefan Kruszewski
Subject Teachers	Lectures: Prof. dr hab. Stefan Kruszewski Laboratories: Dr Blanka Ziolkowska

Course form (character)	Obligatory
Limit of places available in each group	Lecture: 1 <sup>st</sup> year, 1 <sup>st</sup> semester students Laboratories: a group of 12 -, 24- persons
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	N/A
Subject website	<a href="http://www.pracownia.biofizyka.cm.umk.pl">www.pracownia.biofizyka.cm.umk.pl</a>
Learning outcomes determined for the given course form	Lectures: W1-W4, K1 Laboratories: W1 -W4, U1-U3, K1, K2
Methods and criteria of the evaluation for the given course form	<p>The requirement for credit obtainment in Biophysics is passing the exam that is conducted in the winter session. To the exam in the first term, students will be admitted who have received credit in laboratory.</p> <p>During the tutorials student has to realize 6 experiments and pass 6 tests (open and close questions, single choice). The final report from the results of each performed experiment the student should prepared in the end of each classes. Those who did not receive credit in laboratories classes before the end of the winter semester are required to complete the pass before the second term exam.</p> <p>Exam in the first and the second term is written and consists of 30 test tasks (open questions).</p> <p>Assessment criteria:  fail – 0-55 %  satisfactory – 56-67 %  satisfactory plus – 68-75%  good – 76-83 %  good plus – 84-91%)  very good – 92-100%</p>
List of topics	Lectures: Introduction. What is Biophysics. Thermodynamic system. Enthalpy. Entropy. Free energy, free enthalpy. Chemical potential. Phenomena of mass transport. Diffusion, diffusion through the membrane, osmosis. Electrochemical potential. Stationary state. Energy dissipation. Cell membrane, transmembrane transport. Resting potential. Action potential. Fluid flow, equation of continuity. Bernoulli's principle. Viscosity. Newtonian fluid, viscoelastic fluids. Turbulent motion of fluids. Vessel resistance. Surface tension, Laplace principal. Viscosity of blood. Erythrocyte deformability. Erythrocyte aggregation. Vibration, acoustic wave. Impedance. Reflection coefficient. Sound features. Equal loudness contour, threshold of hearing, sound intensity level, loudness level. Auditory system. Mechanical model of the middle ear. Cochlear amplifier. Loudness perception, frequency selectivity,



	<p>pitch perception. Hearing loss. Speech organs. Production of speech sounds.</p> <p>Electricity and magnetism. Electric dipole. Circulatory system. Cardiac energetic. Properties of blood vessels. Cardiac pacemaker. Cardiac action potential. Electrocardiography. Einthoven lead.</p> <p>Electromagnetic wave. Optical fiber. Optical systems. Optical instruments. Microscopic techniques. Resolving power of microscope. Light scattering. Rayleigh scattering, Raman scattering, dynamic light scattering.</p> <p>Lasers in medicine. Absorption of radiation in tissue. Penetration depth of radiation in tissue.</p> <p>Optical layout of the eye, resolving power of eye, defects of vision. Vision process. Illumination units.</p> <p>Nuclear forces. Radioactive decay. Ionizing radiation. Detection of nuclear radiation. Harmful effects of ionic radiation. Radiation protection.</p> <p>Physical basis of selected therapeutic techniques: ultrasound and irradiation.</p> <p>Doppler measurement of blood flow, ultrasonography, computed tomography, magnetic resonance imaging. Single photon emission tomography SPECT, Positron emission tomography PET. Radiopharmaceuticals.</p> <p>Tutorials:</p> <p>Students perform the assigned practice, which were chosen from the following list:</p> <ol style="list-style-type: none"> <li>1. Interference current testing.</li> <li>2. Investigation of diadynamic currents.</li> <li>3. Physical basics of electrocardiography.</li> <li>4. Determination of sound speed.</li> <li>5. Transport through the membrane, diffusion, osmosis.</li> <li>6. Lambert-Beer law.</li> <li>7. Testing liquid flow.</li> <li>8. Surface tension.</li> <li>9. Determination of the linear gamma absorption coefficient. Elements of dosimetry.</li> <li>10. Höppler viscometer.</li> <li>11. audiometry.</li> <li>12. Spectral analysis of sound.</li> <li>13. Microwave examination.</li> <li>14. Physical basics of electrocardiography.</li> <li>15. Electric cell model.</li> <li>16. Elements of biomechanics.</li> <li>17. Mechanics - a moment of strength.</li> <li>18. Physical basics of electrocardiography.</li> <li>19. Liquid viscosity measurement.</li> <li>20. The microscope.</li> <li>21. Physical foundations of ultrasound.</li> <li>22. Determination of visual impairment based on the radius of curvature of the cornea.</li> <li>23. Physical basis for correction of vision defects.</li> <li>24. Examination of emission spectra.</li> </ol>
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	<p>25. Refractometry.</p> <p>26. Polarimetry.</p> <p>27. Methods for determining the refractive index.</p> <p>28. Observation of optical phenomena.</p> <p>29. Geometric optics.</p> <p>30. Determination of the refractive index of a liquid.</p> <p>31. Determination of the upper limit of <math>\beta</math> radiation energy by the absorption method.</p> <p>32. Determination of the linear radiation absorption coefficient <math>\gamma</math>.</p> <p>33. Research on <math>\gamma</math> radiation statistics.</p> <p>34. Examination of the <math>\gamma</math> radiation spectrum.</p> <p>35. Radiation detectors. G-M counters.</p> <p>36. Measurement of dose rate and contamination at measuring stations.</p> <p>37. Determination of unknown concentration by UV-VIS spectroscopy and refractometry.</p> <p>38. Determination of unknown concentration by polarimetry and UV-VIS spectroscopy.</p> <p>39. Optical phenomena in cosmetology.</p> <p>40. Electrical parameters of the skin and body.</p> <p>41. Selected applications of ultrasonic waves.</p> <p>42. Transport through the membrane. Diffusion, osmosis.</p> <p>43. Liquid viscosity measurement.</p> <p>44. Fluorescence research and application.</p> <p>45. Determination of sound velocity by acoustic resonance method.</p> <p>46. Basics of tonal audiometry.</p> <p>47. Superposition of acoustic waves.</p> <p>48. Spectral analysis and sound synthesis.</p> <p>49. Examination of speech signal formability.</p> <p>50. Auditory auditory tests I.</p> <p>51. Auditory auditory tests II.</p> <p>52. Objective and subjective eye examination.</p> <p>53. Dioptrmierz.</p> <p>54. Fluorescence research and application.</p> <p>55. Basics of interferometry and holography.</p> <p>56. Michelson interferometer.</p> <p>57. Polarimetry.</p> <p>58. Contrast-phase and polarizing microscope.</p> <p>59. Examination of optical filters</p>
Didactic methods	The same as in part A
References	The same as in part A

## Analytical chemistry

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Analytical chemistry</b> (Chemia analityczna)
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1710-F2-CHAN-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	12
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module B</b> Physicochemical basis of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– lecture participation – 40 hours,</li> <li>– tutorials participation – 15 hours</li> <li>– laboratories participation – 90 hours,</li> <li>– seminars participation – 15 hours,</li> <li>– consultations participation, including scientific and research consultations – 12 hours,</li> <li>– final exam participation – 3 hours</li> </ul> <p>A total work amount: 175 hours which corresponds to <b>7.00 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– lecture participation – 40 hours,</li> <li>– tutorials participation – 15 hours</li> <li>– laboratories participation – 90 hours,</li> <li>– seminars participation – 15 hours,</li> <li>– consultations participation, including scientific and research consultations – 12 hours,</li> <li>– final exam participation – 3 hours,</li> <li>– preparing and completing notes – 20 hours</li> <li>– collecting materials and preparing for classes – 37 hours</li> <li>– reading the indicated literature – 18 hours,</li> <li>– preparation for tests – 25 hours,</li> <li>– preparation for final exam – 25 hours.</li> </ul> <p>A total work amount: 300 hours, which corresponds to <b>12.00 ECTS points</b>.</p> <p>3. Workload related to conducting research:</p>

	<ul style="list-style-type: none"> <li>– participation in lectures (including research results and scientific studies in the field of analytical chemistry) – 30 hours,</li> <li>– participation in scientific consultations – 12 hours,</li> <li>– reading the indicated literature - 15 hours,</li> <li>– participation in laboratories and seminars related to scientific activity (including research methodology and research results) – 85 hours,</li> <li>– preparation for classes (laboratories and seminars) including scientific results: 40 hours,</li> <li>– preparation for passing (tests and an exam) in the field of scientific aspects for analytical chemistry - 33 hours.</li> </ul> <p>A total student workload related to the conducted research is 197 hours, which corresponds to <b>8.60 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– preparation for tests and exam + preparation for classes + participation in the exam - 25+ 25 + 3 = 53 (2.12 ECTS points).</li> </ul> <p>Total time required for the preparation and participation in evaluating process: 52 hours, which corresponds to <b>2.12 ECTS point</b>.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>The graduate knows and understands:</p> <p>W1: classical methods of quantitative analysis (weight and volume analysis (alkacymetry, redoxymetry, argentometry, complexonometry)</p> <ul style="list-style-type: none"> <li>– K_B.W11</li> </ul> <p>W2: application of classical quantitative analysis methods - K_B.W11</p> <p>W3: classification of instrumental analysis techniques, the theoretical and methodological basis of spectroscopic, electrochemical, chromatographic and mass spectrometry techniques, as well as the operation principles of devices used in the techniques</p> <ul style="list-style-type: none"> <li>– K_B.W12</li> </ul> <p>W4: classification and theoretical foundations of instrumental analytical techniques – K_B.W12</p> <p>W5: criteria for selecting the analytical method to perform a specific analytical task - K_B.W13</p> <p>W6: definitions of validation parameters of analytical method; planning, performing and evaluation of a validation process – K_B.W13</p> <p>W7: Knows types of solutions and their division due to different criteria (e.g. real, colloidal solutions, suspensions) - K_B.W7</p>
Learning outcomes - abilities	<p>The graduate is able to:</p> <p>U1: optimize and perform validation of a classical analytical method – K_B.U6</p> <p>U2: perform qualitative and quantitative analyses of elements and chemical compounds by means of classical analytical methods and assess the credibility of analysis result – K_B.U7</p>

	<p>U3: optimize and perform validation of an instrumental analytical method – K_B.U6</p> <p>U4: perform qualitative and quantitative analyses of elements and chemical compounds by means of instrumental analytical methods and assess the credibility of analysis result – K_B.U7</p> <p>U5: assess the credibility and analytical quality of measurement results using appropriate statistical tools – K_B.U7</p> <p>U6: Performs analysis of water intended for pharmaceutical purposes using the recommended analytical methods - K_B.U5</p>
Learning outcomes – social skills	<p>K1: use objective sources of information - K7</p> <p>K2. draw conclusions based on their measurements or observation - K8</p>
Didactic methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>▪ informative lecture (conventional)</li> <li>▪ problem – oriented lecture</li> <li>▪ multimedia presentation</li> </ul> <p>Laboratory tutorials:</p> <ul style="list-style-type: none"> <li>▪ participation in laboratory tutorials</li> <li>▪ observation</li> <li>▪ practical laboratory studies</li> </ul> <p>Seminars:</p> <ul style="list-style-type: none"> <li>▪ activating and problem-oriented discussion,</li> <li>▪ classical problem-oriented method,</li> <li>▪ use the Moodle platform</li> </ul>
Preliminary requirements	<p>To implement the described subject, it is necessary to have basic knowledge about the properties of chemical compounds and chemical analysis obtained as part of the implementation of the program of general and inorganic chemistry. In addition, students should have knowledge and skills acquired in the subjects of mathematics and statistics.</p>
Brief course description	<p>Analytical chemistry is the science of measurement and includes methods used in many fields of science, including in medicine and pharmacy. The subject of Analytical chemistry includes lectures, exercises (laboratory and auditorium) and seminars aimed at familiarizing students with the methods of detection, identification and determination of the content of ingredients in the test sample, with particular emphasis on the possibility of their use in the quality control of medicinal products in the pharmaceutical industry.</p> <p>Mastering issues in the field of analytical chemistry is the basis for subjects implemented in subsequent semesters, such as: drug chemistry, drug form technology, biopharmacy.</p>
Entire course description	<p>The lectures are designed to familiarize the student with the following topics: stages of the analytical process, development of measurement results, validation of analytical methods, classic methods of analysis (weight analysis, titration analysis), spectroscopic (UV-Vis spectrophotometry, IR, NMR, flame photometry), electroanalytical methods (potentiometry, polarography, voltamperometry, conductometry), chromatographic methods (GC, HPLC, TLC, electrophoresis).</p>

	<p>The laboratories are designed to familiarize the student with the classical quantitative analysis, which includes weight analysis, titration methods - alkacimetry, complexonometry, redoximetry, precision precipitation) and instrumental analysis methods (chromatography - GC, HPLC, TLC; spectrophotometry, spectrofluorimetry, flame photometry, voltammetry, conductometry potentiometry).</p> <p>The seminars are designed to:</p> <ul style="list-style-type: none"> <li>- teach how to use the scientific literature in the field of analytical chemistry,</li> <li>- teach students how to solve problems in the field of analytical chemistry: how to choose the right instrumental technique, method optimization and validation.</li> </ul>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. C. Harris Daniel, Quantitative chemical analysis, Palgrave, 2017</li> <li>2. D.S. Skoog, Fundamentals of Analytical Chemistry, Cengage learning Inc., 2012</li> <li>3. F. Scholz, H. Kahler, Chemical Equilibria in Analytical Chemistry, Springer International Publishing, 2019</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. E. Prichard, Quality Assurance in Analytical Chemistry, Wiley, 2007</li> <li>2. M. F. Vitha, Chromatography. Principles and Instrumentation. Wiley, 2016</li> <li>3. A. J. Bard, L. R. Faulkner, Electrochemical Methods: Fundamentals and Applications, Wiley, 2000</li> <li>4. R. M. Silverstein, et al, Spectrometric Identification of Organic Compounds, 8<sup>th</sup> Edition, Wiley, 2014.</li> </ol>
Methods and criteria of evaluation	<p>Exam: W1-W7, U1-U6  Laboratories: W2, W5, W6, W7, U2, U4, U5, U6  Exercises: W1, W3, U1-U6  Activity: K1, K2  Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	2 <sup>st</sup> year, 3 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Lectures: credit Laboratories: credit Tutorials: credit
Form(s) and number of course hours as well as the form of crediting	Lectures: 20 hours - credit Laboratories: 45 hours - credit Tutorials: 15 hours - credit
Course coordinator(s)	Dr. hab. Bogumiła Kupcewicz
Subject Teachers	Dr. hab. Bogumiła Kupcewicz dr Monika Richert dr Marta Sobiesiak dr Joanna Ronowicz

	mgr Natalia Piekuś-Słomka mgr Mariusz Zapadka
Course form (character)	Obligatory
Limit of places available in each group	Lectures: students of the second year, semester III (fall) Laboratories: groups of 12 people Tutorials: groups of 24 people
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	<a href="https://moodle.umk.pl/WFarm/">https://moodle.umk.pl/WFarm/</a>
Learning outcomes determined for the given course form	Lectures: W1, W2, W7, U1, U2, U4, U5, U6 Laboratories: W1, W2, W7, U1, U2, U4, U5, U6 Tutorials: W1, K1, K2
Methods and criteria of the evaluation for the given course form	The condition of passing the course is active participation in didactic classes and obtaining the appropriate number of points. Laboratories: written tests, passing tests - passing exercises requires 60% points for analysis and tests.
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Types of errors in classical quantitative analysis. Measurement uncertainty.</li> <li>2. Criteria for choosing a classical analytical method.</li> <li>3. Titration analysis - alkacimetry - introduction.</li> <li>4. Alkacimetric titration in a non-aqueous medium.</li> <li>5. Introduction to complexometry.</li> <li>6. redox titration.</li> <li>7. Complexometry.</li> <li>8. Water hardness.</li> <li>9. Precipitation titration.</li> <li>10. Standardization of tests.</li> <li>11. Sampling for testing.</li> <li>12. Quality assurance of analytical methods.</li> </ol> <p>Laboratories:</p> <ol style="list-style-type: none"> <li>1. Health and safety regulations.</li> <li>2. Determination of the proportionality of a volumetric flask with a pipette.</li> <li>3. Weight analysis: weighing and roasting crucibles, BaSO<sub>4</sub> precipitation, sludge filtration and drying.</li> <li>4. Weight analysis: filter combustion with BaSO<sub>4</sub> sludge, first sludge roasting.</li> <li>5. Alkacimetry: preparation of NaOH solution and determination of its titre. Determination of sulfuric acid.</li> <li>6. Alkacimetry: determination of salicylic and acetylsalicylic acid. Preparation of the KMnO<sub>4</sub> solution from the weighing bottle.</li> <li>7. Alkacimetry: determination of a mixture of NaOH and Na<sub>2</sub>CO<sub>3</sub></li> <li>8. Redoximetry: titration of the KMnO<sub>4</sub> solution, titration of the hydrogen peroxide solution.</li> <li>9. Redoximetry: determination of iron (II) ions.</li> </ol>

	<p>10. Redoximetry: iodometric determination of copper (II) ions.  11. Argentometry: determination of chlorides using the Mohr method.  12. Complexonometry: EDTA solution titration, titration of iron (III) ions.  13. Complexonometry: determination of water hardness.</p> <p>Tutorials:  1. Assessment of the uncertainty of measurement results in weight and volume analysis.  2. Solving accounting problems and tasks from weight analysis and precipitation titration.  3. Solving problems and accounting tasks in alkacimetry and redoximetry.  4. Solving problems and accounting tasks in complexometry.  Classical methods of water analysis: assessment of water hardness, assessment of water content in various products.</p>
Didactic methods	<p>Lectures:  – teaching didactic methods - informative lecture (conventional), problem lecture, multimedia presentation</p> <p>Laboratories:  – seeking didactic methods - laboratory, observation, practice.</p> <p>Tutorials:  – activating and problem methods - discussion, classical problem method.</p>
References	The same as in part A

Space name	Comment
Didactic cycle	2 <sup>st</sup> year, 4 <sup>st</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures: exam Laboratories: credit Seminars: credit
Form(s) and number of course hours as well as the form of crediting	Lectures: 20 hours - exam Laboratories: 45 hours - credit Seminars: 15 hours - credit
Course coordinator(s)	Dr. hab. Bogumiła Kupcewicz, prof. UMK
Subject Teachers	Dr. hab. Bogumiła Kupcewicz, prof. UMK dr Monika Richert dr Marta Sobiesiak dr Joanna Ronowicz mgr Natalia Piekuś-Słomka mgr Mariusz Zapadka
Course form (character)	Obligatory
Limit of places available in each group	Lectures: students of the second year, semester III (fall) Laboratories: groups of 9 people Tutorials: groups of 24 people



Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	<a href="https://moodle.umk.pl/WFarm/">https://moodle.umk.pl/WFarm/</a>
Learning outcomes determined for the given course form	Lectures: W3, W4, W5, W6, U3, U4, U5 Laboratories: W3, W4, W5, W6, U3, U4, U5 Seminars: W3, W4, W5, W6, U3, U4, U5
Methods and criteria of the evaluation for the given course form	Seminars: written colloquium; descriptions of a publication; passing requires 60% of points Laboratories: written colloquia; passing requires 60% of points Exam: passing the exam requires 60% of the points  The grade in the subject depends on the sum of points obtained in the classes in the first and second semester, seminar and exam. Grading scale: 92 - 100% excellent 84 - 91% very good 76 - 83% good 68 - 75% satisfactory 60 - 77% acceptable 0 - 59% fail.
List of topics	Lectures: 1. Comparison of classical methods and instrumental methods. 2. Assessment of measurement uncertainty. 3. Validation of analytical methods. 4. Spectroscopic methods: atomic spectroscopy and molecular; absorption and emission methods; UV-Vis and infrared spectroscopy; spectrofluorimetry and other emission methods. 5. Mass spectrometry and its application in pharmacy. 6. Chromatographic methods: Introduction to chromatography; Thin layer chromatography, HPLC and UHPLC liquid chromatography; Gas chromatography. 7. Electrochemical methods: Potentiometry and conductometry; voltammetry, polarography. 8. Application of instrumental analytical methods in pharmaceutical preformulation and formulation studies. 9. Current trends in pharmacy - <i>Quality by Design</i> concept and <i>Process Analytical Strategy</i> . 10. Chemometric methods in pharmaceutical analysis.  Laboratories: 1. Thin layer chromatography - study of the effect of the mobile phase elution force on the separation of nitroaniline isomers.

2. Paper chromatography - detection of eye drop decomposition products - Sulfacetamidum Natricum 10%.
3. Potentiometric measurement of pH of solutions using a glass electrode; assessment of the acidity of pharmaceutical preparations containing acetylsalicylic acid.
4. Potentiometric and conductometric titration of a mixture of NaOH and KI solutions.
5. Determination of strong and weak acids by conductometric titration.
6. Voltammetric determination of iron ions in a medicinal product.
7. Spectrophotometric determination of the active substance in a pharmaceutical preparation (eg acetylsalicylic acid, vitamin C, routine, paracetamol).
8. Infrared spectroscopy - identification of organic solvent functional groups; identification of organic compounds based on IR spectra made with the KBr pellet technique.
9. Infrared spectroscopy - quantitative analysis. Determination of ethyl acetate in chloroform.
10. Spectrofluorimetry - determination of active substance in a pharmaceutical preparation.
11. Determination of sodium and potassium ions in water or a multi-electrolyte fluid by flame photometry.
12. Application of absorbance additivity law for determination in a two-component solution. Determination of the sensitivity of the spectrophotometric method, determination of  $\text{KMnO}_4$  content in solution.
13. Determination of silymarin in drugs and dietary supplements by high-performance liquid chromatography.
14. Determination of lipophilicity ( $\log P$ ) of selected substances by HPLC method and calculation methods.
15. Determination of selected substances by gas chromatography. Substance identification based on mass spectrum.

#### Seminars:

1. Analysis of scientific publications on the use of instrumental analytical methods in pharmaceutical analysis and technology:
  - a) spectroscopic (UV-VIS spectrophotometry, infrared spectrophotometry, spectrofluorimetry, atomic absorption spectrometry),
  - b) electrochemical (voltammetry, potentiometry, polarography),
  - c) chromatography (liquid: HPLC and TLC, gas),
  - d) combined techniques such as GC-MS
2. Mass spectrometry - spectral interpretation, substance identification based on mass spectrum,
3. Problem-oriented discussion - selection of the instrumental method for a specific analytical task.
4. Validation and optimization of analytical methods - analysis of examples.
5. Sample preparation methods for pharmaceutical analysis.

Didactic methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>– teaching didactic methods - informative lecture (conventional), problem lecture, multimedia presentation</li> </ul> <p>Laboratories:</p> <ul style="list-style-type: none"> <li>– seeking didactic methods - laboratory, observation, practice.</li> </ul> <p>Tutorials:</p> <ul style="list-style-type: none"> <li>– activating and problem methods - discussion, classical problem method.</li> </ul>
References	The same as in part A

## Physical Chemistry

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Physical Chemistry</b> Chemia fizyczna
Unit offering the subject	Faculty of Pharmacy The Department of Physical Chemistry Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1708-F2-CHFIZ-J
ERASMUS code	(0916)
ISCED code	
Number of ECTS points	7
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module B</b> Physicochemical basis of pharmacy
Total student workload	<p>Student workload balance:</p> <p>1. Obligatory hours carried out with the teacher's participation:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 30 hours,</li> <li>– participation in laboratories: 45 hours,</li> <li>– participation in seminars: 15 hours</li> <li>– additional opportunity to consult with tutors: 2 hours</li> </ul> <p>The workload related to activities requiring the direct participation of academic teachers is <b>92 hours</b>, which corresponds to <b>3.68 ECTS points</b>.</p> <p>2. Student work balance:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 30 hours</li> <li>– participation in laboratories: 45 hours</li> <li>– participation in seminars: 15 hours</li> <li>– consultation: 2 hours</li> <li>– collection and selection of appropriate materials for classes: 10 hours</li> </ul>

	<ul style="list-style-type: none"> <li>- preparation and completion of notes: 10 hours</li> <li>- repetition of material required: 10 hours</li> <li>- preparation of reports on exercises performed: 10 hours</li> <li>- reading the indicated literature: 19 hours</li> <li>- preparation to pass: 24 hours</li> </ul> <p>The total student workload is <b>175 hours</b>, which corresponds to <b>7.00 ECTS points</b>.</p> <p>3. The workload related to conducting scientific research:</p> <ul style="list-style-type: none"> <li>- participation in activities (including research methodology, research results, studies): 50 hours</li> <li>- research and scientific consultations: 2 hours</li> <li>- participation in lectures (including research methodology, research results, studies): 15 hours</li> <li>- collection and selection of appropriate scientific materials: 6 hours</li> <li>- reading of the indicated scientific literature: 10 hours</li> <li>- preparation for classes covered by scientific activities: 8 hours</li> <li>- preparation to pass in the field of research and development for the subject: 9 hours</li> </ul> <p>The total student workload related to the conducted research is <b>100 hours</b>, which corresponds to <b>4.00 ECTS points</b>.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>- preparation for classes: 10 hours</li> <li>- preparation for tests: 12 hours</li> <li>- preparation for the exam: 18 hours</li> </ul> <p>The total time required to prepare and participate in the assessment process is <b>46 hours</b>, which corresponds to <b>1.84 ECTS points</b>.</p> <p>5. Time required to complete the compulsory practice: not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the basic concepts of mechanics and chemical thermodynamics and thermochemistry - K_B.W15</p> <p>W2: Knows the basics of statics and chemical kinetics - K_B.W15</p> <p>W3: Knows the basics of the structure of matter - K_B.W15</p> <p>W4: Knows the physicochemistry of multiphase systems - K_B.W16</p> <p>W5: Knows the basics of surface phenomena - K_B.W16</p> <p>W6: Knows quantum mechanisms of catalysis - K_B.W16</p>
Learning outcomes - abilities	<p>U1: Can analyze the physicochemical properties underlying the biological action of drugs - K_B.U9</p> <p>U2: Can name and describe the physicochemical processes underlying the biological action of drugs - K_B.U9</p> <p>U3: Can describe phenomena related to pharmacokinetics - K_B.U9</p>
Learning outcomes – social skills	<p>K1: The student is ready to use objective sources of information - K7</p>

	<p>K2: Correctly formulates the conclusions of the measurements - K8</p> <p>K3: Correctly draws conclusions from observations made - K8</p>
Didactic methods	<p>Lecture:</p> <ol style="list-style-type: none"> <li>1. Teaching methods <ul style="list-style-type: none"> <li>- traditional lecture supported by multimedia techniques</li> <li>- interactive lecture</li> <li>- informative lecture</li> </ul> </li> <li>2. Activating methods <ul style="list-style-type: none"> <li>- case method</li> <li>- discussion</li> <li>- informal discussion</li> <li>- "for" and "against" debate</li> </ul> </li> <li>3. Problem methods <ul style="list-style-type: none"> <li>- stock exchange (brainstorming)</li> <li>- classical problem method</li> </ul> </li> <li>4. Exposing methods <ul style="list-style-type: none"> <li>- demonstration of selected phenomena</li> </ul> </li> </ol> <p>Laboratory:</p> <ol style="list-style-type: none"> <li>1. Practical and practical methods <ul style="list-style-type: none"> <li>- practical exercises</li> <li>- measurement and observation</li> <li>- experiences</li> </ul> </li> <li>2. Giving methods: <ul style="list-style-type: none"> <li>- description</li> <li>- talk</li> </ul> </li> <li>3. Activating methods <ul style="list-style-type: none"> <li>- case method</li> <li>- discussion</li> <li>- informal discussion</li> <li>- "for" and "against" debate</li> </ul> </li> <li>4. Problem methods <ul style="list-style-type: none"> <li>- stock exchange (brainstorming)</li> <li>- classical problem method</li> </ul> </li> </ol> <p>Seminar:</p> <ol style="list-style-type: none"> <li>1. Giving methods: <ul style="list-style-type: none"> <li>- description</li> <li>- talk</li> </ul> </li> <li>2. Activating methods <ul style="list-style-type: none"> <li>- case method</li> <li>- discussion</li> <li>- informal discussion</li> <li>- "for" and "against" debate</li> </ul> </li> <li>3. Problem methods <ul style="list-style-type: none"> <li>- stock exchange (brainstorming)</li> <li>- classical problem method</li> </ul> </li> </ol>
Preliminary requirements	To implement the described subject, it is necessary to have basic knowledge of physical chemistry, as well as general, inorganic and organic chemistry, and also mathematics and physics at high school level.
Brief course description	Classes in the subject "Physical chemistry" in the field of Pharmacy are carried out in the third semester. The course

	<p>includes 30 hours of lecture, 60 hours of laboratory classes and 15 hours of seminar. "Physical chemistry" captures macroscopic, atomic, subatomic and intermolecular phenomena in chemical and biochemical systems, taking into account the laws and concepts of physics. The gradually learned rules formulated by physical chemistry with their interrelationship and quantitative representation constitute the basis introducing the student to chemical apparatus analysis and all laboratory methods used during the synthesis and identity research of active substances in medicines and plant materials. In addition, mastering the issues implemented under the subject "Physical chemistry" in the field of Pharmacy is the basis for subjects implemented in subsequent semesters, such as: drug chemistry, drug form technology, pharmacology, biopharmacy and prepares students for independent work in the analytical laboratory. This subject together with other basic sciences is the foundation on which the student should build his further knowledge and improve cognitive and practical skills.</p>
Entire course description	<p>The main purpose of the subject "Physical chemistry" is to familiarize students with the basics of physical chemistry enabling understanding of the laws governing physicochemical processes occurring in nature and to master the terminology and mathematical apparatus describing these phenomena. During the theoretical and practical classes, students acquire the skills to apply acquired knowledge in solving various problems and interpreting observed physicochemical phenomena. Due to the fact that the subject "Physical chemistry" deals with the study of phenomena occurring in macroscopic and intermolecular systems, the theoretical foundations allow students to understand many of the biochemical transformations and processes occurring in living organisms, and thus the selection criteria when designing pharmacological and diagnostic molecules principles of their operation in living organisms. Laboratory exercises support the consolidation of messages transmitted during lectures and develop skills in the practical use of experimental and theoretical methods when solving problems in the field of physical chemistry. Students mastering the rules and laws in the field of physical chemistry and their links with the quantitative and qualitative approach acquire the basis for understanding the basics of chemical instrumental analysis and many laboratory-diagnostic methods.</p> <p>As part of the content of education in the subject "Physical chemistry" the student gains knowledge of the objectives and tasks of physical chemistry. Acquires the ability to make physicochemical measurements and to develop statistical results obtained through direct and indirect measurements. In addition, he learns and uses auxiliary calculation methods. During the course, the student gains professional knowledge of the thermodynamics department, i.e. the first law of thermodynamics, thermochemistry, heat dependence on temperature (Kirchoff's law), the second law of thermodynamics, entropy changes in physico-chemical processes and the calculation of these changes, criteria for</p>

	spontaneity of processes chemical, calculation of free enthalpy changes, relationships between thermodynamic functions, chemical affinity, chemical equilibria and the law of mass action; Le Chatelier-Brown perversity rules, calculation of standard affinity and equilibrium constant. In the solutions and phase equilibria department, the student learns: one-component systems (perfect gases, real gas, liquid solutions, solids), colloidal systems, surface phenomena, equilibria in multiphase systems, thermodynamics of phase equilibria, Gibbs phase rule, Clausius-Clapeyron equation. Presented contents from the chemical kinetics department allow the student to become familiar with: homogeneous reaction rate, simple reaction kinetics (zero, first, second order reactions), complex reaction kinetics (reversible, parallel, follow-up, chain reactions), kinetic theories, catalysis and enzymatic reactions. The last department implemented allows the student to acquire knowledge in the field of electrochemistry elements, namely: conductivity of aqueous electrolyte solutions, galvanic cells, oxidation-reduction potential, characteristics of half-cells, electrolysis, Faraday's law and corrosion phenomenon.
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Atkins P., de Paula J. Physical chemistry. 10<sup>th</sup> Edition. Oxford University Press, 2014</li> <li>2. Berry R. S., Rice S. A. Physical chemistry. 2<sup>nd</sup> Edition. Oxford University Press, 2000</li> <li>3. DeVoe H. Thermodynamics and Chemistry. 2<sup>nd</sup> Edition. Prentice-Hall Inc., 2014</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Mortimer R. G. Mathematic for physical chemistry. Elsevier Academic Press, 2005</li> <li>2. Chang R. Physical chemistry for the Biosciences. University Science Books, 2005</li> </ol>
Methods and criteria of evaluation	<p>Written exam: W1 - W6, U2, U3          Colloquium: W1 - W6, U2, U3          Practical performance of the exercise: U1 - U3, K1 - K3          Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	2 <sup>nd</sup> year, 3 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Lecture: exam Laboratory: credit Seminar: credit
Form(s) and number of course hours as well as the form of crediting	Lectures: 30 hours - exam Laboratory: 60 hours - credit Seminar: 15 hours - credit
Course coordinator(s)	prof. dr hab. Piotr Cysewski
	Lecture:

Subject Teachers	<p>prof. dr hab. Piotr Cysewski  Laboratory:  dr hab. Beata Szeffler prof UMK  dr Przemysław Czeleń  dr Tomasz Jeliński</p> <p>Seminar:  prof. dr hab. Piotr Cysewski</p>																												
Course form (character)	Obligatory																												
Limit of places available in each group	Lectures: students of the second year, semester III Laboratory: groups of 12 people Seminar: groups of 24 people																												
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń																												
Number of hours of classes conducted using e-learning methods	Not applicable																												
Subject website	<a href="https://www.chemfiz.cm.umk.pl/data/pages/dydaktyka/start-chemfiz-farm.html">https://www.chemfiz.cm.umk.pl/data/pages/dydaktyka/start-chemfiz-farm.html</a>																												
Learning outcomes determined for the given course form	Lecture: W1 - W6, U2, U3 Laboratory: W1 - W6, U1 - U3, K1-K3 Seminar: W1 - W6, U2, U3, K1																												
Methods and criteria of the evaluation for the given course form	<p>The conditions of passing the course are: presence, positive assessment issued by the teacher conducting the laboratory and auditorium exercises and the absence of offenses listed in the "Health and Safety Rules" of the Didactic Regulations of the Chair and Department of Physical Chemistry.</p> <p>Lectures: Completion of the course Physical Chemistry takes place on the basis of a written exam consisting of 15 closed questions in the form of test questions and 5 open questions (short answers). For each correct solution of a closed question, the student receives 1 point. Also, student obtains 1 point for every full answer to an open question. The necessary condition for passing the exam is the simultaneous fulfillment of two criteria: obtaining a total number of points (from both parts of the exam) greater than 50% and obtaining at least 30% in the open part of the exam (and only in this case bonus points are counted).</p> <p>The grading scale for the exam is linear in accordance with the following points:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Rating</th> <th>Percentage of possible points to get</th> <th>The number of possible points to get</th> </tr> </thead> <tbody> <tr> <td>very good</td> <td>91-100</td> <td></td> <td>18-20</td> </tr> <tr> <td>good plus</td> <td>81-90</td> <td></td> <td>16-17</td> </tr> <tr> <td>good</td> <td>71-80</td> <td></td> <td>14-15</td> </tr> <tr> <td>satisfactory plus</td> <td>61-70</td> <td></td> <td>12-13</td> </tr> <tr> <td>sufficient</td> <td>51-60</td> <td></td> <td>11</td> </tr> <tr> <td>insufficient</td> <td>0-51</td> <td></td> <td>0-10</td> </tr> </tbody> </table> <p>The condition of taking the exam is getting credit for classes.</p> <p>Laboratory and seminar: on the basis of combined credit (in the first 12 weeks there are laboratories, in the last three seminars). Assessment criteria: during one laboratory, the</p>		Rating	Percentage of possible points to get	The number of possible points to get	very good	91-100		18-20	good plus	81-90		16-17	good	71-80		14-15	satisfactory plus	61-70		12-13	sufficient	51-60		11	insufficient	0-51		0-10
	Rating	Percentage of possible points to get	The number of possible points to get																										
very good	91-100		18-20																										
good plus	81-90		16-17																										
good	71-80		14-15																										
satisfactory plus	61-70		12-13																										
sufficient	51-60		11																										
insufficient	0-51		0-10																										



	<p>student is assessed on the basis of the substantive degree of preparation for the exercise (0-4 points), the quality of performed tasks and fulfilling instructions (0-2 points), preparation of the conducted experiments in the form of a report (0-4 points) and two tests (0-50 points). During the seminar, the student can collect a total of 20 points, based on the final test. In order to obtain credit, a minimum of 51% of all obtainable points (220 points) and correctly completed reports from conducted experiments are required. Detailed assessment criteria are included in the subject regulations available in the Department and Physical Chemistry Department.</p>
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Introduction to physical chemistry issues: 1.1. Subject and tasks of physical chemistry, 1.2. Physicochemical measurement, 1.3. Statistical development of results - direct measurement errors, 1.4. Statistical elaboration of results - indirect measurement errors, 1.5. Auxiliary calculation methods</li> <li>2. Thermodynamics: 2.1. Basic concepts, 2.2. The first law of thermodynamics, 2.3. Thermochemistry, 2.4. Heat dependence on temperature - Kirchoff's law, 2.5. The second law of thermodynamics, 2.6. Changes in entropy in physico-chemical processes, 2.7. Physical and chemical sense of entropy, 2.8. Calculation of entropy changes, 2.9. Criteria of spontaneity of chemical processes, 2.10. Calculation of free enthalpy changes, 2.11. Relations between thermodynamic functions, 2.12. Gibbs-Helmholtz equations, 2.13. Chemical affinity, 2.14. Chemical equilibrium, 2.15. The law of the masses, 2.15. Le Chatelier-Brown's contrariness rule, 2.16. Calculation of standard affinity and equilibrium constant</li> <li>3. Solutions and phase equilibria: 3.1. One-component systems - Perfect gases, 3.2. One-component systems - Real gases, 3.3. One-component systems - Liquid state, 3.4. One-component systems - Solid state, 3.5. Colloidal systems, 3.6. Surface phenomena, 3.7. Equilibria in multiphase systems, 3.8. Thermodynamics of phase equilibria, 3.9. Gibbs phase rule, 3.10. Clausius-Clapeyron equation</li> <li>4. Chemical kinetics: 4.1. Basic concepts, 4.2. Homogeneous reaction rate, 4.3. Kinetics of simple reactions - First order reactions, 4.4. Simple reaction kinetics - Higher order reactions, 4.5. Kinetics of complex reactions - Reversible, parallel and sequential reactions, 4.6. Kinetic theories, 4.7. Catalysis, 4.8. Enzymes and enzymatic reactions</li> <li>5. Elements of electrochemistry: 5.1. Conductivity of aqueous electrolyte solutions, 5.2. Galvanic cells, 5.3. Thermodynamics of the galvanic cell, 5.4. Oxidizing and reduction potential, 5.5. Characteristics of half-cells, 5.6. Electrochemical conventions, 5.7. Examples of the use of electrochemical measurements, 5.8. Electrolysis, 5.9. Faraday's laws, 5.10. Corrosion phenomenon.</li> </ol> <p>Laboratory: Block A - problem exercises:</p> <ol style="list-style-type: none"> <li>1. Mathematical methods</li> </ol>

	2. Heat balance 3. Thermochemistry - Hess's law 4. Spontaneity of physical and chemical processes and state functions 5. Chemical equilibrium 6. Test Block B - laboratory exercises 7. Chemical kinetics 8. Surface phenomena 9. Potentiometric methods 10. Conductometry 11. Phase rule 12. Thermodynamics 13. Test  Seminar: 14.15. Practical use of elements of physical chemistry in pharmaceutical sciences
Didactic methods	The same as in part A
References	The same as in part A

## General and Inorganic Chemistry

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>General and Inorganic Chemistry</b>
Unit offering the subject	Faculty of Pharmacy Department of Inorganic and Analytical Chemistry Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1710-F2-CHAN-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	14
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Course moduleB: Physicochemical foundations of pharmacy Obligatory course
Total student workload	1. Obligatory hours realized with the teacher participation: <ul style="list-style-type: none"> <li>– lecture participation – 40 hours</li> <li>– laboratories participation – 60 hours,</li> <li>– seminars participation – 30 hours</li> <li>– consultations participation, including scientific and research consultations – 6 hours,</li> <li>– final exam participation – 2 hours</li> </ul>

	<p>Total obligatory hours realized with the teacher participation: <b>138 hours</b>, which corresponds to <b>5.52 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– lecture participation – 40 hours,</li> <li>– laboratories participation – 60 hours,</li> <li>– seminars participation – 30 hours</li> <li>– consultations participation, including scientific and research consultations – 3 hours,</li> <li>– final exam participation – 2 hours</li> <li>– reading the indicated literature – 55 hours,</li> <li>– preparation for laboratories – 60 hours,</li> <li>– preparation for seminars – 30 hours</li> <li>– preparation for tests – 40 hours,</li> <li>– preparation for final exam – 30 hours.</li> </ul> <p>A total work amount: <b>350 hours</b>, which corresponds to <b>14.00 ECTS points</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– reading the indicated literature - 30 hours,</li> <li>– participation in lectures (including research results and scientific studies in the field general and inorganic chemistry) - 30 hours,</li> <li>– participation in scientific consultations – 8 hours,</li> <li>– participation in laboratories (including using scientific research methodology, research results and report of results): 70 hours,</li> <li>– preparation for laboratories including scientific results: 30 hours,</li> <li>– preparation for final exam including research results and scientific studies in the field of general and inorganic chemistry - 15 hours.</li> </ul> <p>A total student workload related to the conducted research is <b>183 hours</b>, which corresponds to <b>7.32 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– required repetition of material + preparation for tests + preparation for classes + participation in the exam - 50 + 60 + 40 + 2 = <b>152 hours (6.08 ECTS points)</b></li> </ul> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>Student:</p> <p>W1: knows structure of atom and the elements location in the periodic table – K_B.W5</p> <p>W2: knows and characterizes elementary particles, nuclear radiation and properties of radioactive isotopes and their use in diagnostics and therapy – K_B.W5</p> <p>W3: knows the properties of elements resulting from their location in the periodic table K_B.W5</p> <p>W4: knows type of chemical bonds and ways to form chemical bonds – K_B.W6</p>

	<p>W5: knows mechanisms of intermolecular interactions in various states of matter</p> <p>W6: knows types of solutions and fundamentals of reactions in solutions – K_B.W7</p> <p>W7: knows types of chemical reactions K_B.W8</p> <p>W8: knows concepts, chemical equations and factors that affect reaction rates – K_B.W8</p> <p>W9: knows basics of the precipitation (sparingly soluble substances) and formation of metal complexes K_B.W8</p> <p>W10: knows, defines and explains redox processes and knows fundamental of electrochemistry – K_B.W8</p> <p>W11: knows characterization of metals and nonmetals – K_B.W9</p> <p>W12: knows the systematic names and properties of inorganic compounds and complexes – K_B.W9</p> <p>W13: knows application the inorganic compounds in pharmacy – K_B.W11</p> <p>W14: knows qualitative of inorganic analysis including Pharmacoepia methods</p>
Learning outcomes - abilities	<p>Student:</p> <p>U1: Can use the appropriate pharmacopoeial method to identify inorganic compounds - K_B.U4</p> <p>U2: Can test the reaction speed - K_B.U8</p> <p>U3: Analyzes the impact of various factors on the reaction rate - K_B.U8</p>
Learning outcomes – social skills	<p>Student:</p> <p>K1: uses information technology to search and select information – K7</p> <p>K2: draws conclusions based on the results obtained from the experiments – K8</p>
Didactic methods	<p><u>Lectures:</u> Expository teaching methods – informative (conventional) lecture, participatory lecture, problem-based lecture, multimedia presentation</p> <p><u>Laboratories:</u> Exploratory teaching methods – practical, experimental, classic problem-solving, laboratory. Expository teaching methods – discussion, description Observation/demonstration teaching methods.</p> <p><u>Seminars:</u> Expository teaching methods, activating and problems method – discussion, classic problem-solving</p>
Preliminary requirements	<p>A student starting education in the subject of General and Inorganic Chemistry student should have basic knowledge about the structure of matter and physicochemical phenomena, involved the basic program of chemistry, physics and mathematics in high school</p>
Brief course description	<p>General and Inorganic Chemistry consists of lectures, laboratories and seminars. The aim of it is to familiarize students with topics of the general chemistry and to prepare them for laboratory work.</p> <p>The knowledge of general and inorganic chemistry is the basis for studying more advanced chemical, biochemical and</p>

	technological problems covered in the following semesters as part of analytical chemistry, physical chemistry, biochemistry, medicinal chemistry and drug dosage form technology
Entire course description	<p><u>Lectures:</u></p> <p>- to familiarize student with the following issues: general chemistry and inorganic systematics, the structure and properties of particular groups of elements and compounds; theories of acids and basics, dissociation, hydrolysis, types of chemical bonds, redox reactions, nuclear reactions, orbital hybridisation; applications of radiopharmaceuticals, complexes, inorganic compounds and their significance in medicine and pharmacy, and their application as medical substances and excipients in drug dosage form technology</p> <p><u>Laboratories:</u></p> <p>to familiarize student with methods of cations and anions quality analysis, the identification of pharmacopeia salts and their pollution (contaminations)</p> <p><u>Seminars:</u></p> <p>- to teach students how to solve problems and calculation tasks in the range of the basic chemistry individually</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Katja A. Strohfeldt, Essentials of inorganic chemistry: for students of pharmacy, pharmaceutical sciences and medicinal chemistry, Chichester: Wiley, 2015.</li> <li>2. Robert R. Crichton, Biological inorganic chemistry: a new introduction to molecular structure and function, Elsevier, 2012, 2nd ed.</li> <li>3. Peter Atkins, Inorganic chemistry, Oxford University Press, 2010, 5<sup>th</sup> ed.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Andreja Bakac, Physical inorganic chemistry: principles, methods, and models, Hoboken: Wiley, 2010.</li> <li>2. Mark Weller T. [et al.], Inorganic chemistry, Oxford University Press, 2014, 6<sup>th</sup> ed.</li> <li>3. Gary L. Miessler, Donald A. Tarr. Inorganic chemistry, Boston, Pearson Prentice Hall, 2011.</li> </ol>
Methods and criteria of evaluation	<p><u>Lectures:</u> W1 – W14, U1 – U3</p> <p><u>Laboratories:</u> W1 –W4, W6,W7, W9-W11, W13, W14; U1 – U3</p> <p><u>Seminars:</u> W1-W3, W5-W7, W9, W11, W12, W14, U1-U3</p> <p>Activity: K1, K2</p> <p>Criteria of evaluation are given in part B and C</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 1 <sup>st</sup> semester (fall)

Form of crediting a subject in the cycle	Lectures: credit Laboratories: credit
Form(s) and number of course hours as well as the form of crediting	Lectures: 20 hours – credit Laboratories: 60 hours - credit
Course coordinator(s)	Dr hab. Bogumiła Kupcewicz
Subject Teachers	Lectures: Dr hab. Bogumiła Kupcewicz Dr Monika Richert Dr Joanna Ronowicz Dr Marta Sobiesiak  Laboratories: Dr hab. Bogumiła Kupcewicz, Dr Monika Richert Dr Marta Sobiesiak Dr Joanna Ronowicz MSc Natalia Piekus-Slomka MSc Mariusz Zapadka
Course form (character)	Obligatory
Limit of places available in each group	Lectures: 1 <sup>st</sup> year, I semester Laboratories: groups of 12 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	N/A
Subject website	N/A
Learning outcomes determined for the given course form	Lectures: W5, W9-W14, U1, U3 Laboratories: W1-W3, W5-W10, W12, U1, U3
Methods and criteria of the evaluation for the given course form	Credit conditions for the course and assessment criteria: <u>Lectures:</u> The requirement of credit the subject is an active lecture attendance (and gaining a sufficient number of points) <u>Laboratories:</u> written colloquia, passing analyses – in order to get the credit of the subject students are required to receive the sum of 60% of points for analyses and colloquia
List of topics	<u>Lectures:</u> <ul style="list-style-type: none"> <li>- outline of general and inorganic chemistry,</li> <li>- division of cations into analytical groups; introduction of cations analysis</li> <li>- anions identification, analysis of pharmacopeia salts,</li> <li>- structure of an atom, nuclear chemistry, the properties of radioactive isotopes in terms of their application in diagnosis and therapy,</li> <li>- types of chemical bonds; orbital hybridisation</li> <li>- kinetics of chemical reactions</li> <li>- types and properties solutions</li> <li>- theory of acids and basics</li> <li>- dissociation, Wilhelm Ostwald's dilution law</li> </ul>

	<ul style="list-style-type: none"> <li>- pH of solutions; buffer solutions</li> <li>- hydrolysis of solutions; ways of applications</li> <li>- solubility equilibrium</li> <li>- process of oxidation and reduction; predicting the directions of redox reactions,</li> <li>- introduction to electrochemistry, electrolysis</li> <li>- complexes – structure and nomenclature – application in pharmacy</li> </ul> <p><u>Laboratories:</u></p> <ul style="list-style-type: none"> <li>- complexes – structure and nomenclature – application in pharmacy,</li> <li>- laboratory regulations, OSH regulations (work health and safety regulations); rules of the laboratory work, glass laboratory,</li> <li>- introductory analyses, cations of I-V groups</li> <li>- single cations identification of I-V groups,</li> <li>- cations identification of I, II, V groups</li> <li>- cations identification of III and IV groups</li> <li>- cations identification of I-V groups</li> <li>- introductory analyses, anions of I-VI groups</li> <li>- single anions identification of I-VI groups,</li> <li>- anions identification of I-III groups,</li> <li>- anions identification of IV-VI groups,</li> <li>- anions identification of I-VI groups,</li> <li>- examination of pure salts identifies,</li> <li>- pollutions identification of pharmacopoeia salts</li> <li>- summative classes; retake colloquium, making up for laboratories</li> </ul>
Didactic methods	The same as in part A
References	The same as in part A

### Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures: exam Seminars: credit
Form(s) and number of course hours as well as the form of crediting	Lectures: 20 hours – exam Seminars: 30 hours - credit
Course coordinator(s)	Dr hab. Bogumiła Kupcewicz
Subject Teachers	Lectures: Dr hab. Bogumiła Kupcewicz Dr Monika Richert Dr Joanna Ronowicz Dr Marta Sobiesiak  Seminars: Dr Monika Richert Dr Marta Sobiesiak Dr Joanna Ronowicz
Course form (character)	Obligatory
	Lectures: 1 <sup>st</sup> year, II semester

Limit of places available in each group	Seminars: groups of 24 students														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods	N/A														
Subject website	N/A														
Learning outcomes determined for the given course form	Lectures; W3, W4, W11-W13 Seminars: W1, W3, W5, W6, W8-W13														
Methods and criteria of the evaluation for the given course form	<p>Credit conditions for the course and assessment criteria:</p> <p><u>Lectures:</u> The requirement of credit the subject is an active lecture attendance (and gaining a sufficient number of points)</p> <p><u>Seminars:</u> written colloquia– in order to get the credit of the subject students are required to receive the sum of 60% of points for colloquia</p> <p>Exam: The points obtained by students are converted into grades on the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Very good</td> </tr> <tr> <td>84-91%</td> <td>Good plus</td> </tr> <tr> <td>76-83%</td> <td>Good</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory plus</td> </tr> <tr> <td>60-67%</td> <td>Satisfactory</td> </tr> <tr> <td>0-59%</td> <td>Failed/Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Grade	92-100%	Very good	84-91%	Good plus	76-83%	Good	68-75%	Satisfactory plus	60-67%	Satisfactory	0-59%	Failed/Unsatisfactory
Percentage of points	Grade														
92-100%	Very good														
84-91%	Good plus														
76-83%	Good														
68-75%	Satisfactory plus														
60-67%	Satisfactory														
0-59%	Failed/Unsatisfactory														
List of topics	<p><u>Lectures:</u></p> <ol style="list-style-type: none"> <li>1. Structure of atom, periodic table –properties in groups and periods</li> <li>2. Chemistry of nonmetallic elements: group 14 elements, carbon;</li> <li>3. Nitrogen and its compounds – role in biological systems</li> <li>4. Role of phosphorus and its compounds in nature</li> <li>5. Arsenic, antimony, bismuth; role in pharmacy</li> <li>6. Oxygen, reactive oxygen species</li> <li>7. Sulfur, selenium, tellurium and their compounds – application</li> <li>8. Group 17 elements; halogens</li> <li>9. Noble gases</li> <li>10. Chemistry of metallic elements</li> <li>11. Chemistry of transition metals; ligand field theory; Structure and isomerism in metal complexes; application of complexes in pharmacy and medicine;</li> </ol> <p><u>Seminars:</u></p> <ol style="list-style-type: none"> <li>1. Concentrations of solutions; ways of expressing concentration in solutions; preparing, diluting and mixing solutions; concentration calculations</li> <li>2. Equilibrium in physical and chemical processes, equilibrium constant, factors affecting equilibrium, ionic equilibrium- ionization of acids and bases, strong and weak</li> </ol>														



	<p>electrolytes, degree of ionization, concept of pH, hydrolysis of salts, buffer solution,</p> <ol style="list-style-type: none"> <li>3. solubility and solubility equilibrium; dissolution and precipitation sparingly soluble substances; factors affecting the solubility of the precipitate</li> <li>4. kinetics; mass law; factors affecting equilibrium constant and reaction rates; define reaction order and rate constant</li> <li>5. process of oxidation and reduction, the concepts of oxidizing and reducing agents; influence of pH on directions of redox reactions; balancing oxidation-reduction reactions</li> <li>6. metal complexes</li> <li>7. electrochemistry, SEM and reactions at galvanic cells, electrolysis; reduction potential, the Nernst equation, standard reduction potentials of redox reactions;</li> <li>8. application of pharmacopeia and other inorganic compounds</li> <li>9. biological properties and application in pharmacy and medicine</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

## Organic chemistry

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Organic chemistry</b> Chemia Organiczna
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1711-F2-CHOR-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	14
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module B</b> Physicochemical basis of pharmacy
Total student workload	<ol style="list-style-type: none"> <li>1. Obligatory hours realized with the teacher participation <ul style="list-style-type: none"> <li>– Lecture participation – 40 hours</li> <li>– Laboratories participation – 112 hours,</li> <li>– Seminar participation – 38 hours</li> </ul> </li> </ol>

	<ul style="list-style-type: none"> <li>– additional opportunity to consult the teacher conducting the classes – 2 hours</li> </ul> <p>The workload related to activities requiring the direct participation of academic teachers is <b>192 hours</b>, which corresponds to <b>7.68 ECTS points</b>.</p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 40 hours,</li> <li>– participation in laboratories: 112 hours,</li> <li>– participation in seminars: 38 hours,</li> <li>– consultations: 2 hours,</li> <li>– collection and selection of appropriate materials for classes - 22 hours,</li> <li>– preparation and completion of notes – 25 hours,</li> <li>– repetition of material required - 25 hours,</li> <li>– reading the indicated literature: 35 hours</li> <li>– preparation to pass: 51 hours</li> </ul> <p>The total student workload is <b>350 hours</b>, which corresponds to <b>14 ECTS points</b>.</p> <p>3. The workload related to the scientific research:</p> <ul style="list-style-type: none"> <li>– participation in classes covered by scientific activity (including research methodology, research results, studies): 90 hours,</li> <li>– research and scientific consultations: 2 hours,</li> <li>– participation in lectures (including research methodology, studies, research results): 30 hours,</li> <li>– collection and selection of appropriate materials for classes: 20 hours,</li> <li>– reading of the scientific literature: 23 hours</li> <li>– preparation for classes covered by scientific activities: 15 hours,</li> <li>– preparation to test in the research and development for the subject: 15 hours</li> </ul> <p>The total student workload related to the conducted research is <b>195 hours</b>, which corresponds to <b>7.80 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– preparation for classes: 10 hours,</li> <li>– preparation for tests: 12 hours</li> <li>– preparation for the final exam: 40 hours (</li> </ul> <p>The total time required to prepare and participate in the assessment process is <b>62 hours</b>, which corresponds to <b>2.48 ECTS points</b>.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the basic groups of organic compounds and the principles of their nomenclature - K_B.W17</p> <p>W2: Describes the effect of induction and mesomeric effects on the properties of organic compounds - K_B.W18</p> <p>W3: Knows types of chemical reactions of organic compounds - K_B.W19</p>

	<p>W4: Describes the mechanisms of the reaction of radical, electrophilic and nucleophilic substitution, electrophilic and nucleophilic addition and elimination - K_B.W19</p> <p>W5: Knows the classification of organic compounds due to the presence of functional groups - K_B.W20</p> <p>W6: Knows the chemical properties of hydrocarbons, chlorinated compounds, organometallic compounds, alcohols and phenols, ethers, aldehydes and ketones, carboxylic acids, amines, nitro compounds, sulfonic acids and carbonic acid derivatives - K_B.W20</p> <p>W7: Knows the structure and chemical properties of five- and six-membered heterocyclic compounds containing nitrogen, oxygen and sulfur -K_B.W21</p> <p>W8: Knows the structure and properties of organic compounds of natural origin: alkaloids, carbohydrates, steroids, terpenes, lipids, amino acids, peptides and proteins - K_B.W21</p> <p>W9: Knows the basics of preparation and identification of organic compounds and their purification by crystallization, extraction and distillation methods - K_B.W22</p>
Learning outcomes - abilities	<p>U1: Can describe the structure and properties of individual groups of organic compounds - K_B.U10</p> <p>U2: Can synthesize organic compounds based on the given procedure - K_B.U10</p> <p>U3: Can identify selected organic compounds through qualitative reactions and physicochemical data - K_B.U10</p>
Learning outcomes – social skills	<p>K1: Establishes relationships with colleagues based on mutual trust and respect - K1</p> <p>K2: Can see and recognize their own limitations, self-assess deficits and educational needs - K2</p> <p>K3: Uses objective sources of information - K7</p> <p>K4: Can formulate conclusions from own measurements or observations - K8</p>
Didactic methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>- informative lecture (conventional)</li> <li>- problem lecture with multimedia presentation</li> </ul> <p>Laboratories:</p> <ul style="list-style-type: none"> <li>- individual work</li> <li>- laboratory classes</li> <li>- analysis of results</li> </ul> <p>Seminar:</p> <ul style="list-style-type: none"> <li>- activating and problem methods (discussion, case method, classical problem method)</li> <li>- individual work</li> </ul>
Preliminary requirements	To implement the described subject, it is necessary to have knowledge of organic chemistry at a high school level
Brief course description	The aim of teaching organic chemistry is to familiarize students with the issues of organic chemistry related to the nomenclature, structure and reactions of organic compounds with a focus on the structure of the drug. Acquiring practical skills related to the synthesis and assessment of purity of organic compounds. The knowledge in the field of organic chemistry is the basis for subjects implemented in subsequent years, such as: chemistry of drugs, technology of drug form, pharmacology.

Entire course description	<p>The subject of Organic Chemistry is implemented in the form of lectures, laboratories and seminars.</p> <p>The lecture aims to expand the knowledge of organic chemistry acquired at a high school level. The task of the lecture is to familiarize the student with the structure and chemical properties of individual groups of organic compounds: hydrocarbons, halogenated compounds, organometallic compounds, alcohols and phenols, ethers, aldehydes and ketones, carboxylic acids, amines, nitro compounds, sulfonic acids and carbonic acid derivatives and compounds of natural origin.</p> <p>Laboratory exercises are designed to familiarize students with the general principles of organic synthesis and health and safety regulations in a chemical laboratory, laboratory equipment used in organic preparation and the principles of assembly of basic sets for the synthesis and purification of organic compounds. The aim of the course is also to acquaint students with methods of purification and separation of organic compounds as well as methods of assessing the purity of substances. Students, on their own, purify organic compounds by crystallization, extraction and distillation methods, synthesize selected organic compounds and conduct a qualitative analysis of organic compounds.</p> <p>Seminars involve practical application of the knowledge to solve problems in organic chemistry. They include detailed discussion of reaction mechanisms and directing influence of substituents</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. McMurry J. Organic Chemistry. 9th ed. Boston, MA: Cengage Learning; 2016</li> <li>2. Solomons TWG, Fryhle CB, Snyder SA. Organic Chemistry. 12th ed. Hoboken, NJ: John Wiley &amp; Sons, Inc.; 2016</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Vollhardt P, Schore N. Organic Chemistry: Structure and Function. 8th ed. New York: W. H. Freeman; 2018.</li> <li>2. G.J. Leigh "Principles of Chemical Nomenclature", RSC, Cambridge, 2011</li> <li>3. March's Advanced Organic Chemistry 5th Ed. John Wiley &amp; Sons Inc. 2001</li> </ol>
Methods and criteria of evaluation	<p>Test: W1 – W9, U1, U3</p> <p>Practical performance of tutorials: U2, U3, K1 – K3</p> <p>Exam: W1 – W9, U1, U3</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	2 <sup>st</sup> year, 3 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Lecture: credit Seminar: credit

	Laboratory: credit
Form(s) and number of course hours as well as the form of crediting	Lecture: 20 hours - credit Seminars: 19 hours - credit Laboratory: 56 hours - credit
Course coordinator(s)	Dr hab. Alicja Nowaczyk, prof. UMK
Subject Teachers	Lecture: dr hab. Alicja Nowaczyk, prof. UMK Seminars: dr hab. Alicja Nowaczyk, prof. UMK Laboratory: dr Łukasz Fijałkowski, dr Tomasz Kosmalski
Course form (character)	Obligatory
Limit of places available in each group	Lecture: students of the 2 <sup>st</sup> year, 3 <sup>st</sup> semester. Seminar: groups of 25 people Laboratory: groups of 10 people
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	not applicable
Subject website	not applicable
Learning outcomes determined for the given course form	Lecture: W1 – W6, W9, U1, U3 Seminars: W1 – W6, U1 Laboratory: U1 – U3, W1, W5, W6, W9, K1 – K4
Methods and criteria of the evaluation for the given course form	Laboratory: Laboratory classes in the winter semester include: purification of organic compounds by simple or fractional distillation, extraction and crystallization, three syntheses with discussion, elemental and qualitative analysis of groups of compounds discussed in the winter semester, and writing four partial tests. For each synthesis a maximum of 5 points can be achieved (15 points in total). The maximum of 85 points can be achieved for passing four partial tests. The total number of possible points is 100. The condition to credit the laboratory is to obtain a minimum of 60% of points. Seminar: Attendance is mandatory. Absence from classes should be justified (sick leave). The condition to credit the seminar is to score at least 60% of all points possible to obtain from partial test and final test (maximum number of points is 20). If the required number of points is not gained, the student is entitled to two dates of retake test.
List of topics	Lectures: 1. Alkanes, alkenes and alkynes - synthesis and properties. 2. Aromatic hydrocarbons - nitration, sulfonation, alkylation and arylation reactions. 3. Synthesis and properties of halogenated derivatives of hydrocarbons. 4. Chemical properties of vinyl chloride and allyl. 5. Mechanism of nucleophilic substitution reactions SN1, and SN2, and elimination reactions E1 and E2. 6. Synthesis and chemical properties of aliphatic and aromatic sulfonic acids. 7. Aliphatic and aromatic nitro compounds.

	<p>8. Synthesis and properties of primary, secondary and polyhydric alcohols.</p> <p>9. Synthesis, physical and chemical properties of ethers.</p> <p>10. Nomenclature, synthesis and chemical properties of phenols.</p> <p>11. Nomenclature, synthesis and chemical properties of aldehydes and ketones.</p> <p>Laboratory:</p> <ol style="list-style-type: none"> <li>1. Laboratory regulations, health and safety rules.</li> <li>2. Basic equipment, assembly principles for sets used in the synthesis of organic compounds.</li> <li>3. Methods for purification of organic compounds: crystallization, simple distillation, fractional distillation.</li> <li>4. Assessment of purity of obtained organic compounds: measurement of melting and boiling points, determination of refractive index.</li> <li>5. Synthesis of selected organic compounds: chloride t-butyl, sulfanilic acid, 1-nitroacetanilide, sodium 4-toluenesulfonate, cyclopentanone, 1,1'-bi-2-naphthol, calculation of reaction yield and assessment of purity of obtained compounds.</li> <li>6. Qualitative analysis of basic functional groups - characteristic reactions: aliphatic and aromatic hydrocarbons, alcohols, aldehydes, ketones.</li> </ol> <p>Seminar:</p> <ol style="list-style-type: none"> <li>1. Types of hybridization of carbon atoms, atomic orbitals.</li> <li>2. Types of chemical bonds in organic compounds.</li> <li>3. Features of <math>\sigma</math> and <math>\pi</math> bonds, molecular orbitals.</li> <li>4. Electronic effects in organic compounds.</li> <li>5. Types of isomerism.</li> <li>6. Classification and discussion of basic types of reactions: (polar, radical, pericyclic reactions).</li> <li>7. Description of the chemical reaction: analysis of the state of equilibrium, reaction progress (speed and energy changes) and possible transient states.</li> <li>8. Mechanisms of basic types of reactions: substitution (SN1 and SN2), addition, elimination (E1 and E2), radical reactions.</li> <li>9. Methods for visualizing reaction progress: energy change charts and electrostatic potential maps.</li> <li>10. Structure and physicochemical properties of halogenated hydrocarbons and organometallic compounds.</li> <li>11. Structure and physicochemical properties of compounds containing oxygen or sulfur heteroatom (thioalcohols and thiophenols, thioethers, epoxides)</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

Space name	Comment
Didactic cycle	2 <sup>st</sup> year, 4 <sup>st</sup> semester (spring)
Form of crediting a subject in the cycle	Lecture: exam Seminar: credit Laboratory: credit
Form(s) and number of course hours as well as the form of crediting	Lecture: 20 hours - credit Seminars: 19 hours - credit Laboratory: 56 hours - credit

Course coordinator(s)	Prof. Bożena Modzelewska-Banachiewicz
Subject Teachers	Lecture: Alicja Nowaczyk, Assoc. prof. Seminars: Alicja Nowaczyk, Assoc. prof. Laboratory: Łukasz Fijałkowski, PhD, Tomasz Kosmalski, PhD
Course form (character)	Obligatory
Limit of places available in each group	Lecture: students of the 2 <sup>st</sup> year, 4 <sup>st</sup> semester. Seminar: groups of 25 people Laboratory: groups of 10 people
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	not applicable
Subject website	not applicable
Learning outcomes determined for the given course form	Lecture: W1 – W6, W9, U1, U3 Seminars: W1 – W6, U1 Laboratory: U1 – U3, W1, W5, W6, W9, K1 – K4
Methods and criteria of the evaluation for the given course form	<p>The condition for course crediting is active participation in classes and collecting the appropriate number of points.</p> <p>Laboratory: Laboratory classes in the spring semester include the performance of four syntheses along with the development, qualitative analysis of groups of compounds discussed in the spring semester and writing four tests.</p> <p>You can get a maximum of 5 points (20 points in total) for each synthesis. You can receive a maximum of 80 points for test. The total number of possible points: 100.</p> <p>The condition to credit the laboratory is to obtain a minimum of 60% of points.</p> <p>Seminar: Attendance is mandatory. Absence from classes should be justified (sick leave). The condition to credit the seminar is to score at least 60% of all points possible to obtain from partial test and final test (maximum number of points is 20).</p> <p>If the required number of points is not gained, the student is entitled to two dates of retake test.</p> <p>Exam: passing the exam requires 60% of the points.</p> <p>Grading scale: 92 - 100% points: very good 84 - 91% points: good plus 76 - 83% points: good 68 - 75% points: sufficient plus 60 - 67% points: sufficient &lt;60% points: fail</p>
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Preparation methods, chemical properties and characteristic reactions of aliphatic and aromatic amines I, II and III.</li> <li>2. Reactions for obtaining diazonium salts and their chemical properties</li> <li>3. Azo, ladle, phthalein, antrachinone, and triphenylmethane dyes.</li> <li>4. Synthesis, nomenclature, and properties of aliphatic and aromatic monocarboxylic, and dicarboxylic and polycarboxylic acids.</li> </ol>

	<p>5. Synthesis and properties of carboxylic acids halides, amides, esters and anhydrides.</p> <p>6. Chemical formulas and names of basic five- and six-membered heterocyclic rings with one and two heteroatoms.</p> <p>7. Synthesis and characteristic reactions of thiophene, pyrrole, furan, pyridine, quinoline.</p> <p>8. Structure, properties, and nomenclature of simple sugars and disaccharides.</p> <p>9. Extension and shortening of the carbon chain in sugars.</p> <p>10. Optical isomerism.</p> <p>11. Polysaccharides and ascorbic acid.</p> <p>12. Classification of isoprenoids.</p> <p>13. The alkaloids</p> <p>14. Steroids</p> <p>Laboratory:</p> <p>1. Synthesis of selected organic compounds: acetanilide, methyl benzoate, methyl acetate, benzoic acid, acid p-nitrobenzoate, diazoaminobenzene, <math>\beta</math>-naphthol orange.</p> <p>2. Calculation of reaction yield.</p> <p>3. Evaluation of the products purity.</p> <p>4. Qualitative analysis - characteristic reactions of carboxylic acids and their derivatives (esters, acid anhydrides and chlorides, amides), amines, amino acids and sugars.</p> <p>Seminars:</p> <p>1. Structure and physicochemical properties of compounds containing nitrogen heteroatom (azo, diazo, nitro, nitriles and isonitriles)</p> <p>2. Sulphonic and carboxylic acids.</p> <p>3. Derivatives of carboxylic acids (halogen acids, hydroxy acids, oxo acids, amino acids).</p> <p>4. Monosaccharides (Fischer and Haworth formulas, anomers and epimers, mutarotation, glycosides)</p> <p>5. Amino acids, proteins, nucleic acids</p> <p>6. Lipids and related compounds.</p> <p>7. Heterocyclic compounds.</p> <p>8. Dyes.</p>
Didactic methods	The same as in part A
References	The same as in part A

## Mathematics

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Mathematics</b> (Matematyka)
Unit offering the subject	Faculty of Pharmacy Department of Department of Biostatistics and Biomedical Systems Theory



	Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1703-F1-MAT-J
ERASMUS code	
ISCED code	
Number of ECTS points	3
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module B</b> Physicochemical basis of pharmacy
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– lecture participation – 10 hours,</li> <li>– laboratory tutorials participation – 25 hours,</li> <li>– consultations participation, including scientific and research consultations – 9 hours,</li> <li>– final exam participation – 2 hours</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>46 hours</b>, which corresponds to <b>1.84 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– lecture participation – 10 hours,</li> <li>– laboratory tutorials participation (including the analysis of case studies, clinical and randomized test results) – 25 hours,</li> <li>– consultations participation, including scientific and research consultations – 9 hours,</li> <li>– final exam participation – 2 hours</li> <li>– preparation for tutorials – 5 hours,</li> <li>– preparation for tests – 12 hours,</li> <li>– preparation for final exam – 12 hours.</li> </ul> <p>A total work amount: <b>75 hours</b>, which corresponds to <b>3.00 ECTS points</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– reading the indicated literature -10 hours,</li> <li>– participation in lectures (including research results and scientific studies methodology) - 2 hours,</li> <li>– participation in scientific consultations- 2 hours,</li> <li>– participation in laboratory tutorials (including research results and scientific studies methodology): 15 hours,</li> <li>– preparation for tutorials including scientific results: 4 hours,</li> <li>– preparation for final exam including research results and scientific studies in the field of pathophysiology- 5 hours.</li> </ul> <p>A total student workload related to the conducted research is <b>38 hours</b>, which corresponds to <b>1.52 ECTS points</b>.</p>

	<p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– preparation for test – 12 hours,</li> <li>– preparation for final exam – 12 hours,</li> </ul> <p>Total time required for the preparation and participation in evaluating process: <b>24 hours</b>, which corresponds to <b>0.96 ECTS point</b>.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>The graduate knows and understands:</p> <p>W1: the concept of function, describes the basic properties of functions of one real variable, provides definitions and properties of elementary functions: polynomials, rational, exponential, logarithmic and trigonometric functions - K_B.W24</p> <p>W2: basic properties of number sequences, explains the concepts of monotonicity, limitations and convergence of number sequences - K_B.W24</p> <p>W3: the concept of the limit of a function at a point, explains the concept of unilateral boundaries and function continuity - K_B.W24</p> <p>W4: the concept of the derivative of a function at a point, gives formulas for derivatives of elementary functions and formulas for a derivative of a linear combination and composition of functions, gives the interpretation of derivatives of higher orders and their application to study the properties of function variability - K_B.W24</p> <p>W5: the concept of indefinite and definite integral, gives the primary functions of selected elementary functions, explains the geometric interpretation of the definite integral - K_B.W24</p>
Learning outcomes - abilities	<p>The graduate is able to:</p> <p>U1: draw graphs and study the properties of basic elementary functions: polynomials, rational, exponential, logarithmic and trigonometric functions - K_B.U11</p> <p>U2: determine the limits of numerical sequences; sets the limits of elementary functions - K_B.U11</p> <p>U3: calculate derivatives of functions - K_B.U11</p> <p>U4: performs a study of the course of function variability and draws graphs of elementary functions - K_B.U11</p> <p>U5: calculate simple indefinite and definite integrals - K_B.U11</p>
Learning outcomes – social skills	<p>In the scope of social competencies the graduate is ready to:</p> <p>K1: use objective sources of information - K7</p>
Didactic methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>- informative lecture (conventional) with a multimedia presentation</li> <li>- problem-oriented lecture</li> </ul> <p>Laboratories:</p> <p>classical problem-oriented method</p>
Preliminary requirements	<p>Knowledge of mathematics at the high school level.</p>

Brief course description	The aim of the course is to familiarize students with mathematical methods being basic tools for such fields as statistics and biophysics.										
Entire course description	<p><u>Lectures:</u> The lectures are aimed at providing students with the knowledge of basic tools and concepts of calculus: the concept of function, definitions and properties of elementary functions: polynomials, exponential, logarithmic and trigonometric; basic properties of number sequences, the concepts of monotonicity, limitations and convergence of number sequences; the concept of the limit of a function at a point, the concept of unilateral boundaries; the concept of the derivative of a function at a point, formulas for derivatives of elementary functions and formulas for a derivative of a linear combination and composition of functions, the interpretation of derivatives of higher orders and their applications; the concept of indefinite and definite integral, the primary functions of selected elementary functions, the geometric interpretation of the definite integral.</p> <p><u>Laboratory tutorials:</u> Laboratory tutorials will equip students with the practical abilities of drawing graphs and studying the properties of basic elementary functions: polynomials, rational, exponential, logarithmic and trigonometric functions; determining the limits of numerical sequences; setting the limits of elementary functions; calculating derivatives of functions; calculating simple indefinite and definite integrals.</p>										
References	<p>Primary literature: 1. Heinbockel J.H., Introduction to Calculus, Vol. I, available as the PDF file from the site: <a href="http://www.math.odu.edu/~jhh/Volume-1.PDF">http://www.math.odu.edu/~jhh/Volume-1.PDF</a>.</p> <p>Supplementary literature: 1. McQuarrie D.A.: Mathematical Methods for Scientists and Engineers, University Science Book, 2003,</p>										
Methods and criteria of evaluation	<p>Completion of the lab classes is based on three written tests. In order to pass the test, a student has to get at least 50% of the points.</p> <p>Lecture The knowledge and skills acquired during the lecture are assessed during the final exam.</p> <p>Lectures and laboratory tutorials: The grade for the subject is issued based on the results of the exam according to the number of points obtained in accordance with the table below:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Very good</td> </tr> <tr> <td>80-89%</td> <td>Good plus</td> </tr> <tr> <td>70-79%</td> <td>Good</td> </tr> <tr> <td>60-69%</td> <td>Satisfactory plus</td> </tr> </tbody> </table>	Percentage of points	Grade	90-100%	Very good	80-89%	Good plus	70-79%	Good	60-69%	Satisfactory plus
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50-59%	Satisfactory				
0-49%	Failed/Unsatisfactory				
Practical training as part of course	Not applicable according to the educational program				

## B) Course description in the didactic cycle

Space name	Comment														
Didactic cycle	3 <sup>st</sup> year, 1 <sup>st</sup> semester (fall)														
Form of crediting a subject in the cycle	Lectures: exam Laboratories: credit														
Form(s) and number of course hours as well as the form of crediting	Lectures: 10 hours - exam Laboratories: 25 hours - credit														
Course coordinator(s)	Dr Magdalena Wietlicka-Piszczyńska														
Subject Teachers	Dr Magdalena Wietlicka-Piszczyńska Dr Małgorzata Ćwiklińska-Jurkowska Mgr Rafał Pawłowski Dr Przemysław Tarasewicz														
Course form (character)	Obligatory														
Limit of places available in each group	Lecture: 1 <sup>st</sup> year, I semester Laboratories: groups of 25 students														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods	N/A														
Subject website	N/A														
Learning outcomes determined for the given course form	Lecture: W1-W5, U1, K1 Laboratory tutorials: W1-W3, U1-U5, K1														
Methods and criteria of the evaluation for the given course form	<p>Completion of the lab classes is based on three written tests. In order to pass the test, a student has to get at least 50% of the points.</p> <p><b>Lecture</b> The knowledge and skills acquired during the lecture are assessed during the final exam.</p> <p><b>Lectures and laboratory tutorials:</b> The grade for the subject is issued based on the results of the exam according to the number of points obtained in accordance with the table below:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Very good</td> </tr> <tr> <td>80-89%</td> <td>Good plus</td> </tr> <tr> <td>70-79%</td> <td>Good</td> </tr> <tr> <td>60-69%</td> <td>Satisfactory plus</td> </tr> <tr> <td>50-59%</td> <td>Satisfactory</td> </tr> <tr> <td>0-49%</td> <td>Failed/Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Grade	90-100%	Very good	80-89%	Good plus	70-79%	Good	60-69%	Satisfactory plus	50-59%	Satisfactory	0-49%	Failed/Unsatisfactory
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0-49%	Failed/Unsatisfactory														
List of topics	<u>Lectures:</u>														

	<ol style="list-style-type: none"> <li>1. The concept of function, the basic properties of functions of one real variable, definitions and properties of elementary functions: polynomials, rational, exponential, logarithmic and trigonometric functions.</li> <li>2. Basic properties of number sequences.</li> <li>3. The concept of the limit of a function at a point, the concept of unilateral boundaries and function continuity.</li> <li>4. The concept of the derivative of a function at a point, formulas for derivatives of elementary functions and formulas for a derivative of a linear combination and composition of functions.</li> <li>5. The interpretation of derivatives of higher orders and their application to study the course of function variability.</li> <li>6. The concept of indefinite and definite integral, the primary functions of selected elementary functions, the geometric interpretation of the definite integral.</li> </ol> <p><u>Laboratory tutorials:</u></p> <ol style="list-style-type: none"> <li>1. Drawing diagrams and analysis of properties of the linear, quadratic, power, exponential and trigonometric functions.</li> <li>2. Basic properties of number sequences; monotonicity, limitations and convergence of number sequences</li> <li>3. The limit of a function at a point, the concept of unilateral boundaries and function continuity.</li> <li>4. Calculating derivatives of elementary functions.</li> <li>5. Calculating higher order derivatives.</li> <li>6. Investigation of fundamental features of elementary functions and drawing their diagrams – polynomials and simple rational functions.</li> <li>7. Calculating simple indefinite and definite integrals using integration by parts and integration by substitution.</li> </ol>
Didactic methods	The same as in part A.
References	The same as in part A.

## Statistics

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Statistics</b> (Statystyka)
Unit offering the subject	Faculty of Pharmacy, Department of Department of Biostatistics and Biomedical Systems Theory Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	
ERASMUS code	
ISCED code	

Number of ECTS points	4
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Course moduleB: Obligatory course
Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>- lecture participation – 12 hours</li> <li>- laboratories participation – 23 hours,</li> <li>- consultations participation, including scientific and research consultations – 3 hours,</li> <li>- final exam participation – 2 hours</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>40 hours</b>, which corresponds to <b>1.60 ECTS point</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>- lecture participation – 12 hours,</li> <li>- laboratories participation – 23 hours,</li> <li>- consultations participation, including scientific and research consultations – 5 hours,</li> <li>- preparation for laboratories – 35 hours,</li> <li>- preparation for tests and final exam – 25 hours,</li> </ul> <p>A total work amount: <b>100 hours</b>, which corresponds to <b>4 ECTS point</b>.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>- participation in classes (including research results and scientific studies in the field of statistics) - 15 hours,</li> <li>- participation in scientific consultations - 5 hours,</li> <li>- preparation for laboratories including scientific results: 15 hours,</li> <li>- preparation for final exam including research results and scientific studies in the field of statistics - 5 hours.</li> </ul> <p>A total student workload related to the conducted research is <b>40 hours</b>, which corresponds to <b>1.60 ECTS point</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- - preparation for test – 10 hours,</li> <li>- - preparation for final exam – 10hours,</li> </ul> <p>Total time required for the preparation and participation in evaluating process: <b>20 hours</b>, which corresponds to <b>0.8 ECTS point</b>.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>Student:</p> <p>W1: knows and understands the definition of random variable and probability - K_B.W25</p> <p>W2: knows and understands probability distributions of the discrete random variable - K_B.W25</p> <p>W3: knows moments and central moments of probability distribution of a discrete random variable - K_B.W25</p>

	<p>W4: knows cumulative distribution function for the discrete random variable- K_B.W25</p> <p>W5: knows function of probability density for the continuous random variable- K_B.W25</p> <p>W6: knows and understands probability distributions of the continuous random variable and has basic knowledge of typical probability distributions- K_B.W25</p> <p>W7: possesses knowledge about confidence interval- K_B.W25</p> <p>W8: knows the definition of statistical hypothesis and understands the idea of hypothesis testing- K_B.W26</p> <p>W9: knows measures of linear correlation and methods of computing parameters of the linear regression-K_B.W25</p>
Learning outcomes - abilities	<p>Student:</p> <p>U1: is able to calculate probability of random variables- K_B.U11</p> <p>U2: is able to determine moments and cumulative distribution function for basic probability distributions-K_B.U11</p> <p>U3: is able to compute moments estimators for a statistical sample- K_B.U11</p> <p>U4: is able to apply statistical tools (Statistica, SPSS, SAS, R)- K_B.U12</p> <p>U5: is able to determine confidence interval for t-Student distribution K_B.U11</p> <p>U6: is able to put research statistical hypothesis K_F.U2</p> <p>U7: is able to compute parameters of the linear regression- K_B.U11</p>
Learning outcomes – social skills	<p>Student:</p> <p>K1: understands the need for self education and enlarging knowledge-K2</p>
Didactic methods	<p><u>Lectures:</u> Expository teaching methods – informative (conventional) lecture, participatory lecture, problem-based lecture</p> <p><u>Laboratories:</u> Exploratory teaching methods – practical problem solving using professional statistical software Expository teaching methods – discussion, description Observation/demonstration teaching methods</p>
Preliminary requirements	<p>A student starting education in the subject of Statistics should have knowledge of mathematics at the high school level. Students should have basic knowledge and skills acquired in computer science.</p>
Brief course description	<p>The lectures are an introduction to fundamental statistical concepts necessary to understand hypothesis testing. The aim of the course is to familiarize students with basics methods of the descriptive statistics and hypothesis testing.</p>
Entire course description	<p><u>Lectures:</u> The aim of the lectures is to familiarize the student with the knowledge of theoretical methods and experimental statistics used in medical research problems.</p> <p><u>Laboratories:</u> Laboratories will provide students with the knowledge of probability distribution of discrete and continuous random</p>

	variables, descriptive statistics and linear regression. The students acquire skills and abilities of using the statistical methods both without computer and with the application of programs for statistical analysis (EXCEL, Statistica)														
References	<p>Primary literature</p> <ol style="list-style-type: none"> <li>1. A. Petrie &amp; C. Sabin, <i>Medical Statistics at Glance</i>, Wiley-Blackwell 2012</li> <li>2. M. Triola, <i>Biostatistics</i>, Pearson 2006,</li> <li>3. D. Fisher, <i>Biostatistics</i>, Wiley 2004</li> <li>4. M. Triola, <i>Elementary statistics</i>, Pearson 2010</li> </ol> <p>Supplementary literature</p> <ol style="list-style-type: none"> <li>1. Zar J. H.: <i>Biostatistical Analysis, Fifth edition</i>, Pearson Education International</li> <li>2. B. R. Kirkwood, J. A. C. Sterne, <i>Essential Medical Statistics Second Edition</i>, Wiley &amp; Sons 2010</li> </ol>														
Methods and criteria of evaluation	<p>Lectures: Written test: W1-W9, U1-U3, K1</p> <p>Laboratories: - activity in laboratories (extended observation: 1-3 points): K1 - 1 written test (descriptive): W1-W9, U1-U3, U5-U7, K1 - 1 practical test with computer software: U4</p> <p>Exam: In the case of written tests (exam, colloquium), the points obtained by students are converted into grades on the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Very good</td> </tr> <tr> <td>84-91%</td> <td>Good plus</td> </tr> <tr> <td>76-83%</td> <td>Good</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory plus</td> </tr> <tr> <td>60-67%</td> <td>Satisfactory</td> </tr> <tr> <td>0-59%</td> <td>Failed/Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Grade	92-100%	Very good	84-91%	Good plus	76-83%	Good	68-75%	Satisfactory plus	60-67%	Satisfactory	0-59%	Failed/Unsatisfactory
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0-59%	Failed/Unsatisfactory														
Practical training as part of course	Not applicable according to the educational program														

## B) Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures: exam Laboratories: exam
Form(s) and number of course hours as well as the form of crediting	Lectures: 12 hours - exam Laboratories: 23 hours - credit
Course coordinator(s)	dr hab. Katarzyna Buszko, prof. UMK
Subject Teachers	dr hab. Katarzyna Buszko, prof. UMK dr Magdalena Wietlicka -Piszc dr Małgorzata Ćwiklińska-Jurkowska mgr Rafał Pawłowski
Course form (character)	Obligatory
Limit of places available in each group	Lecture: 1 <sup>st</sup> year, 2 semester Laboratories: groups of 12 students



Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	N/A
Subject website	N/A
Learning outcomes determined for the given course form	<p>Lecture</p> <p>W1: knows and understands the definition of random variable and probability - K_B.W25</p> <p>W2: knows and understands probability distributions of the discrete random variable - K_B.W25</p> <p>W3: knows moments and central moments of probability distribution of a discrete random variable - K_B.W25</p> <p>W4: knows cumulative distribution function for the discrete random variable- K_B.W25</p> <p>W5: knows function of probability density for the continuous random variable- K_B.W25</p> <p>W6: knows and understands probability distributions of the continuous random variable and has basic knowledge of typical probability distributions- K_B.W25</p> <p>W7: possesses knowledge about confidence interval- K_B.W25</p> <p>W8: knows the definition of statistical hypothesis and understands the idea of hypothesis testing- K_B.W26</p> <p>W9: knows measures of linear correlation and methods of computing parameters of the linear regression-K_B.W25</p> <p>Laboratories:</p> <p>U1: is able to calculate probability of random variables- K_B.U11</p> <p>U2: is able to determine moments and cumulative distribution function for basic probability distributions-K_B.U11</p> <p>U3: is able to compute moments estimators for a statistical sample- K_B.U11</p> <p>U4: is able to apply statistical tools (Statistica, SPSS, SAS, R)- K_B.U12</p> <p>U5: is able to determine confidence interval for t-Student distribution K_B.U11</p> <p>U6: is able to put research statistical hypothesis K_F.U2</p> <p>U7: is able to compute parameters of the linear regression- K_B.U11</p> <p>K1: understands the need for self-education and enlarging knowledge-K2</p>
Methods and criteria of the evaluation for the given course form	<p>Credit conditions for the course and assessment criteria:</p> <p>Lectures:</p> <ul style="list-style-type: none"> <li>- exam (written, descriptive covering the full material of the subjects including lectures, laboratories and additional materials).</li> <li>- attendance at lectures - any absence from the lecture must be justified within 14 days.</li> </ul> <p>Laboratories:</p> <ul style="list-style-type: none"> <li>- positive grades from two partial tests.</li> </ul>

	<p>- attendance at laboratories - every absence must be justified and made up in a manner agreed by the person conducting the laboratory.</p> <p>- positive grade from tutors (average of all grades obtained by the student during the laboratories and activity during the classes).</p> <p>In the case of written tests (exam, colloquium), the points obtained by students are converted into grades on the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Very good</td> </tr> <tr> <td>84-91%</td> <td>Good plus</td> </tr> <tr> <td>76-83%</td> <td>Good</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory plus</td> </tr> <tr> <td>60-67%</td> <td>Satisfactory</td> </tr> <tr> <td>0-59%</td> <td>Failed/Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Grade	92-100%	Very good	84-91%	Good plus	76-83%	Good	68-75%	Satisfactory plus	60-67%	Satisfactory	0-59%	Failed/Unsatisfactory
Percentage of points	Grade														
92-100%	Very good														
84-91%	Good plus														
76-83%	Good														
68-75%	Satisfactory plus														
60-67%	Satisfactory														
0-59%	Failed/Unsatisfactory														
List of topics	<p><u>Lectures:</u></p> <ol style="list-style-type: none"> <li>1. Fundamentals of probability: discrete random variable and continuous random variable, classical definition of probability, probability function, cumulative distribution function.</li> <li>2. Probability distributions of the discrete random variable, moments and central moments of probability distribution and typical probability distributions of the discrete random variable.</li> <li>3. Probability density, probability distributions of the continuous random variable, moments and central moments of probability distribution and typical probability distributions of the continuous random variable.</li> <li>4. Confidence interval for mean and proportion.</li> <li>5. Fundamentals of hypothesis testing</li> <li>6. Measures of linear correlation and parameters of linear regression.</li> </ol> <p><u>Laboratories:</u></p> <ol style="list-style-type: none"> <li>1. An introduction to Statistica software, descriptive statistics.</li> <li>2. Fundamentals of probability: classical definition of probability, random variable, probability function, distribution of probability, cumulative distribution function.</li> <li>3. Discrete random variable: probability distributions, moments and central moments of probability distribution, typical probability distributions</li> <li>4. Continuous random variable: probability distributions, moments and central moments of probability distribution, typical probability distributions (normal distribution)</li> <li>5. Calculating confidence intervals for the measure of location</li> <li>6. Fundamentals of hypothesis testing</li> <li>7. Analysis of correlation and linear regression</li> </ol>														
Didactic methods	The same as in part A.														
References	The same as in part A.														

## Information technology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Information technology</b> (Technologia informacyjna)
Unit offering the subject	Faculty of Pharmacy Department of Department of Biostatistics and Biomedical Systems Theory Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1703-f2-techi-j
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	2
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Course moduleB: Physicochemical basis of pharmacy Obligatory course
Total student workload	<p>1. Obligatory hours realized with the teacher participation: - laboratories participation (including the analysis of case studies, clinical and randomized test results) – 30 hours, - consultations participation, including scientific and research consultations – 2 hours, Total obligatory hours realized with the teacher participation: <b>32 hours</b>, which corresponds to <b>1.28 ECTS point</b>.</p> <p>2. Student workload balance: - laboratories participation (including the analysis of case studies, clinical and randomized test results) – 30 hours, - consultations participation, including scientific and research consultations – 2 hours, , - preparation for laboratories – 8 hours, - preparation for test – 10 hours. A total work amount: <b>50 hours</b>, which corresponds to <b>2.00 ECTS point</b>.</p> <p>3. Workload related to conducting research: - not applicable</p> <p>4. Time required for the preparation and participation in evaluating process: - preparation for test – 10 hours, - participation in evaluating process- 2 hours Total time required for the preparation and participation in evaluating process: <b>12 hours</b>, which corresponds to <b>0.48 ECTS point</b>.</p>

	5. Time required for the practical training completion – not applicable.
Learning outcomes – knowledge	The graduate knows and understands: W1: basic rules for entering data into Excel, creating formulas, addressing cells, creating cell names and ranges of cells - K_B.W26 W2: basic rules for formatting text in Word software: paragraph formatting, formatting using styles, chapter numbering, inserting headers and footers, cross-references, table of contents - K_B.W26 W3: functions of MS Access system objects such as tables, queries, forms and reports - K_B.W27
Learning outcomes - abilities	The graduate is able to: U1. enter data into the MS Excel spreadsheet - K_B.U12 U2: construct formulas in MS Excel (including array formulas), address cells, create cell names, create data series in MS Excel sheets and format sheet cells - K_B.U12 U3. use selected mathematical, statistical, date and time, textual and logical functions of the MS Excel package for the presentation and analysis of biomedical data - K_B.U12 U4. select and use the appropriate form of graphical data presentation - K_B.U12 U5. create a simple database project in MS Access - K_B.U12 U6. carry out text formatting in Word software: paragraph formatting, formatting using styles, chapter numbering, inserting headers and footers, links, table of contents - K_B.U12
Learning outcomes – social skills	Student: K1: draw conclusions based on their measurements or observation- K8
Didactic methods	Lectures: <ul style="list-style-type: none"> <li>• not applicable</li> </ul> Laboratory tutorials: <ul style="list-style-type: none"> <li>• computer laboratory</li> <li>• classical problem-oriented method</li> <li>• discussion</li> </ul> Seminars: <ul style="list-style-type: none"> <li>• not applicable</li> </ul>
Preliminary requirements	Basics of Information Technology at secondary school level
Brief course description	The aim of the course is to familiarize students with computer software that can be used for analysis and presentation of biomedical data like MS Excel and to familiarize students with the basic knowledge on database management systems on the example of MS Access.
Entire course description	Laboratories: The aim of the course is to familiarize students with basic features of MS Excel which can be used for the analysis and visual representation of biomedical data: using formulae, Excel built-in mathematical, statistical, logical and text functions and creating and modifying charts. During the tutorials and lectures students are also familiarized with the basic concepts related to databases on the example of MS Access database.

References	Primary literature: Frye Curtis D: Microsoft Excel 2013 Step by Step. Cox J, Lambert J, Microsoft Access 2010 Step by Step. Cox J, Lambert J, Office 2010 Step by Step. Supplementary literature: John Walkenbach J: Excel 213. Bible.
Methods and criteria of evaluation	Test: U1, U2, U3, U4, U5, U6 Practical performance of tutorials: W1, W2, W3 Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

## B) Course description in the didactic cycle

Space name	Comment														
Didactic cycle	2 <sup>nd</sup> year, IV semester (fall)														
Form of crediting a subject in the cycle	Laboratories: exam														
Form(s) and number of course hours as well as the form of crediting	Laboratories: 30 hours – credit with grade														
Course coordinator(s)	Dr hab. Katarzyna Buszko														
Subject Teachers	Dr Małgorzata Ćwiklińska-Jurkowska, mgr Rafał Pawłowski, dr Przemysław Tarasewicz, dr Magdalena Wietlicka-Piszcz, mgr Jacek Wiśniewski														
Course form (character)	Obligatory														
Limit of places available in each group	Laboratories: groups of 10 students														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods	N/A														
Subject website	N/A														
Learning outcomes determined for the given course form	Laboratories: W1-W3, U1-U6, K1														
Methods and criteria of the evaluation for the given course form	<p>Credit conditions for the course and assessment criteria: Laboratories: Tutorials – practical performance of tutorials and test results. Absence on lectures and laboratory classes can be worked off by performing the task designated by teacher. In the case of tests obtained results are converted to the grades according to the following scale:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Percent of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>5.0</td> </tr> <tr> <td>80-89%</td> <td>4.5</td> </tr> <tr> <td>70-79%</td> <td>4</td> </tr> <tr> <td>60-69%</td> <td>3.5</td> </tr> <tr> <td>50-59%</td> <td>3</td> </tr> <tr> <td>0-49%</td> <td>2</td> </tr> </tbody> </table>	Percent of points	Grade	90-100%	5.0	80-89%	4.5	70-79%	4	60-69%	3.5	50-59%	3	0-49%	2
Percent of points	Grade														
90-100%	5.0														
80-89%	4.5														
70-79%	4														
60-69%	3.5														
50-59%	3														
0-49%	2														

	<p>Final test in the computer laboratory (&gt;50%); (W1-W3, U1-U6, K1)</p> <p>Prolonged observation / Activity ((1-3 points; 3 points = very good)) (W1-W3, U1-U6, K1)</p>
List of topics	<p>Tutorials:</p> <ol style="list-style-type: none"> <li>1. The basics of MS Excel: entering the data and formulae, operators used in formulae, using absolute and relative references, assigning names to cells and ranges, number formatting, entering series of values.</li> <li>2. Application of Excel functions for the analysis of quantitative and qualitative data: examples of mathematical, statistical, logical and date-related functions, array formulas.</li> <li>3. Visual representation of data: creating and modifying charts, visualizing data using conditional formatting, creating pivot charts and pivot tables.</li> <li>4. Creating a database in Excel: entering data by using forms, sorting and filtering the data</li> <li>5. Creating Access database: tables, forms, reports and queries.</li> <li>6. Colloquium</li> </ol>
Didactic methods	The same as in part A.
References	The same as in part A.

## **Course module C**

Drug analysis, synthesis and technology

## Pharmaceutical Biotechnology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmaceutical Biotechnology</b> (Biotechnologia farmaceutyczna)
Unit offering the subject	Department of Pharmacodynamics and Molecular Pharmacology Faculty of Pharmacy Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1724-F4-BFAR-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	2
Form of crediting	credit with a grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Course moduleC Drug analysis, synthesis and technology Obligatory course
Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>– Lecture participation – 18 hours,</li> <li>– Laboratory classes participation – 12 hours,</li> <li>– Scientific-research consultation participation (discussion of scientific literature, development and interpretation of obtained research results, supplement knowledge on the assessment of the therapeutic effect of medicines - personalized therapy, treatment monitoring, drug interactions and side effects, “case study”) – 5 hours.</li> </ul> <p>Total amount of work requiring academic teacher participation is 35 hours, which corresponds to 1.40 ECTS points.</p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– Lecture participation – 18 hours,</li> <li>– Laboratory classes participation – 12 hours,</li> <li>– Scientific-research consultation participation – 5 hours,</li> <li>– Preparation for classes – 5 hours,</li> <li>– Preparation for colloquium – 7 hours,</li> <li>– Reading the indicated scientific literature – 3 hours.</li> </ul> <p>Total amount of student individual work is <b>50 hours</b>, which corresponds to <b>2.00 ECTS points</b>.</p>



	<p>3. Time spent on scientific research:</p> <ul style="list-style-type: none"> <li>– Reading the indicated scientific literature – 3 hours,</li> <li>– Lecture participation (including research methodology, research results, reports) – 6 hours,</li> <li>– Scientific-research consultations – 3 hours,</li> <li>– Scientific practical classes participation (including research methodology, research results, reports) – 6 hours,</li> <li>– Preparation for scientific practical classes – 4 hours,</li> <li>– Preparation for completion of the subject in the field of scientific aspects – 5 hours.</li> </ul> <p>Total amount of work spent on scientific research is 27 hours, which corresponds to <b>1.08 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– Preparation for classes – 4 hours,</li> <li>– Preparation for colloquium – 5 hours.</li> </ul> <p>Total amount of work required for the preparation and participation in evaluating process is 9 hours, which correspond to 0.36 ECTS points.</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: The graduate knows the conditions of living cells and organisms culture and understands the mechanism controlling the production potential of living cells and organisms and available biotechnological methods of their regulation; – K_C.W16, K_C.W17</p> <p>W2: The graduate explains the processes generally used in pharmaceutical biotechnology and gives examples and is also familiar with several processes of purification of obtained medicinal substances as well as methods and techniques of changing the scale and optimization of process parameters in pharmaceutical biotechnology; – K_C.W17, K_C.W18</p> <p>W3: The graduate lists and distinguishes between basic groups of biological medicinal substances, knows their biological properties and applications; – K_C.W19</p> <p>W4: The graduate knows the definition of durability and problems of durability of various forms of biopharmaceuticals; – K_C.W20</p> <p>W5: The graduate knows the characteristics and types of basic vaccines, the principles of their use and storage; – K_C.W21</p> <p>W6: The graduate characterizes basic blood-borne products and blood substitutes and the method they are obtained; – K_C.W22</p> <p>W7: The graduate knows the pharmacopoeial requirements described in the current Pharmacopoeia, which should be met by biological drugs and the principles of placing them on the market; – K_C.W23</p>

	<p>W8: The graduate distinguishes between biological and synthetic medicine and also finds the latest achievements in the field of biological and synthetic medicine research; – K_C.W24</p> <p>W9: The graduate knows the techniques of molecular biology in pharmaceutical biotechnology and gene therapy; – K_A.W32</p>
Learning outcomes - abilities	<p>U1: The graduate is able to analyze the stages and parameters of the biotechnological process – K_C.U12</p> <p>U2: The graduate is able to assess the quality and durability of a biotechnologically obtained medicinal substance and prepare or propose its specification; – K_C.U13</p>
Learning outcomes – social skills	<p>K1: The graduate correctly chooses sources of information, including sources based on Evidence Based Medicine; – K7</p> <p>K2: The graduate is ready to accurately formulate conclusions from own and available research, as well as from observing the environment and work; – K8</p>
Didactic methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>• traditional lecture with a multimedia presentation</li> <li>• problem based lecture</li> <li>• conversational lecture</li> </ul> <p>Laboratory classes:</p> <ul style="list-style-type: none"> <li>• observation method</li> <li>• practical classes</li> <li>• analysis of study results related to cell culture</li> <li>• exposing methods: demonstration and practice</li> <li>• classical problem method</li> <li>• discussion</li> </ul>
Preliminary requirements	<p>Basic knowledge in the field of cell biology and physiology is necessary to implement the described subject. Besides, students should have the knowledge and skills acquired in the subjects of chemistry, biochemistry, anatomy, histology, and physiology.</p>
Brief course description	<p>Pharmaceutical biotechnology concerns the detailed characterization of the topic of cell lines and their division into primary and secondary, adherent and suspension, etc. Explains the basic activities performed in the field of maintaining cells in culture, designing experiments using cell culture and about the possibility of their use in pharmacy. The course includes lectures and laboratory classes aimed at familiarizing students with the problems and hopes arising from the use of advanced cell culture techniques. During the course, students become acquainted with the methods used in cell culture: trypsinization, passage, freezing and thawing of cells in established lines and introduction to the cytotoxicity evaluation.</p>

Entire course description	<p>Lectures will familiarize students with modern techniques of cell culture using bioreactors or advanced vessels for 3D culture. They introduce the student to the historical outline and discuss outstanding discoveries in the field of biotechnology. Drug production processes using cell culture in bioreactors (production of antibiotics, insulin) are discussed. Lectures contain information on the design and use of monoclonal antibodies in medicine.</p> <p>Laboratory classes use the skills of independent student work, work in pairs and group processing of obtained results. The student is familiarized with the basic laboratory equipment used in maintaining cell cultures (bottles, culture dishes, multi-well plates) and with the use of a spectrophotometer and performing a cell survival curve based on the obtained absorbance results. The student learns to practically prepare a culture medium of appropriate composition, as well as to perform a cell line passage.</p>														
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. K. Sambamurthy, Ashutosh Kar. Pharmaceutical Biotechnology. New Age International Pvt Ltd Publishers, 2009.</li> <li>2. Shayne Cox Gad, Handbook of Pharmaceutical Biotechnology, John Wiley &amp; Sons, 2007.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Daan J. A. Crommelin, Robert D. Sindelar, Bernd Meibohm. Pharmaceutical Biotechnology. Fundamentals and Applications. Springer International Publishing, 2019.</li> <li>2. Stokłosowa S. Hodowla komórek i tkanek. Wydawnictwo Naukowe PWN, Warszawa 2015.</li> <li>3. Kayser O., Müller R.H. Biotechnologia farmaceutyczna. Państwowy Zakład Wydawnictw Lekarskich, Warszawa 2003</li> </ol>														
Methods and criteria of evaluation	<p>The basis for passing the subject of Pharmaceutical Biotechnology is compliance with the principles set out in the Didactic Regulations of the Department of Pharmacodynamics and Molecular Pharmacology.</p> <p>The course ends with a credit with a grade. Test form, single and multiple choice.</p> <p>The degrees are issued according to the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Excellent</td> </tr> <tr> <td>85-89%</td> <td>Very good</td> </tr> <tr> <td>80-84%</td> <td>Good</td> </tr> <tr> <td>75-79%</td> <td>Satisfactory</td> </tr> <tr> <td>60-74%</td> <td>Acceptable</td> </tr> <tr> <td>0-59%</td> <td>Fail</td> </tr> </tbody> </table> <p>Credit with a grade: &gt; 60% Prolonged observation / activity</p>	Percentage of points	Grade	90-100%	Excellent	85-89%	Very good	80-84%	Good	75-79%	Satisfactory	60-74%	Acceptable	0-59%	Fail
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0-59%	Fail														

Practical training as part of course	Not applicable according to the educational program
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F. Course description in the didactic cycle

Space name	Comment														
Didactic cycle	4 <sup>th</sup> year, 8 <sup>th</sup> semester (spring)														
Form of crediting a subject in the cycle	Lectures: credit Laboratory classes: credit														
Form(s) and number of course hours as well as the form of crediting	Lectures: 18 hours - credit Laboratory classes: 12 hours - credit														
Course coordinator(s)	Barbara Bojko, Ph.D., D.Sc.														
Subject Teachers	Lectures: Barbara Bojko, Ph.D., D.Sc. Krzysztof Goryński, Ph.D. Laboratory classes: Karol Jaroch, Ph.D., Jonasz Podemski, M.Sc.														
Course form (character)	Obligatory														
Limit of places available in each group	Lectures: all students of 4 <sup>th</sup> year of Pharmacy Laboratory classes: groups up to 12 students														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods	Not applicable														
Subject website	Not applicable														
Learning outcomes determined for the given course form	Lectures: W1-W9 Laboratory classes: W1, U1, U2, K1-K2														
Methods and criteria of the evaluation for the given course form	<p>The basis for passing the subject of Pharmaceutical Biotechnology is compliance with the principles set out in the Didactic Regulations of the Chair of Pharmacodynamics and Molecular Pharmacology.</p> <p>The course ends with a credit with a grade. Test form, single and multiple choice.</p> <p>The degrees are issued according to the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Excellent</td> </tr> <tr> <td>85-89%</td> <td>Very good</td> </tr> <tr> <td>80-84%</td> <td>Good</td> </tr> <tr> <td>75-79%</td> <td>Satisfactory</td> </tr> <tr> <td>60-74%</td> <td>Acceptable</td> </tr> <tr> <td>0-59%</td> <td>Fail</td> </tr> </tbody> </table> <p>Credit with a grade: &gt; 60% Prolonged observation / activity</p>	Percentage of points	Grade	90-100%	Excellent	85-89%	Very good	80-84%	Good	75-79%	Satisfactory	60-74%	Acceptable	0-59%	Fail
Percentage of points	Grade														
90-100%	Excellent														
85-89%	Very good														
80-84%	Good														
75-79%	Satisfactory														
60-74%	Acceptable														
0-59%	Fail														
List of topics	Topics of lectures: 1. The development of biotechnology in historical terms														

	<p>2. Discovery of beta-lactam antibiotics (penicillin, cephalosporin).</p> <p>3. Microorganism's resistance to an antimicrobial drugs.</p> <p>4. Drug therapy in diabetes</p> <p>5. Monoclonal antibodies</p> <p>6. Achievements in biotechnology and material engineering in the field of targeted drug delivery and modern therapy.</p> <p>Topics of laboratory classes:</p> <p>1. Overview of rules and health and safety regulations. Establishment of immortalized cell cultures in vitro.</p> <p>2. Passage of the cell culture line and determination of the parameter associated with cell growth (proliferation). Elaboration of results using a computer program coupled with a spectrophotometer.</p>
Didactic methods	The same as in part A
References	The same as in part A

## Drug Chemistry

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Drug chemistry</b> (Chemia Leków)
Unit offering the subject	Faculty of Pharmacy Department of Drug Chemistry Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1709-F3-CHLE-J 1709-F3-CHLEL-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	15 ECTS
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Education module: Analysis, synthesis and technology of medicines Obligatory course
Total student workload.	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>- Lecture participation – 55 hours,</li> <li>- Tutorials participation – 50 hours,</li> <li>- Laboratories participation – 145 hours,</li> <li>- Consultation participation – 4 hours.</li> </ul> <p>The effort involved in classes requiring the direct participation of academic teachers is 254 hours, equivalent to 10.16 ECTS</p>

	<p>points.</p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>- Lecture participation – 55 hours,</li> <li>- Tutorials participation – 50 hours,</li> <li>- Laboratories participation – 145 hours,</li> <li>- Consultation participation – 4 hours,</li> <li>- Prior preparation and completion of notes – 25 hours,</li> <li>- Collecting and choosing the right materials for classes – 25 hours,</li> <li>- Reading the indicated literature – 26 hours,</li> <li>- Obligatory material revision – 20 hours.</li> </ul> <p>The total workload of the student is <b>350 hours</b>, equivalent to <b>14 ECTS points</b>.</p> <p>3. Time required for the preparation and participation in research process:</p> <ul style="list-style-type: none"> <li>- Collecting and choosing the right materials for classes – 40 hours,</li> <li>- Reading the indicated literature – 60 hours,</li> <li>- Research consultation – 2 hours,</li> <li>- Participation in lectures (taking into account research methodologies, research results, studies) – 45 hours,</li> <li>- Preparation for tutorials (scientific activity) – 40 hours,</li> <li>- Obligatory material revision – 15 hours,</li> <li>- Preparation for the completion in the field of R&amp;D on a given subject – 15 hours.</li> </ul> <p>The total workload of the student related to the R&amp;D is <b>217 hours</b>, equivalent to <b>8.68 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- Tutorials preparation – 18 hours,</li> <li>- Test preparation – 20 hours (1.5 ECTS).</li> </ul> <p>5. Time required for the practical training completion – not applicable.</p>
<p>Learning outcomes – knowledge</p>	<p>W1: knows the chemical and biochemical mechanisms of drug action - K_C.W1</p> <p>W2: knows the physicochemical properties of medicinal substances that affect the biological activity of drugs - K_C.W2</p> <p>W3: divides medicinal substances according to anatomical-therapeutic-chemical classification (ATC) or in the pharmacological system, taking into account international names and synonymous names - K_C.W3</p> <p>W4: knows drugs and compounds marked by isotopes used in the diagnosis and therapy of diseases, methods of obtaining them and their properties - K_C.W4</p> <p>W5: knows the classical and instrumental methods used in assessing the quality of substances for pharmaceutical purposes and in quantitative analysis in medicinal products - K_C.W6</p>

Learning outcomes - abilities	<p>U1: can explain the relationship between the chemical structure and the action of drugs of different classification – K_C.U1</p> <p>U2: carries out quality control of substances for pharmaceutical purposes and medicines in accordance with pharmacopoeial requirements; uses the appropriate analytical method in pharmaceutical research and validates the analytical method– K_C.U5, K_C.U6</p> <p>U3: based on the structure and activity of radiopharmaceuticals, the graduate can indicate their use in medicine – K_C.U2</p> <p>U4: using pharmacopoeial monographs, the graduate is able to perform a qualitative and quantitative analysis of pure medicinal substance and its extraction from the drug form – K_C.U1</p> <p>U5: the graduate evaluates the results obtained in the field of testing the quality of substances for pharmaceutical purposes, as well as confirms their compliance – K_C.U7</p>
Learning outcomes – social skills	K1: Extracts and formulates conclusions from own measurements and observations - K8
Didactic methods	<p><u>Lectures:</u></p> <ul style="list-style-type: none"> <li>▪ informative lecture (conventional)</li> <li>▪ problem lecture with a multimedia presentation</li> </ul> <p><u>Laboratories:</u></p> <ul style="list-style-type: none"> <li>▪ laboratory and practical classes</li> <li>▪ work in teams and individually</li> <li>▪ measurement and analysis of results</li> <li>▪ verification of student knowledge (written or oral answer)</li> </ul> <p><u>Tutorials:</u></p> <ul style="list-style-type: none"> <li>▪ auditorium tutorials with a multimedia presentation</li> <li>▪ conversation lecture</li> </ul>
Preliminary requirements	To attend drug chemistry laboratories (tutorials, and lectures), it is necessary to have a basic knowledge from inorganic, organic, and analytical chemistry. Also, student attending these classes should know the physiological factors determining the course of pharmacokinetic and pharmacodynamics processes of various drugs. Additionally, student should have knowledge and skills acquired in the following subjects: biophysics, mathematics, and statistics.
Brief course description	The purpose of teaching Drug Chemistry is to discuss and familiarize the student with basic drugs used in pharmacotherapy, that are presented in the anatomical-therapeutic-chemical system (ATC) (with the use of the international nomenclature and synonymous names). These drugs are used in diseases affecting: central and peripheral nervous system, cardiovascular system, respiratory, digestive and excretory systems. Also, in hormone and cancer therapy, or in preventing and treatment of infections caused by pathogenic microorganisms. The thematic area of Drug Chemistry also applies to the structure-activity relationships, therefore, issues regarding therapeutic usefulness of medicines, mainly in terms of their biochemical mechanism of their action, routes of administration, distribution in the body, biotransformation, and adverse and toxic effects will also be discussed during the

	classes. Educational material also discusses the basic issues of radiopharmacy.
Entire course description	<p>The subject of Drug Chemistry is carried out in the form of lectures, exercises and laboratories.</p> <p>The aim of the lectures is to teach and familiarize students with the information and knowledge in the field of drug names and their classification, regarding the pharmacological-therapeutic-chemical system (ATC), and the mechanism of action, as well as biotransformation of drugs. Lectures are designed to teach and give knowledge regarding drugs that acts on the peripheral nervous system, adrenergic and adrenolytic drugs, cholinergics, skeletal muscle relaxants, drugs acting on the central nervous system, neuroleptics, antidepressants, anxiolytics, hypnotics, sedatives, surgical anaesthetics, narcotics, NSAIDs, antiepileptics, central nervous system stimulants, and medicines used in the Alzheimer, and Parkinson disease. During drug chemistry lectures issues regarding cardiovascular system, and medicines used in myocardial insufficiency, and other cardiovascular disorders, as well as drugs acting on the respiratory system will also be discussed. Other subjects, include drugs action on pathogenic microorganisms (antibacterial, antiparasitic and antifungal drugs). In terms of knowledge, students know the basic pharmacological division of drugs, chemical and biochemical mechanisms of action of drugs and can explain the dependence of chemical structure of drugs.</p> <p>Exercises are designed to teach and familiarize students with the international (and/or synonymous) names of drugs, drug dependencies, adverse (side) and/or toxic effects of drugs, and their interactions. Also, exercises are a source of information about fat-soluble vitamins characteristics, local anaesthetics, hormones (hypothalamus, pituitary gland, thyroid glands - thyrostatic, adrenal corticoids – glucocorticoids (natural and synthetic), mineralocorticoids, sex hormones – estrogen, gestagens, androgens, hormonal contraceptives, sex antihormones, and issues regarding drugs used in osteoporosis, as well as immunotropic, antiviral, antidiabetic, and anticancer drugs.</p> <p>Student attending laboratories knows and understands the methods of qualitative and quantitative analysis, and as a result, can carry out quality control of medicinal substances, and therefore is able to propose an appropriate analytical method for a specific purpose, including its validation. Laboratories are aimed to learn the basic pharmacopoeial methods used in quantitative and qualitative analysis of medicinal substances.</p>
References	<p><u>Primary literature:</u></p> <ol style="list-style-type: none"> <li>1. Zejc A., Górczyca M. (red.): <i>Chemia Leków</i>, PZWL, Warszawa 2008.</li> <li>2. Zając M., Pawełczyk E., Jelińska A.: <i>Chemia Leków</i>, Wydawnictwo Naukowe Akademii Medycznej im. Karola Marcinkowskiego w Poznaniu, Poznań 2006.</li> <li>3. Kraczkowska A., Ołędzka I., Rajzer D., Sell E.: <i>Chemiczne metody identyfikacji środków leczniczych</i>, Akademia Medyczna w Gdańsku, Gdańsk 2002.</li> </ol>



	<p>4. Hopkała H., Misztal G. Przyborowski L.: <i>Analiza środków leczniczych – skrypt do ćwiczeń</i>, Akademia Medyczna w Lublinie, Lublin 1997.</p> <p>5. Patrick, G.L. <i>An introduction to Medicinal Chemistry (Fourth Edition)</i>, Oxford University Press, 2009.</p> <p><u>Supplementary literature:</u></p> <p>1. <i>European Pharmacopeia</i> 9.0, Ph. Eur., Strasbourg: Council of Europe, 2018.</p> <p>2. <i>Farmakopea Polska XI</i>, PTFarm, Warszawa 2017.</p> <p>3. Zając M., Jelińska A.: <i>Ocena jakości substancji i produktów leczniczych</i>, Wydawnictwo Naukowe Uniwersytetu Medycznego im. Karola Marcinkowskiego w Poznaniu, Poznań 2010.</p> <p>4. Patrick G.L.: <i>Chemia medyczna</i>, Wydawnictwa Naukowo-Techniczne, Warszawa 2003.</p>
Methods and criteria of evaluation	<p><u>Written exam:</u> (Lectures material) The exam is taken by students who have completed exercises and laboratories. The exam consists of 10 open questions. Student can receive a maximum of 0-3 points per question (with a multiple of 1 point), grades (notes) are shown below:</p> <p>Satisfactory rating: 18.00 – 19.00 points      Good enough rating: 20.00 – 22.00 points      Good rating: 23.00 – 25.00 points      More than good rating: 26.00 – 28.00 points      Very good rating: 29.00 – 30.00 points</p> <p>The total sum of exam points, additionally includes colloquium points and allows partial scoring.</p> <p><u>Colloquium:</u> (Lectures material) There are four colloquias consisting of 9 basic questions. Student can receive a maximum of 0-1 points for each question. A partial score of 0.25 points is allowed. Points received from a given colloquium, after splitting them by number 2, are added to the total sum of exam points received during the final exam. During the academic year there are 4 colloquias planned.</p> <p>Exercises: The condition for the assessment of exercises is to obtain a positive assessments from all colloquias performed by the lecturer - 2 mid-semester colloquias.</p> <p>Laboratory: The condition of obtaining the final credit is the correct identification of all preparations and getting the credit from all the tests.</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	3 <sup>rd</sup> year, 1 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Lectures: credit Tutorials: credit Laboratories: credit

Form(s) and number of course hours as well as the form of crediting	Lectures: 30 hours – credit Tutorials: 50 hours – credit Laboratories: 70 hours – credit
Course coordinator(s)	Prof. dr hab. Michał Marszałł
Subject Teachers	Lectures: Prof. dr hab. Michał Marszałł  Tutorials: Prof. dr hab. Michał Marszałł Dr Tomasz Siódmiak Dr Michał Falkowski Mgr Dominik Mieszkowski Dr Adam Sikora  Laboratories: Dr Tomasz Siódmiak Dr Michał Falkowski Mgr Dominik Mieszkowski Dr Adam Sikora
Course form (character)	Obligatory
Limit of places available in each group	Lectures: all year, students of the 3 <sup>rd</sup> year (winter semester) Tutorials: groups of 25 students Laboratories: groups of 12 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Lectures: W1-W5, U1 Tutorials: W1-W5, U1 Laboratories: U1-U5, K1
Methods and criteria of the evaluation for the given course form	<u>Lectures:</u> Verification and assessment of learning outcomes achieved by the student is carried out by two mid-term control tests. The test consists of 9 basic questions. For each question a student can receive a maximum of 0-1 points. A partial score in the form of a multiple of 0.25 points is allowed. <u>Tutorials:</u> Lectures will be held during the winter term with 50 teaching hours for 15 weeks. Attendance at seminars is obligatory. Classes abandoned for random reasons should be justified (appropriate sick leave) and worked off with another training group that will carry out the material of abandoned classes. The student is obliged to prepare theoretically for each practical class in the aforementioned range of material. Verification and assessment of learning outcomes achieved by the student is checked by means of two mid-term tests. The basis for passing the exercises is obtaining positive grades from all tests conducted by the teacher. <u>Laboratories:</u> The cycle of laboratory classes includes 11 analyzes of preparations: - 8 analyzes of one-component preparations, 2 from each group (section),

	<p>- 1 analysis of one-component preparation and 2 analyzes of two-component preparations from all groups (section) of compounds  - and writing 2 tests covering the material of all sections divided into two blocks.</p> <p>The first test includes sections: reactions characteristic of functional groups in identifying therapeutic compounds and selected ions, identifying carboxylic acids and their salts, and identifying carboxylic acid derivatives.</p> <p>The second test includes sections: identification of sulfonamides and their salts, compounds of steroid structure and identification of organic bases and their salts.</p> <p>Obtaining at least 60% of points from the test is a condition for passing it.</p> <p>A maximum of 2 points can be obtained for correctly identifying a preparation (first check - 2 points, second check - 1 point, next check - unsuccessful preparation). If the preparation fails, the student may receive from the tutor a new preparation from a given group of compounds, but not more than twice during the whole laboratory exercise.</p> <p>The condition of obtaining the final credit is the correct identification of all preparations and getting the credit from all the tests.</p>
List of topics	<p><u>Lectures– winter semester:</u></p> <ol style="list-style-type: none"> <li>1. Preparation of radionuclides for medical purposes.</li> <li>2. Characteristics of individual radiopharmaceuticals.</li> <li>3. Application of radiopharmaceuticals.</li> <li>4. Historical outline, nomenclature, and classification of drugs in the pharmacological-therapeutic-chemical system (ATC).</li> <li>5. Mechanism of drug action and drug biotransformation.</li> <li>6. Drugs acting on the peripheral nervous system, adrenergic, adrenergic drugs, cholinergic and cholinolytic drugs, drugs acting on the ganglia of the autonomic system.</li> <li>7. Central nervous system drugs: neuroleptics, antidepressants, anxiolytics, hypnotics and sedatives, surgical anesthetics, analgesics - narcotics and NSAIDs, anti-epileptic, central nervous system stimulants, drugs for Alzheimer's and Parkinson's disease.</li> </ol> <p><u>Laboratories – winter semester :</u></p> <p>Topics of laboratories include a qualitative analysis of selected medicinal substances and pharmaceutical preparations in accordance with the requirements of Polish Pharmacopoeia VI, VIII.</p> <ol style="list-style-type: none"> <li>1. Introductory classes (regulations, course completion rules).</li> <li>2. Characteristic reactions for functional groups in the identification of therapeutic compounds and selected ions.</li> <li>3. Identification of carboxylic acids and their salts - 1 formulation.</li> </ol>

	<ol style="list-style-type: none"> <li>4. Identification of carboxylic acids and their salts -1 formulation.</li> <li>5. Identification of carboxylic acid derivatives - 1 formulation.</li> <li>6. Identification of carboxylic acid derivatives - 1 formulation.</li> <li>7. Identification of sulfonamides and their salts, steroid compounds - 1 formulation.</li> <li>8. Identification of sulfonamides and their salts, steroid compounds - 1 formulation.</li> <li>9. Identification of organic bases and their salts - 1 formulation.</li> <li>10. Identification of organic bases and their salts -1 formulation.</li> <li>11. Identification of one-component preparation - 1 formulation.</li> <li>12. Identification of the two-component preparation- 1 formulation.</li> <li>13. Identification of the two-component preparation - 1 formulation.</li> <li>14. Complementary classes (supplementing or correction of failed analysis).</li> <li>15. Final classes – summary of semester (summary, correction of failed formulations, and tests).</li> </ol> <p><u>Tutorials – winter semester:</u></p> <ol style="list-style-type: none"> <li>1. Introduction.</li> <li>2. Sulfonamides, nitrofurans derivatives, quinolones.</li> <li>3. Antibiotics part 1.</li> <li>4. Antibiotics part 2.</li> <li>5. Hormones part 1.</li> <li>6. Hormones part 2.</li> <li>7. Test I.</li> <li>8. Anticancer drugs and radiopharmaceuticals part 1.</li> <li>9. Anticancer drugs and radiopharmaceuticals part 2.</li> <li>10. Antiviral drugs and used to treat HIV infection.</li> <li>11. Analgesics, antipyretics and anti-inflammatory drugs.</li> <li>12. Vitamins.</li> <li>13. Test II.</li> <li>14. Retake of test I.</li> <li>15. Retake of test II.</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

#### Course description in the didactic cycle

Space name	Comment
Didactic cycle	3 <sup>rd</sup> year, 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures: exam Laboratories: credit
Form(s) and number of course hours as well as the form of crediting	Lectures: 25 hours – exam Laboratories: 75 hours – credit
Course coordinator(s)	Prof. dr hab. Michał Marszał

Subject Teachers	<p>Lectures: Prof. dr hab. Michał Marszałł</p> <p>Laboratories: Dr Tomasz Siódmiak Dr Michał Falkowski Mgr Dominik Mieszkowski Dr Adam Sikora</p>
Course form (character)	Obligatory
Limit of places available in each group	<p>Lectures: all year, students of the 3<sup>rd</sup> year (winter semester)</p> <p>Laboratories: groups of 12 students</p>
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	<p>Lectures: W1-W5, U1</p> <p>Laboratories: U1-U5, K1</p>
Methods and criteria of the evaluation for the given course form	<p><u>Lectures:</u> Verification and assessment of learning outcomes achieved by the student is carried out by two mid-term control tests. The test consists of 9 basic questions. For each question a student can receive a maximum of 0-1 points. A partial score in the form of a multiple of 0.25 points is allowed.</p> <p>Lectures/subject ends with a written exam.</p> <p><u>Laboratories:</u> The cycle of laboratory classes includes 12 quantitative analyzes of pharmaceutical preparations and writing 2 tests. The basis for passing is at least 60% of each test. The basis for passing each exercise is obtaining a quantitative analysis result within the error range determined by the teacher and providing within a week after the end of the exercise a correctly prepared report, whose assessment and acceptance by the assistant is a condition for his final passing.</p> <p>The improvement of exercises and tests takes place in the 14th and 15th exercise week.</p>
List of topics	<p><u>Lectures– summer semester:</u></p> <ol style="list-style-type: none"> <li>1. Skeletal muscle relaxants.</li> <li>2. Drugs acting on pathogenic microorganisms: antibacterial, antiprotozoal, antifungal drugs.</li> <li>3. Radiopharmaceuticals.</li> <li>4. Antihistamines.</li> <li>5. Local anesthetics.</li> <li>6. Drugs affecting the cardiovascular system: drugs used in myocardial insufficiency, drugs used in coronary heart disease, anti-arrhythmia, antihypertensive drugs, peripheral vasodilator, cerebral, hypolipemic drugs, drugs that affect blood clotting.</li> <li>7. Diuretics.</li> <li>8. Drugs that affect the digestive system.</li> <li>9. Drugs acting on the respiratory system.</li> </ol> <p><u>Laboratories – summer semester:</u></p>

	<p>Laboratories topics include quantitative analysis of medicinal substances and pharmaceutical formulations by chemical and instrumental methods.</p> <p>Introductory classes (Basics of statistical analysis) - first week of classes. Quantitative analysis - 12 weeks of tutorials.</p> <p>Quantitative analysis by chemical methods include: Titration analysis (6 tutorials - Alkacymetric titration (Alkalimetry and Acidimetry), Complexometry (Complexonometry), Redoximetry (Iodometry)). Quantitative analysis by instrumental methods include: Spectroscopic methods - UV-VIS spectrophotometry (1 lab), Electroanalytical methods (Potentiometry (1 lab), Conductometry (1 lab), Chromatographic methods (High-performance liquid chromatography (1 lab), Thin-layer chromatography (2 labs)) Complementary laboratories – improvement of analyzes and retake of failed tests - weeks 14 and 15.</p>
Didactic methods	The same as in part A
References	The same as in part A

## Pharmacognosy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmacognosy</b> (Farmakognozja)
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1713-F3-FKGNL-J
ERASMUS code	
ISCED code	
Number of ECTS points	8
Form of crediting	exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Education module: Drug analysis, synthesis and technology Obligatory course
Total student workload	2. Student workload balance: - participation in lectures: 45 hours, - participation in laboratories: 70 hours, - participation in seminars: 35 hours, - preparation for tests 16 hours, - preparation for the exam: 24 hours,

	<ul style="list-style-type: none"> <li>- reading the indicated literature: 8 hours,</li> <li>- consultations with tutors: 2 hours.</li> </ul> <p>The total student workload is <b>200 hours</b>, which corresponds to <b>8.00 ECTS points</b>.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>- reading of the indicated scientific literature: 8 hours,</li> <li>- research and scientific consultations: 2 hours</li> <li>- participation in lectures (including research methodology, research results, studies): 40 hours,</li> <li>- participation in laboratories covered by scientific activity (including research methodology, research results, studies): 30 hours,</li> <li>- preparation for laboratories covered by scientific activity: 30 hours</li> <li>- participation in seminars covered by scientific activities (including research methodology, research results, studies): 20 hours,</li> <li>- preparation for seminars covered by scientific activity: 18 hours</li> <li>- preparation to pass in the field of research and development for the subject: 15 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>163 hours</b>, which corresponds to <b>6.52 ECTS points</b>.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>- preparation for tests: 16 hours,</li> <li>- preparation for the exam: 24 hours.</li> </ul> <p>The time required to prepare and participate in the assessment process is 40 hours, which corresponds to 1.6 ECTS points.</p> <p>5. Time required to undergo compulsory practice: not applicable</p>
Learning outcomes – knowledge	<p>W1: The graduate has knowledge of medicinal pharmacopoeial and non-pharmacopoeial medicinal raw materials, as well as methods of analysis and qualitative assessment of medicinal plant raw materials; – K_C.W41</p> <p>W2: The graduate knows the criteria for assessing the quality of medicinal plant products and dietary supplements; – K_C.W41</p> <p>W3: The graduate has knowledge of raw materials of natural origin used in medicine and used as consumer products in the pharmaceutical, cosmetics and food industries; - K_C.W42</p> <p>W4: The graduate knows the principles of placing medicinal plant products and dietary supplements containing plant materials on the market; - K_C.W42</p> <p>W5: The graduate knows side effects specific to the herbal medicine and dose dependent; - K_C.W42</p> <p>W6: The graduate knows the impact of groups of chemical compounds - primary and secondary metabolites on the biological and pharmacological activity of plant raw materials; - K_C.W43</p>

	<p>W7: The graduate demonstrates knowledge of the mechanisms of action of plant substances at the biochemical and molecular level; - K_C.W43</p> <p>W8: The graduate has knowledge of highly and very highly potent plant materials, as well as chemical composition, healing properties and toxicity of narcotic plants; - K_C.W44</p> <p>W9: The graduate knows the physicochemical properties of medicinal substances that affect the biological activity of drugs; - K_C.W44</p> <p>W10: The graduate knows the chemical and biochemical mechanisms of action of plant medicines; - K_C.W44</p> <p>W11: The graduate knows the research methods used in systematics and the search for new species and varieties of medicinal plants; - K_C.W45</p> <p>W12: The graduate demonstrates knowledge of the basics of biotechnology in the preparation of a medicinal substance; - K_C.W45</p>
Learning outcomes - abilities	<p>U1: Can make infusions, decoctions, tinctures and plant extracts using appropriate solvents - K_C.U18</p> <p>U2: Can, using a pharmacopoeia, carry out a quality assessment of plant products - K_C.U18</p> <p>U3: Can identify and describe the structural components of cells, tissues and organs of plants by microscopic and histochemical methods and recognize plants on the basis of morphological and anatomical features (especially species of pharmaceutical importance) - K_C.U29</p> <p>U4: Can use the acquired knowledge and pharmacopoeia; marking keys; atlases, identify medicinal plant raw material - K_C.U29</p> <p>U5: Can recognize a medicinal plant material and classify it into the appropriate botanical group based on its morphological and anatomical features - K_C.U30</p> <p>U6: Able to assess the quality of the raw material and its medicinal value based on organoleptic assessment, pharmacopoeial monograph and analytical methods - K_C.U31</p> <p>U7: Uses analytical and biological methods and techniques in qualitative and quantitative research on active substances occurring in plant raw materials - K_C.U32</p> <p>U8: Performs phytochemical analysis of a plant raw material and determines the group of chemical compounds or chemical compound present in this raw material - K_C.U32</p> <p>U9: Can explain the mechanism of action of a plant raw material by justifying it with the presence of active compounds - K_C.U33</p> <p>U10: Can indicate the right raw material or plant processing for use in a specific ailment - K_C.U33</p>
Learning outcomes – social skills	<p>K1: The graduate is aware of the need to promote healthy behaviour; - K6</p> <p>K2: The graduate has a habit of using objective sources of information; - K7</p> <p>K3: The graduate draws and formulates conclusions from his own measurements and observations; - K8</p>



Didactic methods	<p><u>Lectures:</u></p> <ul style="list-style-type: none"> <li>• informative lecture problem lecture with multimedia presentation</li> </ul> <p><u>Seminars:</u></p> <ul style="list-style-type: none"> <li>• didactic discussion,</li> <li>• work in groups (case method)</li> </ul> <p><u>Laboratories:</u></p> <ul style="list-style-type: none"> <li>• didactic discussion,</li> <li>• demonstration</li> </ul>
Preliminary requirements	Basic knowledge of biology possessed by the participant to implement the subject of participation, especially botany, chemistry and physiology.
Brief course description	<p>General information, basic definitions (raw material / plant substance, active compounds) synergism, antagonism, factors of variation, origin, principles of raw material collection, methods of identity testing, standardization, types of herbal medicines, methods of preparation, groups of compounds belonging to primary metabolites (carbohydrates, fats: oils, proteins: enzymes) and secondary (phenolic compounds, phenylpropanoids, coumarins, tannins, flavonoids, anthocyanins, quinones, terpenes, bitterness, alkaloids, and essential oils) that determine biological and pharmacological activity of plant raw materials, also at the molecular level, operation and use of raw materials. Knowledge about side effects, toxicity, possible side effects, interactions of plant raw materials with plant medicines and synthetic, addiction options, when used as a stimulant. Use of vegetable raw materials for purposes other than therapeutic and prophylactic (cosmetics, food).</p>
Entire course description	<p>The course is implemented in the form of lectures, exercises and auditorium classes. Lecture topics are focused around issues related to the origin of natural resources, groups of pharmacologically active substances contained in the discussed raw materials and their importance in the treatment and prevention of diseases. During lectures, methods of standardizing plant material are also presented.</p> <p>Practical exercises include detailed research on the morphological and anatomical features of plant materials, as well as research phytochemicals of selected raw materials.</p> <p>Topics of lectures</p> <ul style="list-style-type: none"> <li>- general knowledge: types of raw materials, methods of obtaining them, division of plant medicines, standardization of raw materials and medicines, as well as discussion of active compounds of raw materials in the chemical system.</li> </ul> <p>Topics of classes and auditoriums</p> <ul style="list-style-type: none"> <li>- analysis of diagnostic features of macro- and microscopic plant materials, as well as recognition of comminuted raw materials single and herbal blend ingredients.</li> <li>- phytochemical analysis of plant raw materials</li> <li>- getting to know the chemical composition of the raw materials, justifying their pharmacological action and use as components of medicines</li> </ul>

	herbal and plant preparations, familiarization with the mechanisms of pharmacological action of groups of active compounds.
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Matławska I. (red) Farmakognozja. UM Poznań 2005, 2006, 2008.</li> <li>2. Baclerek M.: Atlas sproszkowanych substancji roślinnych, PZWL, Warszawa 2019</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Kohlmünzer St. Farmakognozja. PZWL, Warszawa 2000</li> <li>2. Deryng J. Atlas sproszkowanych roślinnych surowców leczniczych. PZWL Wydawnictwo Lekarskie, Warszawa 1961</li> <li>3. Bruneton J. Pharmacognosy Medicinal Plants. Intercept Ltd, Londres, New York 1999</li> <li>4. Hansel R., Sticher O., Steinegger E. Pharmacognosie – Phytopharamazie. Springer–Verlag, 1999</li> <li>5. ESCOP MONOGRAPHS, The Scietific Foundation for Herbal Medicinal Products. Thieme, 2003</li> </ol>
Methods and criteria of evaluation	<p>Practical performance of tutorials: tests, ongoing preparation for classes</p> <p>Exam: written exam on all material (lectures and exercises) after the classes</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	3 <sup>st</sup> year, 1 <sup>st</sup> semester (fall) and 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Exam (2 <sup>nd</sup> semester (spring))
Form(s) and number of course hours as well as the form of crediting	Lectures: 45 h (1 <sup>st</sup> semester) Laboratory: 30 h Auditorium: 15 h
Course coordinator(s)	Dr hab. Daniel Załuski, prof. UMK
Subject Teachers	Dr hab. Daniel Załuski, prof. UMK Dr Maciej Balcerek, Dr Daniel Modnicki,
Course form (character)	Obligatory
Limit of places available in each group	15
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	<a href="https://www.wf.cm.umk.pl/kizf/">https://www.wf.cm.umk.pl/kizf/</a>
Learning outcomes determined for the given course form	Laboratories: test, practical task: W1-W12, U1-U10 Exam: W1-W12, K2, K3

<p>Methods and criteria of the evaluation for the given course form</p>	<p>Winter term:</p> <p>The condition of passing the course is: attendance at classes (two absences in the semester are the basis for failing this semester), positive assessment issued by the tutor (average of all grades obtained by the student during the laboratories and activity during the seminar), no offenses listed in "Health and Safety Rules "of the Didactic Regulations of the Department of Pharmacognosy</p> <p>Lectures: assessment criteria: written exam in the form of a test (open and closed questions) - written after completing all the classes in the subject, after the semester VI.</p> <p>Laboratories: Assessment criteria: assessment based on tests (tests, open and closed single-choice questions)</p> <p>In the case of written tests (test from laboratories), the points obtained are converted into grades on the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Excellent (5,0)</td> </tr> <tr> <td>84-91%</td> <td>Very good (4,5)</td> </tr> <tr> <td>76-83%</td> <td>Good (4,0)</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory (3,5)</td> </tr> <tr> <td>60-67%</td> <td>Acceptable (3,0)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2,0)</td> </tr> </tbody> </table> <p>Summer term:</p> <p>The condition of passing the course is: attendance at laboratories and seminars: (two absences in the first term are the basis for not passing this term), a positive grade issued by the tutor (average of all grades obtained by the student during the classes and activity during classes), no offenses listed in the "Health and Safety Rules" of the Didactic Regulations of the Department of Pharmacognosy</p> <p>Laboratories and seminars: Assessment criteria: assessment based on tests (tests, open and closed single-choice questions)</p>	Percentage of points	Grade	92-100%	Excellent (5,0)	84-91%	Very good (4,5)	76-83%	Good (4,0)	68-75%	Satisfactory (3,5)	60-67%	Acceptable (3,0)	0-59%	Fail (2,0)
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68-75%	Satisfactory (3,5)														
60-67%	Acceptable (3,0)														
0-59%	Fail (2,0)														
<p>List of topics</p>	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Pharmacognosy against the background of pharmaceutical sciences.</li> <li>2. Nomenclature of raw materials of natural origin.</li> <li>3. Sources of obtaining natural resources.</li> <li>4. Conditions for growing and harvesting medicinal plants.</li> <li>5. Stabilization of plant material.</li> <li>6. Methods for standardizing plant materials.</li> <li>7. Carbohydrates - structure, physicochemical characteristics, occurrence, biological and pharmacological properties.</li> <li>8. Lipids - structure, physicochemical characteristics, occurrence, biological and pharmacological properties.</li> <li>9. Proteins and amino acids, organic acids of plant origin - structure, physicochemical characteristics, occurrence, biological and pharmacological properties.</li> <li>10. Phenolic compounds, quinones - structure, physicochemical characteristics, occurrence, biological and pharmacological properties.</li> </ol>														

11. Polyphenols: flavonoids, tannins - structure, physicochemical characteristics, occurrence, biological and pharmacological properties.
12. Coumarins - structure, physicochemical characteristics, occurrence, biological and pharmacological properties.
13. Terpenoids - structure, physicochemical characteristics, occurrence, biological and pharmacological properties.
14. Alkaloids - structure, physicochemical characteristics, occurrence, biological and pharmacological properties.
15. Essential oils - structure, physicochemical characteristics, occurrence, biological and pharmacological properties.

Lab:

- analysis of the diagnostic features of macro- and microscopic plant materials, as well as recognition of comminuted single raw materials and ingredients of herbal mixtures.
- phytochemical analysis of plant raw materials
- getting to know the chemical composition of the raw materials, justifying their pharmacological action and the use as ingredients of herbal medicines and plant preparations, familiarizing with the mechanisms of pharmacological action of groups of active compounds

1. Chemistry, operation, application, morphological and anatomical analysis, phytochemical analysis of raw materials containing:

- a. carbohydrates
- b. phenolic glycosides
- c. tannins
- d. coumarin
- e. anthraquinones

seminars:

I. Pharmacognosy as an interdisciplinary field, preliminary information.

1. Definition: vegetable raw materials, plant substances, *plantae medicinales*.
2. Nomenclature of raw materials used in medicine and cosmetology.
3. Groups of raw materials / plant substances / division (organographic, phytochemical, therapeutic).
4. Types of plant secretions and examples thereof (juices, gums, resins, balms ...).
5. Raw materials of animal origin used in pharmacy and cosmetology.

II. Acquisition of medicinal and cosmetic plant materials.

1. Origin of plant raw materials.
2. Breeding treatments - goals and methods.
3. Biotechnological methods in obtaining plants and substances of plant origin.
4. Collection of plant raw materials, factors determining the period, time and time of harvest.
5. Active substances, definition.
6. Interactions of chemical compounds in the plant, examples.

	7. Variability of active compounds.
Didactic methods	The same as in part A
References	The same as in part A

## Synthesis and technology of pharmaceuticals

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Synthesis and technology of pharmaceuticals</b> (Synteza i technologia środków leczniczych)
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	6
Form of crediting	Egzamin
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module C</b> Drug analysis, synthesis and technology
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– lecture participation – 30 hours,</li> <li>– participation in laboratories – 48 hours,</li> <li>– participation in seminars – 12 hours,</li> <li>– consultations with people conducting classes (konsultacje z osobami prowadzącymi zajęcia) – 5 hours,</li> <li>– conducting the test (przeprowadzenie zaliczenia) – 2 hours,</li> </ul> <p>The workload related to activities that require direct participation of academic teachers is 97 hours, which corresponds to 3.88 ECTS points</p> <p>2. Time spent by the student on the individual work:</p>

	<ul style="list-style-type: none"> <li>- participation in lectures – 30 hours,</li> <li>- participation in laboratories – 48 hours,</li> <li>- participation in seminars – 12 hours,</li> <li>- preparation and completion notes – 7 hours,</li> <li>- collection materials and preparation for classes – 7 hours,</li> <li>- repetition of required material – 10 hours,</li> <li>- consultations – 5 hours,</li> <li>- reading indicated literature: – 9 hours,</li> <li>- preparation to and passing the exam – <math>20 + 2 = 22</math> hours,</li> </ul> <p>The total student workload is <b>150 hours</b>, which corresponds to <b>6.00 ECTS points</b>.</p> <p>3. Workload related to ongoing research:</p> <ul style="list-style-type: none"> <li>- reading of the indicated scientific literature: 8 hours,</li> <li>- participation in lectures (including research methodology, research results, studies): 15 hours,</li> <li>- research and scientific consultations: 5 hours</li> <li>- participation in classes covered by scientific activity (including research methodology, research results, studies): 30 hours,</li> <li>- preparation for classes covered by scientific activities: 6 hours,</li> <li>- preparation to pass in the field of research and development for the subject: 16 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>80 hours</b>, which corresponds to <b>3.20 ECTS points</b>.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>- - preparation for classes + required repetition of material + preparation for passing and passing - <math>14 + 10 + 22 = 46</math> hours (1.84 ECTS points).</li> </ul> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: knows methods of preparing selected medicinal substances, the necessary physical operations, discrete chemical processes; K_C.W10,</p> <p>W2: knows and understands requirements concerning the description of manufacturing and quality assessment of medicinal substances in registration documentation; K_C.W11,</p> <p>W3: knows the methods of obtaining and separating optically active medicinal substances and methods of obtaining various polymorphic forms; K_C.W12,</p> <p>W4: knows the methods of searching for novel medicinal products; K_C.W13,</p> <p>W5: knows and understands basic categories of drugs and has knowledge of issues in patent protection; K_C.W14.</p>

Learning outcomes - abilities	<p>U1: can select stages and critical parameters in the process of medicinal substance synthesis and prepare a block diagram of an exemplary synthesis process; K_C.U9,</p> <p>U2: is able to perform the synthesis of a medicinal substance and propose a cleansing method; K_C.U10,</p> <p>U3: explain the presence of solvent residues and other pollution in a medicinal substance; K_C.U11.</p>
Learning outcomes – social skills	<p>K1: uses objective sources of information; K7,</p> <p>K2: draws conclusions based on their measurements or observation; K8.</p>
Didactic methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>• problem lecture with multimedia presentation</li> </ul> <p>Laboratories:</p> <ul style="list-style-type: none"> <li>• performing experiments</li> <li>• problem analysis.</li> </ul> <p>Seminars:</p> <ul style="list-style-type: none"> <li>• presentations</li> <li>• discussion.</li> </ul>
Preliminary requirements	<p>Knowledge and skills in the following subjects: physical, inorganic, analytical, organic chemistry, biochemistry and chemistry of medicines conducted during studies.</p>
Brief course description	<p>The theme of the course is to learn and understand the methods of searching for biologically active compounds and the methods of obtaining selected therapeutic agents. It also includes the presentation of the principles of patenting and the pharmaceutical industry in Poland and in the world, problems of polymorphism of drugs as well as physical operations and unit chemical processes used in the production of active pharmaceutical substances.</p>
Entire course description	<p>The lectures are designed to:</p> <ul style="list-style-type: none"> <li>- familiarize students with the subject of synthesis and technology of pharmaceuticals in both historical and contemporary context,</li> <li>- present general issues concerning the preparation of medicinal products using various chemical methods and physical methods of their isolation,</li> <li>- familiarize with obtaining selected therapeutic agents, taking into account stereochemical and economic problems.</li> </ul> <p>The laboratories are designed to:</p> <ul style="list-style-type: none"> <li>- get students familiar with the methods of medicines design and synthesis,</li> <li>- teach students how to carry out synthesis of medicines.</li> </ul> <p>The seminars are designed to:</p> <ul style="list-style-type: none"> <li>- teach yourself how to suggest methods of obtaining therapeutic agents.</li> </ul>

References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Jie Jack Li Douglas S. Johnson Drago R. Sliskovic Bruce D. Roth: Contemporary Drug Synthesis, John Wiley &amp; Sons, 2004.</li> <li>2. Victor J. Hruby, Ruben Vardanyan: Synthesis of Essential Drugs, Elsevier Science, 2006.</li> <li>3. Richard B. Silverman Mark W. Holladay: The Organic Chemistry of Drug Design and Drug Action, Academic Press, 2014.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>4. Graham Patrick: An Introduction to Medicinal Chemistry, Oxford University Press, 2017.</li> </ol>
Methods and criteria of evaluation	<p>Experimental: implementation of laboratories: U1, U2, U3.</p> <p>Presentations: W1, U1, U2, U3.</p> <p>Exam: W1, W2, W3, W4, W5.</p> <p>Activity: K1. K2</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	4 <sup>th</sup> year, 1 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Exam
Form(s) and number of course hours as well as the form of crediting	Lectures: 30 hours - credit without a grade Laboratory: 48 hours - credit without a grade Seminar: 12 hours - credit without a grade
Course coordinator(s)	dr hab. Konrad Misiura, prof. UMK
Subject Teachers	dr hab. Konrad Misiura, prof. UMK dr Joanna Cytarska dr hab. Krzysztof Łączkowski, prof. UMK
Course form (character)	Obligatory
Limit of places available in each group	Lectures: 4th year students, 7th semester Laboratory: groups of 10 people Seminar: groups of 24 people
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	
Subject website	
Learning outcomes determined for the given course form	The graduate knows the methods of preparing selected medicinal substances, the necessary physical operations, discrete chemical processes; - K_C.W10. The graduate knows and understands the requirements for the description of how to manufacture and assess the quality of a



	<p>medicinal substance in the registration documentation; - K_C.W11.</p> <p>The graduate knows the methods of obtaining and separating optically active medicinal substances and the methods of obtaining various polymorphic forms; K_C.W12.</p> <p>The graduate knows the methods of searching new medicinal substances; - K_C.W13.</p> <p>The graduate knows and understands the issues of patent protection of substances for pharmaceutical purposes and medicinal products; - K_C.W14.</p> <p>The graduate can identify the stages and critical parameters in the process of synthesis of a drug substance and prepare a block diagram of an example synthesis process; - K_C.U9</p> <p>The graduate is able to synthesize a medicinal substance and propose a method for its purification; - K_C.U10.</p> <p>The graduate can explain the presence of solvent residues and other impurities in the medicinal substance; - K_C.U11.</p> <p>The graduate uses objective sources of information; -K7</p> <p>The graduate draws conclusions from his own measurements or observations; -K8</p>														
<p>Methods and criteria of the evaluation for the given course form</p>	<p>The condition of passing the course is active participation in didactic classes and obtaining the appropriate number of points. Laboratories: short written tests (so-called tickets), studies - passing the laboratory requires 60% of points possible to obtain.</p> <p>Seminars: preparation of the presentation and discussion - passing requires 60% of the points available.</p> <p>Lectures: written test - 8 descriptive questions 0-10 points, 4 descriptive questions 0-5 points, total &gt; 60%.</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>88-100%</td> <td>Excellent</td> </tr> <tr> <td>81-87%</td> <td>Very good</td> </tr> <tr> <td>74-80%</td> <td>Good</td> </tr> <tr> <td>67-73%</td> <td>Satisfactory</td> </tr> <tr> <td>60-66%</td> <td>Acceptable</td> </tr> <tr> <td>0-59%</td> <td>Fail</td> </tr> </tbody> </table>	Percentage of points	Grade	88-100%	Excellent	81-87%	Very good	74-80%	Good	67-73%	Satisfactory	60-66%	Acceptable	0-59%	Fail
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0-59%	Fail														
<p>List of topics</p>	<p>Topics of lectures:</p> <ol style="list-style-type: none"> <li>1. Subject matter and its historical outline. Methods of searching for biologically active compounds.</li> <li>2. Basic physical unit processes. Basic chemical unit processes.</li> <li>3. Stereochemical problems in the synthesis of therapeutic agents and chirotechnology.</li> <li>4. Problems of therapeutic agents polymorphism. Pharmaceutical industry, patent protection.</li> <li>5. Anticancer drugs - Oxazaphosphorinane Drugs.</li> <li>6. Protein kinase inhibitors - a new type of cancer medicine.</li> <li>7. Antiviral nucleoside drugs.</li> <li>8. Therapeutic nucleic acids.</li> <li>9. Cholesterol lowering drugs.</li> </ol>														

	<p>10. Hormonal contraceptives. Hormone therapy in the treatment of infertility.</p> <p>11. Selected topic or presentations of topics made by students.</p> <p>12. Medicines for disorders of sexual function.</p> <p>13. Antidepressants. Memory enhancers.</p> <p>14. Measures supporting the weight loss process.</p> <p>15. Cosmeceuticals.</p> <p>Topics of laboratories:</p> <p>1. Organization of the laboratory. Work and study plan in the semester. Rules for passing the laboratory. Health and safety regulations. Scientific bases. Synthesis design.</p> <p>2. Magnesium aspartate</p> <p>3. N-acetyl-4-aminophenol</p> <p>4. N,N-Diethyl nicotinamide</p> <p>5. 2-Hydroxybenzamide</p> <p>6. Ethyl 4-aminobenzoate</p> <p>7. Methenamine</p> <p>8. Thioxolone</p> <p>Seminar topic:</p> <p>1. Development of a method for the synthesis of a selected drug substance.</p>
Didactic methods	The same as in part A
References	The same as in part A

## Pharmaceutical Technology I

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmaceutical Technology I</b> (Technologia Postaci Leku I)
Unit offering the subject	Faculty of Pharmacy, Department of Pharmaceutical Technology, Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1720-F3-TEPL-J 1720-F3-TEPLL-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	9
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module C</b> Drug analysis, synthesis and technology

Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>- Lecture participation – 35 hours,</li> <li>- Laboratories participation – 125 hours,</li> <li>- Practical classes participation – 20 hours,</li> <li>- Consultations – 2 hours,</li> <li>- Evaluation participation – 4 hours,</li> </ul> <p>Total work amount: <b>186 hours</b> which corresponds to <b>6.20 ECTS points</b>.</p> <p>1. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>- Lecture participation – 35 hours,</li> <li>- Laboratories participation – 125 hours,</li> <li>- Practical classes participation – 20 hours,</li> <li>- Preparation to laboratories and practical classes – 47 hours,</li> <li>- Obligatory material revision – 34 hours,</li> <li>- Consultations – 2 hours,</li> <li>- Preparation and participation in evaluation – 3+4 hours.</li> </ul> <p>Total work amount: <b>270 hours</b> which corresponds <b>9 ECTS points</b>.</p> <p>2. Time spent by the student on the research activity:</p> <ul style="list-style-type: none"> <li>- Reading referenced literature - 10 hours,</li> <li>- Consultations – 2 hours,</li> <li>- Lectures participation (including research, methodology, results, conclusions) – 35 hours,</li> <li>- Participation for laboratories and practical classes including research activity (including research methodology, results, conclusions) – 145 hours,</li> <li>- Preparation for laboratories and practical classes including research activity – 20 hours,</li> <li>- Preparation for evaluation in research aspect – 3 hours.</li> </ul> <p>Total work amount: <b>215 hours (7.17 ECTS points)</b></p> <p>3. Time required for the preparation and participation in evaluating process: - Preparation for laboratories and practical classes + preparation to evaluation + evaluation – 20+3+4. Total work amount: <b>27 hours (0.90 ECTS point)</b></p> <p>4. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: The graduate knows methods of aseptic treatment and obtaining sterility of medicinal products, substances and materials; - K_C.W31</p> <p>W2: The graduate knows the types of packaging and dispensing systems and knows how to select them to ensure the quality of the prescription medicine; – K_C.W32</p> <p>W3: The graduate knows the types of physicochemical incompatibilities between the components of pharmaceutical preparations; – K_C.W28</p>

	<p>W4: The graduate knows the scope of chemical and pharmaceutical tests required for the registration documentation of the medicinal product; – K_C.W36</p> <p>W5: The graduate knows and understands the impact of technological process parameters on the properties of the form of a prescription drug; - K_C.W30</p> <p>W6: The graduate knows the rules for preparing and controlling prescription drugs and how to determine their storage conditions; - K_C.W27</p>
Learning outcomes - abilities	<p>U1: The graduate assesses the properties of the prescription drug and presents the method of its preparation and characterizes the factors that affect the durability of the prescription drug, and selects the right immediate packaging and storage conditions; - K_C.U16</p> <p>U2: The graduate explains the importance of the pharmaceutical form and composition of the medicinal product for its operation; - K_C.U15</p> <p>U3: The graduate recognizes and solves the problems arising from the composition of the prescription drug prescribed on the prescription, verifies its composition in order to prepare it correctly and checks the doses, and detects qualitative defects of the prescription drug qualifying for pharmaceutical supervision based on its observation; - K_C.U17</p> <p>U4: The graduate is able to use the pharmacopoeia, guidelines and literature regarding the assessment of the quality of substances for pharmaceutical use and medicinal products; - K_C.U4.</p> <p>U5: The graduate can prepare plant preparations in laboratory conditions and assess their quality using pharmacopoeial methods; – K_C.U18</p> <p>U6: The graduate is able to assess the functional properties of excipients for pharmaceutical use; – K_C.U19</p> <p>U7: The graduate knows how to prepare operational procedures and draw up protocols of activities carried out while preparing the prescription and pharmacy medicine; - K_C.U23</p> <p>U8: The graduate uses pharmacopoeias, prescriptions and technological regulations, guidelines and literature on the technology and quality of the form of the drug, in particular in relation to prescription drugs; - K_C.U14</p> <p>U9: The graduate prepares eye medications under aseptic conditions and selects the sterilization method; K_C.U20</p> <p>U10: The graduate can search for scientific information on medicinal substances and products; - K_C.U34</p>
Learning outcomes – social skills	<p>K1: The graduate has a habit of using objective sources of information to search and select information needed in the selection of auxiliary substances when creating prescription drugs; - K7</p> <p>K2: The graduate draws and formulates conclusions from his own measurements and observations of prescription drugs; - K8</p>
Didactic methods	<p><u>Lecture:</u></p> <ul style="list-style-type: none"> <li>- informative lecture (conventional),</li> <li>- problem-based lecture.</li> </ul> <p><u>Laboratories and practical classes:</u></p>

	<ul style="list-style-type: none"> <li>- classical problem method,</li> <li>- laboratory method.</li> </ul>
Preliminary requirements	<p>General and inorganic chemistry Physical chemistry Organic chemistry Mathematics</p>
Brief course description	<p>Pharmaceutical Technology is the science of methods of manufacturing and quality control of various forms of a drug. The Pharmaceutical Technology includes lectures, laboratories and practical classes, aimed at familiarizing students with the methods of producing prescription drug forms and their requirements, especially pharmacopoeial ones. Mastering issues in the field of pharmaceutical technology is the basis for the pharmacist's professional work.</p>
Entire course description	<p>Pharmaceutical Technology lectures are designed to familiarize students with the following topics: naming prescription drugs, basic technological processes, the technology of galenical preparations and prescription drugs such as solutions, drops, mixtures, emulsions, suspensions, powders, suppositories, ointments, eye preparations. Student is also familiarized with pharmaceutical incompatibilities, the requirements of aseptic preparation of drugs and factors affecting the stability of the drug and methods of testing drugs. Laboratories and practical classes are devoted to the production of solutions, tinctures, syrups, drops, mixtures, emulsions, suspensions, powders, suppositories, ointments and eye medications.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Loyd V. Allen, Jr.: Pharmaceutical Dosage forms and Drug Delivery Systems, LWW; Eleventh, North American edition, USA 2017</li> <li>2. Yvonne Bouwman- Boer, V'lain fenton-May, Paul Le Brun: Practical Pharmaceutis, Springer 2015</li> <li>3. Kevin Taylor, Michael Aulton: Aulton's Pharmaceutics, Elsevier 2017</li> <li>4. Loyd V. Allen, Jr.: The Art, Science, and Technology of Pharmaceutical Compounding” American Pharmaceutical Association, 2016</li> <li>5. Remington: The Science and Practice of Pharmacy, Pharmaceutical Press, 2012.</li> <li>6. European Pharmacopoeia 10</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Loyd V. Allen, Jr.: Suppositories, Pharmaceutical Press, 2008</li> <li>2. Tapash K. Ghosh, Bhaskara R. Jasti: Theory and practice of contemporary pharmaceutics, CRC Press, 2005</li> </ol>
Methods and criteria of evaluation	<p>Written tests: W1 – W6, U1 – U10, Observation: K1-K2</p>

	In the case of written tests (exam, colloquium), the points obtained by students are converted into grades on the following scale:														
	<table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>91-100%</td> <td>Very good</td> </tr> <tr> <td>84-90%</td> <td>Good plus</td> </tr> <tr> <td>78-83%</td> <td>Good</td> </tr> <tr> <td>70-77%</td> <td>Satisfactory plus</td> </tr> <tr> <td>60-69%</td> <td>Satisfactory</td> </tr> <tr> <td>0-59%</td> <td>Failed/Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Grade	91-100%	Very good	84-90%	Good plus	78-83%	Good	70-77%	Satisfactory plus	60-69%	Satisfactory	0-59%	Failed/Unsatisfactory
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0-59%	Failed/Unsatisfactory														
Practical training as part of course	Not applicable according to the educational program														

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	3 <sup>rd</sup> year, 5 <sup>th</sup> and 6 <sup>th</sup> semester (autumn and spring)
Form of crediting a subject in the cycle	Exam
Form(s) and number of course hours as well as the form of crediting	Lectures: 35 hours -exam Laboratories and practical classes: 145 hours – exam
Course coordinator(s)	Łukasz Pałkowski, PhD
Subject Teachers	Lectures: Łukasz Pałkowski, PhD  Laboratories and practical classes: Łukasz Pałkowski, PhD Piotr Bilski, PhD Jakub Płaczek, PhD Maciej Karolak, MPharm Andrzej Winnicki, MPharm
Course form (character)	Obligatory
Limit of places available in each group	Lectures: 3 <sup>rd</sup> year, V and VI semester Laboratories: group of 12 students Practical classes: group of 6 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	N/A
Subject website	N/A
Learning outcomes determined for the given course form	Lectures: W1-W6 Laboratories and practical classes: W1-W6; U1-U10; K1-K2
Methods and criteria of the evaluation for the given course form	Lectures: Written exam W1-W6 Laboratories and practical classes: Written exam: W1-W6; U1-U10 Observation: K1-K2

	<p>In the case of written tests (exam, colloquium), the points obtained by students are converted into grades on the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>91-100%</td> <td>Very good</td> </tr> <tr> <td>84-90%</td> <td>Good plus</td> </tr> <tr> <td>78-83%</td> <td>Good</td> </tr> <tr> <td>70-77%</td> <td>Satisfactory plus</td> </tr> <tr> <td>60-69%</td> <td>Satisfactory</td> </tr> <tr> <td>0-59%</td> <td>Failed/Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Grade	91-100%	Very good	84-90%	Good plus	78-83%	Good	70-77%	Satisfactory plus	60-69%	Satisfactory	0-59%	Failed/Unsatisfactory
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0-59%	Failed/Unsatisfactory														
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Preliminary information about the prescription drug, doses, Pharmacopoeia.</li> <li>2. Solvents in pharmacy, pharmacopoeial monographs of water.</li> <li>3. Technological processes in liquid drugs.</li> <li>4. Methods of extracting plant substances.</li> <li>5. Plant substances preparations.</li> <li>6. Liquid preparations</li> <li>7. Incompatibilities in liquid preparations.</li> <li>8. Dispersion systems - characteristics. Emulsifiers.</li> <li>9. Emulsions for internal and external use; factors affecting the stability of emulsions and suspensions.</li> <li>10. Suspensions for internal and external use.</li> <li>11. Powders for internal and external use, pharmaceutical incompatibilities in powders.</li> <li>12. Characteristics forms for body cavities.</li> <li>13. Suppository bases, suppository technology, interactions.</li> <li>14. Semi-solid preparations for use on the skin, physico-chemical division of ointments and preparation principles.</li> <li>15. Characteristics of ointment bases.</li> <li>16. Pharmaceutical incompatibilities in ointments. Factors affecting the penetration of a medicinal substance into and through the skin.</li> <li>17. Rules for preparing eye drops.</li> <li>18. Interactions in ocular drugs.</li> </ol> <p>Lectures and practical classes:</p> <ol style="list-style-type: none"> <li>1. Introduction. Pharmacopoeias. Aqueous solutions, dilutions.</li> <li>2. Water and alcohol solutions.</li> <li>3. Glycerol and oil solutions, collodion based solutions.</li> <li>4. Storage solutions, aromatic waters, liquid extracts.</li> <li>5. Tinctures and syrups.</li> <li>6. Mixtures and checking doses.</li> <li>7. Mixtures with decoctions, infusions, macerations</li> <li>8. Drops for internal use, checking the doses in drops.</li> <li>9. Drops for external use. Pharmaceutical incompatibilities in liquid medicines part I.</li> <li>10. Pharmaceutical incompatibilities in liquid drugs part II.</li> </ol>														

	11. Emulsions and suspensions for internal use. 12. Suspensions for external use, liniments. 13. Undivided powders. 14. Eye drops. 15. Eye drops with increased viscosity. Eye liquids. 16. Divided powders in starch capsules - checking doses. 17. Divided powders in gelatin capsules, incompatibility in powders. 18. Divided powders from tablets. 19. Standardization of suppository forms. Checking doses in suppositories. 20. Determination of the displacement coefficient for various suppository bases. 21. Preparation of suppositories by cold compression method. 22. Preparation of suppositories by fusion method. 23. Ointments part I. 24. Ointments part II. 25. Ointments part III. 26. Ointments with urea. Ointments with vitamins. Incompatibilities in ointments and suppositories. 27. Eye ointments. Pharmaceutical Incompatibilities in eye drugs. 28. Drug forms with antibiotics. Multi-component eye drops. 29. Final practical test
Didactic methods	The same as in part A
References	The same as in part A

## Pharmaceutical Technology II

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmaceutical Technology II</b> (Technologia Postaci Leku II)
Unit offering the subject	Faculty of Pharmacy Department of Pharmaceutical Technology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1720-F4-TEPL-J 1720-F4-TEPL-L-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	9
Form of crediting	Graded credit



Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module C</b> Drug analysis, synthesis and technology
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lectures participation – 35 hours</li> <li>– Laboratories participation – 45 hours</li> <li>– Practical classes participation – 25 hours</li> <li>– Consultations – 2 hours</li> <li>– Evaluation participation – 4 hour</li> </ul> <p>Total work amount: <b>111 hours (3.6 ECTS point)</b></p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– Lectures participation – 35 hours</li> <li>– Laboratories participation – 45 hours</li> <li>– Practical classes participation – 25 hours</li> <li>– Preparation to laboratories and practical classes – 100 hours</li> <li>– Obligatory material revision – 56 hours</li> <li>– Consultations – 2 hour</li> <li>– Preparation and participation in evaluation – 3+4 hours</li> </ul> <p>Total work amount: <b>270 hours (9 ECTS points)</b></p> <p>Time spent by the student on the research activity:</p> <p>Reading referenced literature – 20 hours Consultations – 2 hour Lectures participation (including research methodology, results, conclusions) – 35 hours Participation for laboratories and practical classes including research activity (including research methodology, results, conclusions) – 70 hours Preparation for laboratories and practical classes including research activity – 40 hours Preparation for evaluation in research aspect – 20 hours Total work amount: <b>187 hours (6.23 ECTS points)</b></p> <p>Time required for the preparation and participation in evaluating process: Preparation for laboratories and practical classes + preparation to evaluation + evaluation – 100+3+4 hours Total work amount: <b>107 hours (3.56 ECTS points)</b></p> <p>Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: The graduate knows and understands the basic technological processes and devices used in drug dosage form technology; - K_C.W29</p> <p>W2: The graduate knows the functional properties of excipients and knows how to select them depending on the type of medicine; - K_C.W15</p>

	<p>W3: The graduate knows the types of packaging and dosing systems, and knows how to select them in order to ensure the quality of industrially manufactured medicine forms; - K_C.W32</p> <p>W4: The graduate knows and understands the methods of testing the quality of the drug form and factors affecting the stability of the drug, the processes that the drug may undergo during storage, and methods of testing the stability of medicinal products; - K_C.W34</p> <p>W5: The graduate knows and understands the impact of technological process parameters on the properties of industrially manufactured drug forms; - K_C.W35</p> <p>W6: The graduate knows the principles of preparation and control of medicines, including parenteral nutrition and cytostatics, and how to determine their storage conditions; – K_C.W33</p> <p>W7: The graduate knows biomedical polymers and macromolecular drug conjugates and their use in medicine and pharmacy; – K_C.W47</p>
Learning outcomes - abilities	<p>U1: The graduate assesses the properties of an industrially manufactured medicinal product and presents how it is manufactured, as well as assesses the application properties of an industrially manufactured medicine based on its composition and advises on the proper use, depending on the form of the drug; - K_C.U24</p> <p>U2: The graduate characterizes the factors that affect the durability of an industrially manufactured medicine form, and selects the right immediate packaging and storage conditions; – K_C.U28</p> <p>U3: The graduate is able to propose a specification for a medicinal product and plan studies on the stability of a medicinal substance and a medicinal product; -K_C.U27</p> <p>U4: The graduate detects qualitative defects qualifying for notification for pharmaceutical supervision on the basis of his observation of an industrially manufactured medicinal product; - K_C.U26</p> <p>U5: The graduate prepares parenteral preparations under aseptic conditions; - K_C.U21</p> <p>U6: The graduate prepares cytostatic drugs; - K_C.U22</p> <p>U7: The graduate performs analyses in the field of assessing the quality of the drug form and operates appropriate control and measuring equipment, as well as interpreting the results of the medicinal product quality testing; - K_C.U25</p>
Learning outcomes – social skills	<p>K1: The graduate has a habit of using objective sources of information to search and select information needed in the selection of excipients when creating solid drug forms; - K7</p> <p>K2: The graduate draws and formulates conclusions from his own measurements and observations of solid drug forms; - K8</p>
Didactic methods	<p><u>Lectures:</u></p> <ul style="list-style-type: none"> <li>▪ informative lecture (conventional)</li> <li>▪ problem lecture</li> </ul> <p><u>Laboratories and practical classes:</u></p> <ul style="list-style-type: none"> <li>▪ classic problem method</li> <li>▪ laboratory method</li> </ul>

Preliminary requirements	General and inorganic chemistry Physical chemistry Organic chemistry Pharmaceutical Technology I Medicinal Chemistry Microbiology
Brief course description	Introduction to the industrial preparation of medicines - forms of industrially prepared medicines, unit technological processes, requirements, methods, technology, technological problems, quality control.
Entire course description	The aim of the lectures is an introduction to the industrial production of pharmaceuticals. Issues include elements of pharmaceutical engineering (unit processes), as well as the selection of excipients and their impact on the properties of the dosage form. Industrial methods for the production of various drug forms and appropriate production equipment are presented. Students learn practical preparation of industrial drug forms and parenteral preparations including cytostatics, parenteral nutrition and methods of testing the quality during laboratories and practical classes.
References	Primary literature: <ol style="list-style-type: none"> <li>1. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen Jr., LWW; Eleventh, North American edition, 2017</li> <li>2. Pharmaceutical Formulation: The Science and Technology of Dosage Forms (Drug Discovery), Geoffrey D Tovey, Royal Society of Chemistry; 2018</li> <li>3. Pharmaceuticals - Dosage Form and Design, Jones, David S, Pharmaceutical Press, 2016</li> </ol> Supplementary literature: <ol style="list-style-type: none"> <li>1. Handbook on Injectable Drugs, 16th Ed. American Society of Health-System Pharmacists Lawrence A. Trissel, FASHP, 2011</li> <li>2. <i>European Pharmacopoeia</i> 6, 7, 8, 9, 10</li> <li>3. <i>United States Pharmacopoeia</i> 35, 36, 37.</li> </ol>
Methods and criteria of evaluation	Lectures: Presence (exam for the fifth year) <u>Laboratories and practical classes:</u> Credit for a grade (exam for the fifth year): W1-W7, U1-U7 Observations: K1-K2 Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

### C. Course description in the didactic cycle

Space name	Comment
Didactic cycle	4 <sup>th</sup> year, 1 <sup>st</sup> semester (fall), 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Graded credit
Form(s) and number of course hours as well as the form of crediting	Lectures: 35 hours, presence (exam for the fifth year) Laboratories: 45 hours, graded credit (exam for the fifth year)

	Practical classes: 25 hours, graded credit (exam for the fifth year)
Course coordinator(s)	Prof. Jerzy Krysiński
Subject Teachers	Lectures: Prof. Jerzy Krysiński Piotr Bilski, PhD Laboratories and practical classes: Łukasz Pałkowski, PhD Piotr Bilski, PhD Marta Czapiewska, MPharm Maciej Karolak, MPharm
Course form (character)	Obligatory
Limit of places available in each group	Lectures: students 4 <sup>th</sup> year, 1 <sup>st</sup> semester (fall) Laboratories and practical classes: students 4 <sup>th</sup> year 2 <sup>nd</sup> semester (spring), 12-person and 6-person groups
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Lectures: W1-W7 Laboratories and practical classes: W1-W7; U1-U7; K1-K2;
Methods and criteria of the evaluation for the given course form	Lectures: - presence (exam for the fifth year), W1-W7;  Laboratories and practical classes: - credit for a grade (exam for the fifth year), W1-W7, U1-U7; - observations K1-K2  Assessment criteria: 2 - fail – below 2,99 (below 59,9%) 3 - acceptable – 3,0 – 3,49 (60%-69,9%) 3,5 – satisfactory – 3,50 – 3,83 (70%-76,7%) 4 – good – 3,84 - 4,16 (76,8%-83,3%) 4,5 – very good – 4,17-4,50 (83,4%-90%) 5 – excellent – above 4,50 (above 90%)
List of topics	Lectures: 1. Dosage form used in medicine. 2. Preformulation. 3. Technological unit processes. 4. Modifying the dissolution rate and solubility of active pharmaceutical ingredients. 5. Excipients used in pharmaceutical technology. 6. Solid drug forms: - granules, pellets, - tablets, dragees, pastilles, coated tablets, - capsules. 7. Methods of modifying the release of active pharmaceutical ingredients from solid dosage form. 8. Criteria for quality assessment of dosage form. 9. Dissolution testing.

	<p>10. Parenteral medicines. 11. Rules of preparing cytostatics and parenteral nutrition. 12. Aerosols.</p> <p>Laboratories and practical classes:</p> <ol style="list-style-type: none"> <li>1. Preparation and qualitative assessment of granulated products constituting the dosage form and intermediate product for tableting.</li> <li>2. Preparation and qualitative assessment of tablets constituting the dosage form and intermediate product for the coating process.</li> <li>3. Tablets coating by sugar method (sugar-coat).</li> <li>4. Physicochemical evaluation of dragees.</li> <li>5. Tablets coating by macromolecular polymers.</li> <li>6. Physicochemical evaluation of coated tablets.</li> <li>7. Dissolution testing of suppositories prepared on a hydrophilic and lipophilic basis.</li> <li>8. Dissolution testing of semisolid products with different rheological properties.</li> <li>9. Dissolution testing of tablets - investigating the influence of excipients on dissolution rate.</li> <li>10. Introduction to parenteral drugs.</li> <li>11. Preparation and physicochemical assessment of injectable drugs.</li> <li>12. Preparation and qualitative assessment of parenteral nutrition preparations.</li> <li>13. Preparation of cytostatics - procedures, guidelines and devices for the preparation of cytostatics.</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

## Pharmaceutical Technology III

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmaceutical Technology III</b> (Technologia Postaci Leku III)
Unit offering the subject	Faculty of Pharmacy Department of Pharmaceutical Technology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1720-F5-TEPL-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	3
Form of crediting	Graded credit
Language of instruction	English

Designation whether a subject may be credited more than once	No
Subject group	Course moduleC Drug analysis, synthesis and technology Obligatory course
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lectures participation – 15 hours</li> <li>– Laboratories participation – 45 hours</li> <li>– Consultations – 2 hours</li> <li>– Evaluation participation – 2 hour</li> </ul> <p>Total work amount: <b>64 hours (2.13 ECTS point)</b></p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– Lectures participation – 15 hours</li> <li>– Laboratories participation – 45 hours</li> <li>– Preparation to laboratories – 10 hours</li> <li>– Reding literature – 11 hours</li> <li>– Consultations – 2 hours</li> <li>– Preparation and participation in evaluation – 5+2 hours</li> </ul> <p>Total work amount: <b>90 hours (3.00 ECTS points)</b></p> <p>3. Time spent by the student on the research activity:</p> <ul style="list-style-type: none"> <li>– Reading referenced literature – 9.5 hours</li> <li>– Consultations – 2 hour</li> <li>– Lectures participation (including research methodology, results, conclusions) – 15 hours</li> <li>– Participation for laboratories including research activity (including research methodology, results, conclusions) – 30 hours</li> <li>– Preparation for laboratories including research activity – 10 hours</li> <li>– Preparation for evaluation in research aspect – 3 hours</li> </ul> <p>Total work amount: <b>69.5 hours (2.32 ECTS points)</b></p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– Preparation for laboratories + preparation to evaluation + evaluation – 10+3+4 hours</li> </ul> <p>Total work amount: <b>17 hours (0.56 ECTS points)</b></p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: The graduate knows nomenclature, composition, structure and properties of particular medicine forms- K_C.W25</p> <p>W2: The graduate knows rules for the selection of the form of the drug depending on the properties of the medicinal substance and the intended use of the medicinal product- K_C.W26</p> <p>W3: The graduate knows basic technological processes and equipment used in drug dosage form technology; - K_C.W29</p> <p>W4: The graduate knows principles of Good Manufacturing Practice specified in the regulations issued on the basis the</p>

	<p>Article 39 (5) (1) of the Pharmaceutical Law of September 6, 2001 (Journal of Laws of 2019, item 499, as amended), including the principles of technological processes documentation– K_C.W33</p> <p>W5: The graduate knows range of risk analysis, quality design and process analysis-based technology in pharmaceutical production– K_C.W37</p> <p>W6: The graduate knows possibilities of using nanotechnology in pharmacy – K_C.W40</p> <p>W7: The graduate knows nanoparticles and their use in diagnostics and therapy – K_C.W46</p> <p>W8: The graduate knows principles of preparing homeopathic medications - K_C.W38</p> <p>W9: The graduate knows ds for preparing radiopharmaceuticals ex tempore - K_C.W39</p>
Learning outcomes - abilities	<p>U1: The graduate assesses manufacture prescription drugs, select packaging and determine their shelf life and method of storage; - K_C.U16</p> <p>U2: The graduate assesses assess the risk of poor-quality medicinal product and medical device as well as clinical consequences - K_C.U26</p>
Learning outcomes – social skills	<p>K1: The graduate has a habit of using objective sources of information to search and select information needed in the selection of auxiliary substances when creating prescription drugs; - K7</p> <p>K2: The graduate draws and formulates conclusions from his own measurements and observations of prescription drugs; - K8</p>
Didactic methods	<p><u>Lectures:</u></p> <ul style="list-style-type: none"> <li>▪ informative lecture (conventional)</li> <li>▪ problem lecture</li> </ul> <p><u>Laboratories and practical classes:</u></p> <ul style="list-style-type: none"> <li>▪ classic problem method</li> <li>▪ laboratory method</li> </ul>
Preliminary requirements	<p>General and inorganic chemistry</p> <p>Botany</p> <p>Latin language</p> <p>Physical chemistry</p> <p>Organic chemistry</p> <p>Physiology</p> <p>Pharmaceutical Technology I, II</p> <p>Biopharmacy</p>
Brief course description	<p>The course aims to familiarize students with modern and semi-solid drug dosage forms and with excipients used in their production.</p>
Entire course description	<p>Lectures are designed to familiarize the student with the following topics: Quality by Design, the basics of homeopathic medicines preparation, drug dosage forms with controlled release of the active pharmaceutical substances. Students learn about therapeutic systems, packaging in pharmaceutical technology, radiopharmaceuticals, Good Manufacturing Practice (GMP) principles. Students study issues on development perspectives in pharmaceutical</p>

	technology. The laboratories are devoted to hydrogels, homeopathic medicines, preparation of homeopathic drug dosage forms, and technology of cosmetic forms. Students prepare and study the properties of polymer films dissolving in oral cavity (ODF), and occlusive silicone patches. The problems of the modern compounded dosage forms are discussed
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen Jr., LWW; Eleventh, North American edition, 2017</li> <li>2. Pharmaceutical Formulation: The Science and Technology of Dosage Forms (Drug Discovery), Geoffrey D Tovey, Royal Society of Chemistry; 2018</li> <li>3. Pharmaceutics - Dosage Form and Design, Jones, David S, Pharmaceutical Press, 2016</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Pharmaceutical Compounding and Dispensing Marriott, John; Wilson, Keith; Langley, Christopher A; Belcher, Dawn, 2010</li> <li>2. European Pharmacopoeia 6, 7, 8, 9, 10</li> <li>3. United States Pharmacopoeia 35, 36, 37.</li> </ol>
Methods and criteria of evaluation	<p>Practical and written exam W1-W9, U1- U2</p> <p>Observations: K1-K2</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5 <sup>th</sup> year, 1 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Exam (practical and written)
Form(s) and number of course hours as well as the form of crediting	Lectures: 15 hours, written exam Laboratories: 30 hours, practical and written exam
Course coordinator(s)	Prof. Jerzy Krysiński
Subject Teachers	<p>Lectures: Professor Jerzy Krysiński</p> <p>Laboratories: Andrzej Winnicki, MPharm Łukasz Pałkowski, PhD Piotr Bilski, PhD Marta Czapiewska, MPharm</p>
Course form (character)	Obligatory
Limit of places available in each group	Lectures: students of 5 <sup>th</sup> year, 1 <sup>st</sup> semester (fall) Laboratories: students of 5 <sup>th</sup> year 1 <sup>st</sup> semester (fall), 12-person groups
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable



Subject website	Not applicable
Learning outcomes determined for the given course form	Lectures: W1-W9 Laboratories: W1-W9; U1-U2; K1-K2;
Methods and criteria of the evaluation for the given course form	<ul style="list-style-type: none"> <li>• Practical and written exam W1-W9, U1-U2;</li> <li>• Test colloquium, W1-W9, U1-U2;</li> <li>• observations K1-K2</li> </ul> <p>Assessment criteria:</p> <p>2 - fail – below 2.99 (below 59.9%)  3 - acceptable – 3.0 – 3.49 (60%-69.9%)  3,5 – satisfactory – 3.50 – 3.83 (70%-76.7%)  4 – good – 3.84 – 4.16 (76.8%-83.3%)  4.5 – very good – 4.17-4.50 (83.4%-90%)  5 – excellent – above 4.50 (above 90%)</p>
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Rules for preparing homeopathic medicines.</li> <li>2. Quality by Design.</li> <li>3. Pharmaceutical dosage forms with controlled release of the active substance. Therapeutic systems.</li> <li>4. Packaging in pharmaceutical technology.</li> <li>5. Radiopharmaceuticals</li> <li>6. Principles of Good Manufacturing Practice (GMP).</li> <li>7. Modern drug dosage forms, development perspectives in pharmaceutical technology.</li> </ol> <p>Laboratories:</p> <ol style="list-style-type: none"> <li>1. Pharmaceutical hydrogels – principles and formulation issues.</li> <li>2. Formulation technology in cosmetics</li> <li>3. Preparation and testing of basic properties of polymer films dissolving in oral cavity (ODF). Preparation and testing of occlusive properties of silicone patches.</li> <li>4. Homeopathic medicines. Preparation of homeopathic drug dosage forms.</li> <li>5. Recent advances in pharmaceutical compounding.</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

## **Course module D**

Biopharmacy and the effects of drug activities

# Biopharmacy

## A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Biopharmacy</b> (Biofarmacja)
Unit offering the subject	Faculty of Pharmacy Department of Biopharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1705-F5-BIOF-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	3 ECTS
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module D</b> Biopharmacy and the effects of drug activities
Total student workload	<p>2. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lectures participation – 15 hours</li> <li>– Tutorials participation – 45 hours</li> <li>– Consultations participation – 2 hours</li> <li>– Final test participation – 2 hours</li> </ul> <p>Total obligatory hours realized with the teacher participation: <b>64 hours</b>, which corresponds to <b>2.13 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– Lectures participation – 15 hours</li> <li>– Tutorials participation – 45 hours</li> <li>– Preparation for laboratories – 5 hours</li> <li>– Reading the indicated literature – 6 hours</li> <li>– Preparation of lab reports – 5 hours</li> <li>– Consultations participation – 2 hours</li> <li>– Final test preparation and test participation – 10 + 2 = 12 hours</li> </ul> <p>A total work amount: 90 hours, which corresponds to 3 ECTS points.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>– Reading scientific literature – 4 hours</li> <li>– Research and scientific consultation participation – 1 hour.</li> <li>– Lectures (including methodology of research, results, and reports) participation – 10 hours</li> <li>– Laboratory (including methodology of research, results, and reports) participation – 25 hours</li> </ul>

	<ul style="list-style-type: none"> <li>– Preparation for laboratory that includes scientific activity – 3 hours</li> <li>– Preparation for final test that includes scientific and research activity in the field of biopharmacy – 6 hours</li> <li>– Preparation of laboratory course report on scientific research in biopharmacy – 5 hours</li> </ul> <p>A total work amount of scientific research activity: <b>54 hours</b>, which corresponds to <b>1.8 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– Preparation for laboratory class + preparation for final test + final test: 5 + 10 + 2 = 17 hours (0.57 ECTS points)</li> </ul> <p>5. Time required for the practical training completion – not applicable</p>
Learning outcomes – knowledge	<p>W1: Explains the structure of physiological barriers and their functions in the mechanisms of passage of drugs - K_D.W2</p> <p>W2: Describes the fate of drug in the body and the pharmacokinetic processes to which the drug in the body is subject - K_D.W1, K_D.W3</p> <p>W3: Uses the term of bioavailability and calculates parameters characterizing bioavailability and criteria for its assessment - K_D.W3, K_D.W9, K_D.W10</p> <p>W4: Uses the term of pharmaceutical availability and calculates the parameters characterizing pharmaceutical availability and criteria for its assessment - K_D.W9, K_D.W10</p> <p>W5: Interprets the impact of the drug form, route of administration, physicochemical properties of drug substances and excipients and physiological factors on the bioavailability of the drug substance and its duration of action - K_D.W9, K_D.W10</p> <p>W6: Substantiates the correlation between drug release results obtained in vitro and bioavailability results determined in vivo (IVIVC) - K_D.W9</p> <p>W7: Analyzes issues related to bioequivalence and organizes issues related to biopharmaceutical assessment of original and generic drugs - K_D.W11</p> <p>W8: Predicts the interaction of drugs with food, stimulants and environmental pollution – K_D.W35, K_D.W7</p>
Learning outcomes - abilities	<p>U1: Is able to determine the requirements for bioavailability and bioequivalence studies and use these studies to evaluate drugs - K_D.U4</p> <p>U2: Is able to perform a pharmaceutical availability test under various conditions and for different forms of the drug and apply them to assess bioequivalence - K_D.U4, K_D.U7</p> <p>U3: Is able to apply the BCS classification system in the process of releasing a medicinal product from in vivo bioequivalence studies - K_D.U8</p> <p>U4: Is able to determine the effect of modification of the drug form on the pharmaceutical and biological availability of the drug substance - K_D.U4, K_D.U7, K_D.U9</p> <p>U5: Is able to assess the effect of the composition of the drug, its form and physiological and pathological conditions on the</p>

	<p>absorption of the drug substance and advise on the proper application, dosage and intake of the drug - K_D.U1</p> <p>U6: Is able to interpret and present scientific research on bioavailability, pharmaceutical availability and bioequivalence - K_D.U4, K_D.U5, K_D.U7</p> <p>U7: Is able to perform a pharmaceutical availability test to assess the similarity of medicinal products using statistical analysis methods - K_D.U4, K_D.U7</p> <p>U8: Is able to interpret the results of research on bioavailability, pharmaceutical availability and bioequivalence - K_D.U4, K_D.U5</p>
Learning outcomes – social skills	<p>K1: Demonstrates the conclusions drawn from the measurements and observations made - K8</p> <p>K2: Demonstrates the ability to work in a team – K3</p>
Didactic methods	<p><u>Lecture:</u></p> <ul style="list-style-type: none"> <li>▪ Informative lecture with the elements of multimedia presentation</li> <li>▪ Conversation lecture</li> </ul> <p><u>Tutorials:</u></p> <ul style="list-style-type: none"> <li>▪ Laboratory classes</li> <li>▪ Didactic discussion with a multimedia presentation</li> <li>▪ Computer-assisted learning</li> <li>▪ Exposing methods: film</li> </ul>
Preliminary requirements	Basic information in the field of pharmacokinetics, pharmaceutical technology, biochemistry, physicochemistry, biology, mathematics and statistics.
Brief course description	Biopharmacy is a subject that introduces pharmacy students to factors that have an impact on bioavailability of drug substances present in pharmaceutical preparation.
Entire course description	<p>Biopharmacy as a subject brings the knowledge and skills that are essential to understanding the factors that have an impact on bioavailability of pharmaceutical preparation and releasing an active ingredient from drugs medicinal product.</p> <p>The aim of lectures is to obtain a knowledge on releasing a drug's active ingredient and its fate in organism based on pharmaceutical preparations. Biological membranes and physiological barriers are also a subject of interest.</p> <p>The aim of the lectures is to introduce to the students the idea of bioavailability and its parameters as well as an impact of product form, route of drug administration, physiological factors and physicochemical properties of active ingredients and excipients on bioavailability.</p> <p>Students are provided with a knowledge on interaction of medications with food and alcohol. Biopharmacy lectures are dedicated to discussing the research data according the availability of therapeutic drug ingredient as well as factors that affect the pharmaceutical availability and the methods of assessing profiles of therapeutic substance releasing. The problems of generic drugs and targeted pharmacotherapy are also presented during these lectures.</p> <p>Laboratory class topics are to some extent bond with problems presented during lectures.</p> <p>Lab class has a practical character, so their aim is to introduce students to analytical procedures and techniques essential for</p>

	<p>carrying out the particular research problem. They are designed as a student competence self-development by working with apparatuses designed to asset the rate of releasing therapeutic substance from a drug using techniques of high-performance liquid chromatography and spectroscopy. There are also used computer programs that allow to conduct sophisticated calculations based on data gathered during the class.</p> <p>Laboratory classes allow to develop competences of effective teamwork and to specify conclusions based on conducted measurements and observations.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Leon Shargel, Andrew B. C. Yu, Applied Biopharmaceutics &amp; Pharmacokinetics, Seventh Edition, McGraw-Hill United States, 2016</li> <li>2. Malcolm Rowland , Thomas N. Tozer, Clinical Pharmacokinetics and Pharmacodynamics : Concepts and Applications, Lippincott Williams and Wilkins, Philadelphia, 2010</li> <li>3. Ashutosh Kar, Essentials of Biopharmaceutics and Pharmacokinetics- E-Book, Elsevier Health Sciences, 2010</li> <li>4. Han van de Waterbeemd, Bernard Testa, Raimund Mannhold, Hugo Kubinyi, Gerd Folkers, Drug Bioavailability: Estimation of Solubility, Permeability, Absorption and Bioavailability, 2nd Edition, Wiley-VCH, 2008</li> <li>5. Gopala Krishnamurty, Srinivasa Babu and Sheshagiri Rao, Pharmaceutical Statistics, PharmaMed Press, 2014</li> <li>6. Ed.Milo Gibaldi, Biopharmaceutics and Clinical Pharmacokinetics,4th, PharmaMed Press, 2008</li> <li>7. Recommended papers from scientific journals.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Beverly McCabe-Sellers, Eric H. Frankel, Jonathan J. Wolfe, Handbook of Food-Drug Interactions, CRC Press, 2019</li> <li>2. Thomas N. Tozer, Malcolm Rowland, Essentials of Pharmacokinetics and Pharmacodynamics, Lippincott Williams and Wilkins, Philadelphia, United States, 2015</li> <li>3. Donald J. Birkett, Pocket Guide: Pharmacokinetics Made Easy, McGraw-Hill Education, Australia, 2011</li> </ol>
Methods and criteria of evaluation	<p>Completion of individual laboratory classes on the basis of correctly performed laboratory exercises and completed exercise reports, continuous assessment of current preparation for classes and student activity: K1, K2.</p> <p>Test</p> <p>Two written tests: W1-W8, U1-U8 - passing after obtaining &gt;60% of points from each test.</p> <p>Grade:</p> <p>92% - 100% - Excellent (5)</p> <p>84% - 91% - Very good (4.5)</p> <p>76% - 83% - Good (4)</p> <p>68% - 75% - Satisfactory (3.5)</p>

	60% - 67% - Acceptable (3) 0% - 59% - Fail (2) Obtaining credit for lectures and laboratory classes is a condition for passing the subject. Final grade The final grade is the average of the grades obtained: 4,75 - 5,00 Excellent (5) 4,25 - 4,74 Very good (4.5) 3,75 - 4,24 Good (4) 3,25 - 3,74 Satisfactory (3.5) 2,75 - 3,24 Acceptable (3) 0 - 2,74 Fail (2)
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5 <sup>th</sup> year 1 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Lectures: Credit with grade Laboratories: Credit with grade
Form(s) and number of course hours as well as the form of crediting	Lectures - 15 hours – Credit with grade Laboratories - 45 hours- Credit with grade
Course coordinator(s)	Prof. dr hab. Adam Buciński
Subject Teachers	Lectures: prof. dr hab. Adam Buciński dr Urszula Marzec – Wróblewska  Laboratories: prof. dr hab. Adam Buciński dr Urszula Marzec-Wróblewska mgr Anna Badura mgr Andżelika Lorenc
Course form (character)	Obligatory
Limit of places available in each group	Lectures: 5 <sup>th</sup> year 1 <sup>st</sup> semester students Laboratories: groups of 8 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	
Subject website	
Learning outcomes determined for the given course form	Lectures: W1 – W8, U1 - U5, Laboratories: U1 – U8, W2 -W5, W8, K1, K2
Methods and criteria of the evaluation for the given course form	Lectures A written test containing open questions and test : W1-W8, U1, U3 - U5. Positive grades >60% of points.  Laboratories A written test containing open questions : U1, U2, U4 - U8, W2 - W5, W8, K1. Positive grades >60% of points.

	<p>Properly conducting laboratory exercises and providing the reports on their results: U1, U2, U4 - U8, W2 - W5, W8, K1, K2.</p> <p>Continuous assessment of current preparation for classes and student activity: K1, K2.</p> <p>Grade:</p> <p>92% - 100% - Excellent (5)        84% - 91% - Very good (4.5)        76% - 83% - Good (4)        68% - 75% - Satisfactory (3.5)        60% - 67% - Acceptable (3)        0% - 59% - Fail (2)</p> <p>Obtaining credit for lectures and laboratory classes is a condition for passing the subject.</p> <p>Final grade</p> <p>The final grade is the average of the grades obtained:</p> <p>4,75 - 5,00 Excellent (5)        4,25 - 4,74 Very good (4.5)        3,75 - 4,24 Good (4)        3,25 - 3,74 Satisfactory (3.5)        2,75 - 3,24 Acceptable (3)        0 - 2,74 Fail (2)</p>
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Release of a therapeutic substance from drug and its fate in the body: LADME processes.</li> <li>2. Biological membranes and Physiological barriers: drug passages mechanisms.</li> <li>3. Bioavailability – its parameters and methods of their determination.</li> <li>4. An impact of a drug form, route of drug administration, physiological factors and physicochemical properties of active ingredients and excipients on bioavailability.</li> <li>5. Pharmaceutical availability examination of therapeutic substance in various drug forms.</li> <li>6. Factors of pharmaceutical availability.</li> <li>7. Methods of assessing the similarity of therapeutic substance release profiles.</li> <li>8. The importance of pharmaceutical availability measurement.</li> <li>9. Interactions of drugs with food, substances and environmental pollution.</li> <li>10. Bioequivalence: methodics of research conducting and statistical evaluation.</li> <li>11. Correlation of in vitro therapeutic substance release and in vivo bioavailability results (ivivc).</li> <li>12. Generic drugs and biogenerics: drug interchangeability according to EU regulations.</li> <li>13. Targeted pharmacotherapy: pro-drugs, drugs carriers, pharmaceutical nanotechnology.</li> </ol> <p>Laboratories:</p> <ol style="list-style-type: none"> <li>1. Therapeutic substance release from a drug form and its fate in the body: pharmacokinetic description.</li> <li>2. Release rate measurement for drugs with and without modified rate of therapeutic substance release.</li> </ol>



	<ol style="list-style-type: none"> <li>3. Conducting the assessing of similarity of release profile for two series (referential one and test one) by using methods of statistical analysis.</li> <li>4. Determining the drug binding with human albumin and <math>\alpha</math>1-glycoprotein</li> <li>5. Examination of active substance release from transdermal therapeutic systems.</li> <li>6. Research on an impact of acceptor fluid pH on active substance release profile.</li> <li>7. Assessing the characteristic parameters of bioavailability.</li> <li>8. Statistical evaluation of research on bioequivalence.</li> <li>9. An impact of components of a diet on pharmaceutical availability.</li> <li>10. Examination of release kinetics of diclofenac sodium from gel.</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

## Bromatology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Bromatology</b> Bromatologia
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	(1707-F4-BROM-J)
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	5
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module D</b> Biopharmacy and the effects of drug activities
Total student workload	<ol style="list-style-type: none"> <li>1. Obligatory hours realized with the teacher participation <ul style="list-style-type: none"> <li>– Lecture participation – 30 hours</li> <li>– Tutorials participation – 45 hours,</li> <li>– Scientific and research consultations participation – 2 hours,</li> <li>– Course credit (colloquium + exam): 2 hours + 1 hour = 3 hours</li> </ul> </li> </ol>

	<p>The total student workload related to activities requiring direct participation of academic teachers is <b>80 hours</b>, which corresponds to <b>3.28 ECTS points</b>.</p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>- Lecture participation – 30 hours</li> <li>- Tutorials participation – 45 hours,</li> <li>- preparation of reports, supplementing notes: 10 hours,</li> <li>- collecting materials and preparing for classes: 5 hours,</li> <li>- material repeat required: 5 hours,</li> <li>- consultations with tutors: 5 hours,</li> <li>- reading the indicated literature: 3 hours,</li> <li>- preparation to pass and pass <math>20 + 2 = 22</math> hours.</li> </ul> <p>The total student workload is 125 hours, which corresponds to 5.0 ECTS points.</p> <p>3. Time required for the scientific research:</p> <ul style="list-style-type: none"> <li>- Lecture participation (including research methodology, interpretation of results of conducted analyzes: – 20 hours,</li> <li>- carrying out scientific and research aspects as part of tutorials: – 25 hours,</li> <li>- scientific and research consultations: – 1 hour,</li> <li>- reading literature as part of aspects of scientific research: – 12 hours,</li> <li>- preparation to complete the course in the field of research and development for the subject: – 12 hours.</li> </ul> <p>Total time related to the conducted research: <b>70 hours, 3.08 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- preparation for classes + required repetition of material + preparation for passing and passing - <math>10 + 8 + 22 = 40</math> hours (1.6 ECTS point).</li> </ul> <p>5. Time required for the practical training completion – not applicable.</p> <p>Total work amount: 118 hours (5 ECTS point)</p>
Learning outcomes – knowledge	<p>W1: Knows the basic nutrients, system expenditure, its meaning, physiological availability and metabolism and nutrition sources; K_D.W30</p> <p>W2: Knows and uses methods used in the assessment of nutritional value of food; K_D.W31</p> <p>W3: Knows the problems of substances added do food, food contamination and inappropriate quality of goods intended for contact with food; K_D.W32</p> <p>W4: Knows and understands the problems of enriched foods, dietary supplements and special purpose foods; K_D.W33</p> <p>W5: Knows the methods used to assess the diet of a healthy and sick person; K_D.W34</p> <p>W6: Knows and understands the basics of drug-food interaction; K_D.W35</p>

	W7: Knows the requirements and methods of assessing the quality of dietary supplement, in particular the ones including vitamins and minerals; K_D.W36
Learning outcomes - abilities	<p>U1: Is able to explain the causes and results of interactions during the pharmacokinetic phase and determine methods of prevention; K_D.U10</p> <p>U2: Is able to explain the causes and effects of interactions in the pharmacodynamic phase and identify ways to prevent these interactions; K_D.U14</p> <p>U3: Is able to characterize food products in terms of their composition and nutritional value; K_D.U23</p> <p>U4: Is able to assess the nutritional value of food by calculation and analytical methods (including gas and liquid chromatography and atomic absorption spectrometry); K_D.U24</p> <p>U5: Has the ability to assess the diet in terms of covering energy needs and essential nutrients in health and illness; K_D.U25</p> <p>U6: Is able to explain the principles and role of proper nutrition in the prevention and course of diseases; K_D.U26</p> <p>U7: Is able to assess the exposure of the human body to contaminants present in food; K_D.U27</p> <p>U8: Can predict the effects of changes in the concentration of the active substance in the blood as a result of eating certain food products; K_D.U28</p> <p>U9: Can explain the causes and effects of drug-drug interaction and food; K_D.U29</p> <p>U10: Is able to provide patient regarding drug-food interactions; K_D.U30</p> <p>U11: Is able to provide information on the use of nutritional preparations and dietary supplements; K_D.U31</p> <p>U12: Has the ability to assess the quality of products containing herbal medicinal raw materials; K_D.U32</p>
Learning outcomes – social skills	<p>K1: Is ready to establish relationships with the patient and colleagues based on mutual trust and respect; K1.</p> <p>K2: Is ready to see and recognize their own limitations, make a self-assessment of deficits and educational needs; K2.</p> <p>K3: Has a habit of using of promoting health-oriented behaviours; K6.</p> <p>K4: Has a habit of using objective sources of information; K7.</p> <p>K5: Draws and phrases conclusions from own measurements or observation; K8.</p>
Didactic methods	<p><u>Lecture:</u> Problematic lecture with multimedia presentation.</p> <p><u>Labs:</u> Performing experiments and problem analysis.</p>
Preliminary requirements	Knowledge and skills in the following subjects: analytical chemistry, organic chemistry, biochemistry, physiology and microbiology and chemistry of medicines conducted during the studies.
Brief course description	The subject of the course is to learn and understand methods of studying the influence of food and nutrition on human health and the choice, the progress and evaluation of the effects of pharmacotherapy in humans. It also includes familiarizing the student with the achievements of bromatology in the scope of

	<p>modern ways of preventing diet-related diseases of civilization, especially in the context of optimizing procedures, the products and costs of pharmacotherapy and how to identify the environmental risks affecting the manufacture of the foodstuffs. The aim of this programme is to promote the development of a healthy eating habits among the population which contribute to the reduction of the social cost of pharmacotherapy.</p>
Entire course description	<p>The lectures have a purpose:</p> <ul style="list-style-type: none"> <li>- to acquaint students with the subject of Bromatology both in historical terms and with the current work in this field,</li> <li>- present nutritional standards and principles of proper nutrition and supplementation of a healthy person and in various diseases,</li> <li>- to become familiar with the issues of food health safety and the assessment of the effects of improper nutrition and consumption of contaminated food in humans during different periods of life,</li> <li>- to acquaint oneself with the assessment of the impact of interactions of food ingredients and drugs on human health and the effects of pharmacotherapy.</li> </ul> <p>Labs have a goal:</p> <ul style="list-style-type: none"> <li>- get acquainted with the methods of determination of nutritious and non-nutritious food components and its impurities and additives</li> <li>- evaluate the eating habits of a healthy and sick person and provide dietary advice</li> </ul>
References	<p><u>Primary literature:</u></p> <ol style="list-style-type: none"> <li>1. Gertig H., Przysławski J. Bromatologia – zarys nauki o żywności i żywieniu. Wyd. PZWL, Warszawa 2006.</li> <li>2. Gertig H., Duda G. Żywność a zdrowie i prawo. Wyd. PZWL, Warszawa 2004.</li> <li>3. Zachwieja Z. (red.): Leki i pożywienie-interakcje, MedPharm Polska, Wrocław 2016.</li> <li>4. Jarosz M. (red). Normy żywienia dla populacji Polski. Wyd. IZZ, Warszawa 2017 .</li> <li>5. Gawęcki J. (red.). Żywnienie człowieka 1 Podstawy nauki o żywieniu. Wyd. Naukowe PWN, 2012</li> <li>6. Gawęcki J., Grzymisławski M. (red.). Żywnienie człowieka zdrowego i chorego Tom 2, Wyd. Naukowe PWN, Warszawa 2016</li> <li>7. Gawęcki J., Roszkowski W. (red.). Żywnienie człowieka a zdrowie publiczne Tom 3, Wyd. Naukowe PWN, Warszawa 2009.</li> <li>8. Payne A., Barker H. M. Jan Chojnacki J. (red. wyd. pol.). Dietetyka i żywienie kliniczne. Wyd. Elsevier Urban &amp; Partner, Wrocław 2013</li> </ol> <p><u>Supplementary literature:</u></p> <ol style="list-style-type: none"> <li>1. Langley-Evans S.: Żywnienie. Wpływ na zdrowie człowieka, PZWL, Warszawa 2013.</li> <li>2. Grajeta H. (red.), Wybrane zagadnienia z analizy żywności i żywienia człowieka, Wyd. AM im. Piastów Śląskich, Wrocław 2010.</li> <li>3. Moyad M.A., Lee J., Przewodnik po świecie suplementów, Wyd. Galaktyka, Łódź 2016.</li> </ol>

Methods and criteria of evaluation	Test: W1.W2, W5, U3, U4, U5, U6, U7, U8, U9, U10, K1, K2, K4, K5. Practical performance of tutorials: U1, U2 Exam: W1.W2, W3, W4, W5, W6, W7, U1, U2, U5, U10. Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

B. Course description in the didactic cycle

Space name	Comment														
Didactic cycle	4 <sup>th</sup> year, 7 <sup>th</sup> semester (fall)														
Form of crediting a subject in the cycle	Subject - Exam Labs - Credit Lecture - Exam														
Form(s) and number of course hours as well as the form of crediting	Labs, 45 hours, Lecture, 30 hours,														
Course coordinator(s)	Beata Sperkowska														
Subject Teachers	Beata Sperkowska														
Course form (character)	Obligatory														
Limit of places available in each group	Lecture: group of 120 Labs :groups of 12														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods															
Subject website															
Learning outcomes determined for the given course form	Lectures: W1-W7, U1-U3 Laboratories: W1, W3, W6-W7, U1-U12, K1-K3														
Methods and criteria of the evaluation for the given course form	The course is passed if the student actively participated in didactic classes and obtained the appropriate number of points. <u>Labs</u> : written colloquia, class work and multimedia presentation - passing laboratory requires 60% of the possible points (117 points), i.e. $60\% \times 117 \text{ points} = 70 \text{ points}$ . <u>Lectures</u> : Written exam, five descriptive questions 0-10 points, cumulatively >60%. <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>88-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>81-87%</td> <td>Very good (4.5)</td> </tr> <tr> <td>74-80%</td> <td>Good (4)</td> </tr> <tr> <td>67-73%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-66%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table>	Percentage of points	Grade	88-100%	Excellent (5)	81-87%	Very good (4.5)	74-80%	Good (4)	67-73%	Satisfactory (3.5)	60-66%	Acceptable (3)	0-59%	Fail (2)
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88-100%	Excellent (5)														
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74-80%	Good (4)														
67-73%	Satisfactory (3.5)														
60-66%	Acceptable (3)														
0-59%	Fail (2)														
List of topics	<u>Lecture</u> : 1. Principles of rational human feeding, food standards, energy and nutrients demands (2h). 2. Effects of excessive food energy intake (1h).- 3. Fats - the function in the body, nutritional sources, fatty acids composition of food, the														

	<p>influence of different groups of fatty acids on the body's lipid balance, consumption standards (2h).-</p> <p>4. Minerals - classification into macro and microelements, role in the body, health effects of their deficiency in the diet, factors influencing bioavailability, sources in food, consumption standards (4h).- 5. Vitamins - characterization and role in the body, health effects of their deficiencies in the diet, sources in food, consumption standards (4h). – 6. Dietary supplements (1h).- 7. Drug-nutrient interactions. Mechanisms of interaction between drugs and food ingredients (4h).- 8. Diseases of civilization (2h).- 9. The influence of food ingredients on the effects of drugs and the influence of drugs on the bioavailability of nutrients and nutritional status of the body (4h). 10. The influence of food ingredients on the effects of cardiological drugs (2h). 11. The influence of the analgesic drugs on the bioavailability of nutrients (2h). 12. The influence of the psychotropic drugs on the bioavailability of nutrients (2h).</p> <p><u>Labs</u></p> <ol style="list-style-type: none"> <li>1. Introduction exercise: Regulations, occupational health and safety training, organization.</li> <li>2. Body analysis by bioimpedance method (BIA).</li> <li>3. Qualitative evaluation of dietary intake in students</li> <li>4. Quantitative evaluation of dietary intake.</li> <li>5. Dietary diseases of civilization - pharmacotherapy and nutrition.</li> <li>6. Determination of nitrate and kitchen salt content in sausage products.</li> <li>7. Quality assessment of bee honeys.</li> <li>8. Quantitative and qualitative evaluation of preserving compounds contained in fruit juices.</li> <li>9. Quality assessment of wine.</li> <li>10. Quality assessment of drinking water.</li> <li>11. Determination of polyphenols and flavonoids in herbal teas.</li> </ol> <p><u>Presentation:</u> Drug/food interactions, case study.</p>
Didactic methods	<p>The same as in part A</p> <p><u>Problematic lecture</u> with multimedia presentation.</p> <p><u>Labs:</u> performing experiments and problem analysis.</p>
References	The same as in part A

## Pharmacokinetics

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmacokinetics</b> (Farmakokinetyka)
Unit offering the subject	Faculty of Pharmacy Department of Biopharmacy

	Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1705-F3-FKIN-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	3
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module D</b> Biopharmacy and the effects of drug activities
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>- Lectures participation – 10 hours</li> <li>- Tutorials participation – 25 hours</li> <li>- Consultations participation – 2 hours</li> <li>- Final test participation – 2 hours</li> </ul> <p>Total obligatory hours realized with the teacher participation: 39 hours, which corresponds to 1.56 ECTS points.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>- Lectures participation – 10 hours</li> <li>- Tutorials participation – 25 hours</li> <li>- Preparation for laboratories – 7 hours</li> <li>- Reading the indicated literature – 7 hours</li> <li>- Preparation of lab reports – 7 hours</li> <li>- Consultations participation – 2 hours</li> <li>- Final test preparation and test participation – 15 + 2 = 17 hours</li> </ul> <p>A total work amount: 75 hours, which corresponds to 3 ECTS points.</p> <p>3. Workload related to conducting research:</p> <ul style="list-style-type: none"> <li>- Reading scientific literature – 4 hours</li> <li>- Research and scientific consultation participation – 1 hour</li> <li>- Lectures (including methodology of research, results, and reports) participation – 6 hours</li> <li>- Laboratory (including methodology of research, results, and reports) participation – 14 hours</li> <li>- Preparation for laboratory that includes scientific activity – 5 hours</li> <li>- Preparation for final test that includes scientific and research activity in the field of pharmacokinetics – 8 hours</li> <li>- Preparation of laboratory course report on scientific research in pharmacokinetics – 7 hours</li> </ul>

	<p>A total work amount of scientific research activity: 45 hours, which corresponds to 1.8 ECTS points.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- Preparation for laboratory class + preparation for final test + final test: 7 + 15 + 2 = 24 hours (0.96 ECTS points)</li> </ul> <p>5. Time required for the practical training completion – not applicable</p>
Learning outcomes – knowledge	<p>W1: Uses pharmacokinetic parameters to describe the kinetics of drug-related processes in the body - K_D.W4, K_D.W5</p> <p>W2: Uses compartmental theory to describe pharmacokinetic processes determining dose-concentration-time relationships - K_D.W5</p> <p>W3: Predicts the effect of intrinsic and extrinsic factors on the course of drug pharmacokinetic processes in the body - K_D.W6</p> <p>W4: Explains the term of bioavailability and the parameters characterizing it - K_D.W9</p> <p>W5: Substantiates the use of drug concentration-monitored therapy - K_D.W8</p>
Learning outcomes - abilities	<p>U1: Can calculate the pharmacokinetic parameters of the drug describing the kinetics of the processes that the drug undergoes in the body - K_D.U2, K_D.U3, K_D.U6</p> <p>U2: Is able to carry out and interpret the drug bioavailability study - K_D.U4</p> <p>U3: Is able to plan the change of drug dosage in an individual patient based on the influence of intrinsic and extrinsic factors and on the basis of monitored drug concentration in the blood - K_D.U12</p>
Learning outcomes – social skills	<p>K1: Demonstrates the conclusions drawn from the measurements and observations made - K8</p> <p>K2: Demonstrates the ability to work in a team - K3</p>
Didactic methods	<p><u>Lecture:</u></p> <ul style="list-style-type: none"> <li>– Informative lecture with the elements of multimedia presentation</li> <li>– Conversation lecture</li> </ul> <p><u>Tutorials:</u></p> <ul style="list-style-type: none"> <li>– Laboratory classes,</li> <li>– Didactic discussion with the elements of multimedia presentation</li> <li>– Computer-assisted learning</li> </ul>
Preliminary requirements	Basic knowledge on biology, physicochemistry, biochemistry, mathematics and statistics.
Brief course description	Pharmacokinetics is a field of science that employs description of numerical changes in concentration of therapeutic agent in blood, body tissues, organs, as well as changes of its metabolism and excretion rates.
Entire course description	Pharmacokinetics course concerns the knowledge and practical skills essential in understanding the kinetic processes of drug is



	<p>subjected to in organism i.e. release, absorbing, distribution, biotransformation and excretion.</p> <p>The lectures provide a knowledge on distribution law and compartment theory of therapeutic substance based on hydrodynamic analogues as well as understanding of terms such as biological half-life, distribution capacity, bioavailability, organ clearance and total body clearance.</p> <p>Students will be acknowledged about pharmacokinetics of intravascular and extravascular drug administration in single and double compartment delivery model, pharmacokinetics of multiple drug delivery, the notion of a steady-state concentration and its description, and pharmacokinetics of intravenous infusion.</p> <p>They will be also acknowledged about the problems concerning the assessment of pharmacokinetic parameters based on mass of drug found in excreted urine and about the assessment of basic pharmacokinetic parameters using non compartment model technique. They will be also presented the nonlinear pharmacokinetics.</p> <p>Lectures will familiarize participants with physiological model of pharmacokinetics and problems of pharmacokinetics based on measurement of drug concentration in the body.</p> <p>Lab exercises are to some extent bond with the topics of lectures. Their aim is to acknowledge students with analytical techniques essential to conducting the determined research goal. They will allow students to conduct exercises using HPLC techniques and spectroscopic analysis on their own.</p> <p>There are also used computer programs that allow the students to conduct sophisticated calculations based on data gathered during the class.</p> <p>Laboratory classes allow to develop competences of effective work organization and teamwork.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>8. Leon Shargel, Andrew B. C. Yu, Applied Biopharmaceutics &amp; Pharmacokinetics, Seventh Edition, McGraw-Hill United States, 2016</li> <li>9. Malcolm Rowland , Thomas N. Tozer, Clinical Pharmacokinetics and Pharmacodynamics : Concepts and Applications, Lippincott Williams and Wilkins, Philadelphia, 2010</li> <li>10. Ashutosh Kar, Essentials of Biopharmaceutics and Pharmacokinetics- E-Book, Elsevier Health Sciences, 2010</li> <li>11. Thomas N. Tozer, Malcolm Rowland , Introduction to Pharmacokinetics and Pharmacodynamics : TheQuantitative Basis of Drug Therapy, Lippincott Williams and Wilkins, Philadelphia, 2006</li> <li>12. Recommended papers from scientific journals.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Thomas N. Tozer, Malcolm Rowland, Essentials of Pharmacokinetics and Pharmacodynamics, Lippincott Williams and Wilkins, Philadelphia, United States, 2015</li> </ol>

	<p>2. Michael E. Winter, Basic Clinical Pharmacokinetics, Fourth Edition, Lippincott Williams and Wilkins, Philadelphia, United States, 2004</p> <p>3. Donald J. Birkett, Pocket Guide: Pharmacokinetics Made Easy, McGraw-Hill Education, Australia, 2011</p>
Methods and criteria of evaluation	<p>Completion of individual laboratory classes on the basis of correctly performed laboratory exercises and completed exercise reports, continuous assessment of current preparation for classes and student activity: K1, K2.</p> <p>Test</p> <p>Two written tests: W1-W5, U1-U3 - passing after obtaining &gt;60% of points from each test.</p> <p>Grade:</p> <p>92% - 100% - Excellent (5)</p> <p>84% - 91% - Very good (4.5)</p> <p>76% - 83% - Good (4)</p> <p>68% - 75% - Satisfactory (3.5)</p> <p>60% - 67% - Acceptable (3)</p> <p>0% - 59% - Fail (2)</p> <p>Obtaining credit for lectures and laboratory classes is a condition for passing the subject.</p> <p>Final grade</p> <p>The final grade is the average of the grades obtained:</p> <p>4,75 - 5,00 Excellent (5)</p> <p>4,25 - 4,74 Very good (4.5)</p> <p>3,75 - 4,24 Good (4)</p> <p>3,25 - 3,74 Satisfactory (3.5)</p> <p>2,75 - 3,24 Acceptable (3)</p> <p>0 - 2,74 Fail (2)</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	3 <sup>rd</sup> year, 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures: Credit with grade Laboratories: Credit with grade
Form(s) and number of course hours as well as the form of crediting	Lectures - 10 hours – Credit with grade Laboratories - 25 hours- Credit with grade
Course coordinator(s)	Prof. dr hab. Adam Buciński
Subject Teachers	Lectures: prof. dr hab. Adam Buciński dr Urszula Marzec – Wróblewska  Laboratories: prof. dr hab. Adam Buciński dr Urszula Marzec-Wróblewska mgr Anna Badura mgr Andżelika Lorenc
Course form (character)	Obligatory
Limit of places available in each group	Lectures: 3 <sup>rd</sup> year, 2 <sup>nd</sup> semester students Laboratories: groups of 8 students

Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	
Subject website	
Learning outcomes determined for the given course form	<p>Lectures:</p> <p>W1: Uses pharmacokinetic parameters to describe the kinetics of drug-related processes in the body - K_D.W4, K_D.W5</p> <p>W2: Uses compartmental theory to describe pharmacokinetic processes determining dose-concentration-time relationships - K_D.W5</p> <p>W3: Predicts the effect of intrinsic and extrinsic factors on the course of drug pharmacokinetic processes in the body - K_D.W6</p> <p>W4: Explains the term of bioavailability and the parameters characterizing it - K_D.W9</p> <p>W5: Substantiates the use of drug concentration-monitored therapy - K_D.W8</p> <p>U3: Is able to plan the change of drug dosage in an individual patient based on the influence of intrinsic and extrinsic factors and on the basis of monitored drug concentration in the blood - K_D.U12</p> <p>Laboratories:</p> <p>W1: Uses pharmacokinetic parameters to describe the kinetics of drug-related processes in the body - K_D.W4, K_D.W5</p> <p>W2: Uses compartmental theory to describe pharmacokinetic processes determining dose-concentration-time relationships - K_D.W5</p> <p>W4: Explains the term of bioavailability and the parameters characterizing it - K_D.W9</p> <p>U1: Can calculate the pharmacokinetic parameters of the drug describing the kinetics of the processes that the drug undergoes in the body - K_D.U2, K_D.U3, K_D.U6</p> <p>U2: Is able to carry out and interpret the drug bioavailability study - K_D.U4</p> <p>K1: Demonstrates the conclusions drawn from the measurements and observations made - K8</p> <p>K2: Demonstrates the ability to work in a team - K3</p>
Methods and criteria of the evaluation for the given course form	<p>Lectures</p> <p>A written test containing open questions and test : W1-W5, U3.</p> <p>Positive grades &gt;60% of points.</p> <p>Laboratories</p> <p>A written test containing open questions : W1, W2, W4, U1, U2, K1.</p> <p>Positive grades &gt;60% of points.</p> <p>Properly conducting laboratory exercises and providing the reports on their results: W1, W2, W4, U1, U2, K1, K2.</p> <p>Continuous assessment of current preparation for classes and student activity: K1, K2.</p> <p>Grade:</p> <p>92% - 100% - Excellent (5)</p>

	<p>84% - 91% - Very good (4.5)  76% - 83% - Good (4)  68% - 75% - Satisfactory (3.5)  60% - 67% - Acceptable (3)  0% - 59% - Fail (2)</p> <p>Obtaining credit for lectures and laboratory classes is a condition for passing the subject.</p> <p>Final grade</p> <p>The final grade is the average of the grades obtained:  4,75 - 5,00 Excellent (5)  4,25 - 4,74 Very good (4.5)  3,75 - 4,24 Good (4)  3,25 - 3,74 Satisfactory (3.5)  2,75 - 3,24 Acceptable (3)  0 - 2,74 Fail (2)</p>
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. KLADME: kinetics of therapeutic substances release, absorption, distribution, biotransformation and excretion from the organism.</li> <li>2. Distribution law.</li> <li>3. Compartment theory of drugs distribution: hydrodynamic analogues.</li> <li>4. Biological half-life.</li> <li>5. Volume of distribution.</li> <li>6. Bioavailability.</li> <li>7. Total body clearance and clearances of particular organs.</li> <li>8. Intravascular drug administration: single and double compartment models.</li> <li>9. Oral drug administration: single and double compartment models.</li> <li>10. Multiple drug delivery: steady-state concentration and its description.</li> <li>11. Pharmacokinetics of intravenous infusion.</li> <li>12. Assessment of pharmacokinetic parameters based on mass of drug found in excreted urine.</li> <li>13. Non compartment model pharmacokinetics: assessment of basic pharmacokinetic parameters.</li> <li>14. Nonlinear pharmacokinetics.</li> <li>15. Physiological pharmacokinetic model.</li> <li>16. Pharmacokinetics based on measurement of drug concentration in the body.</li> </ol> <p>Laboratories:</p> <ol style="list-style-type: none"> <li>1. Pharmacokinetics of single intravenous drug administration in an open single compartment model.</li> <li>2. Pharmacokinetics of single intravenous drug administration in an open double compartment model.</li> <li>3. Pharmacokinetics of single oral drug administration in single compartment model.</li> <li>4. Pharmacokinetics of single oral drug administration in double compartment model.</li> <li>5. Multiple drug administration.</li> <li>6. Pharmacokinetics of intravenous infusion.</li> </ol>

	<p>7. Assessment of pharmacokinetic parameters based on mass of drug found in excreted urine.</p> <p>8. Non compartment model pharmacokinetics.</p> <p>9. Nonlinear pharmacokinetics.</p> <p>10. Bioavailability.</p>
Didactic methods	The same as in part A
References	The same as in part A

## Pharmacology and Pharmacodynamics

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmacology and Pharmacodynamics</b> (Farmakologia i farmakodynamika)
Unit offering the subject	Department of Pharmacodynamics and Molecular Pharmacology Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1724-F3-FARMFL-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	3
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module D</b> Biopharmacy and the effects of drug activities
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lecture participation – 30 hours</li> <li>– Tutorials participation – 15 hours</li> <li>– Scientific-research consultation participation (discussion of scientific literature, development and interpretation of obtained research results, supplementing knowledge on the assessment of the therapeutic effect of drugs, personalized therapy, monitoring of treatment, drug interactions and side effects, "case study") - 4 hours</li> </ul> <p>Total amount of work requiring academic teacher participation is <b>49 hours</b>, which corresponds to <b>1.96 ECTS points</b>.</p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– Lecture participation – 30 hours,</li> </ul>

	<ul style="list-style-type: none"> <li>- Tutorials participation – 15 hours,</li> <li>- Scientific-research consultation participation – 2 hours,</li> <li>- Preparation for classes – 10 hours,</li> <li>- Preparation for colloquium – 8 hours</li> <li>- Preparation for completion of the subject- 8 hours</li> <li>- Reading the indicated scientific literature – 2 hour</li> </ul> <p>Total amount of student individual work is <b>75 hours</b>, which corresponds to <b>3 ECTS points</b></p> <p>3. Time spent on scientific research:</p> <ul style="list-style-type: none"> <li>- Reading the indicated scientific literature – 2 hour,</li> <li>- Lecture participation (including research methodology, research results, reports) – 18 hours,</li> <li>- Scientific-research consultations – 2 hour,</li> <li>- Scientific practical classes participation (including research methodology, research results, reports) – hours,</li> <li>- Preparation for scientific practical classes – 5 hours,</li> <li>- Preparation for completion of the subject in the field of scientific aspects- 5 hours</li> </ul> <p>Total amount of work spent on scientific research is <b>40 hours</b>, which corresponds to <b>1.60 ECTS points</b></p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- Preparation for classes – 10 hours,</li> <li>- Preparation for colloquium – 8 hours</li> <li>- Preparation for completion of the subject- 8 hours</li> </ul> <p>The total amount of work required for the preparation and participation in evaluating process is <b>26 hours</b>, which corresponds to <b>1.04 ECTS points</b></p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the target points and mechanisms of drug action including the achievement of structural biology in this field - K_D.W12</p> <p>W2: Knows the division and pharmacological properties of known drug groups -K_D.W13</p> <p>W3: Knows the determinants of drug action in the pharmacodynamic phase, taking into account the hereditary factors of molecularly targeted therapy and drug resistance mechanisms - K_D.W14, K_D.W15</p> <p>W4: Characterizes the route of administration, indicating the differences between them affecting pharmacotherapy, skillfully distinguishes drug dosing methods and is able to explain the assumptions of personalized therapy - K_D.W14- K_D.W16</p> <p>W5: Knows the concepts of indications, contraindications and drug-specific and dose-related adverse reactions Understands the classification of adverse reactions - K_D.W18- K_D.W17</p>

	<p>W6: Knows and understands the concepts of polypragmasia as well as the principles of proper drug pairing and the possibility of drug interactions occurring and avoiding, - K_D.W19</p> <p>W7: Knows the basic concepts of pharmacogenetics and pharmacogenomics and is aware and familiar with new developments in the field of pharmacology - K_D.W20</p>
Learning outcomes - abilities	<p>U1: Is able to specify the causes and effects of drug interactions and interprets the impact of factors on drug action - K_D.U9</p> <p>U2: Can explain the pharmacological properties of the drug based on the target point and mechanism of action - K_D.U11</p> <p>U3: Is able to propose the necessity to change the drug dosage resulting from physiological and pathological conditions as well as genetic factors - K_D.U12</p> <p>U4: Can capture the possibility of adverse effects of individual groups of drugs depending on the dose and mechanism of action - K_D.U13</p> <p>U5: Is able to notice the possibility of side effects, determine their causes and effects in the pharmacodynamic phase and determine ways to prevent these interactions - K_D.U14</p> <p>U6: Independently constructs information necessary to provide the patient with indications and contraindications for the use of drugs and in the scope of their proper dosage and intake - K_D.U15</p> <p>U7: Is able to present information on pharmacology in a way understandable to the patient - K_D.U16</p> <p>U8: Is able to establish interpersonal contacts necessary in contacts with representatives of other medical professions in the scope of ensuring safety and effectiveness of pharmacotherapy - K_D.U17</p>
Learning outcomes – social skills	<p>K1: Is ready to use the experience gained in the implementation of the principles of professional camaraderie and cooperation in a team of specialists, including representatives of other medical professions, also in a multicultural and multinational environment -K3</p> <p>K2: Skilfully uses objective sources of information including Evidence Based Medicine in his daily duties - K7</p> <p>K3: Formulates the conclusions from own research and available in literature as well as from observation of the environment and at work - K8</p> <p>K4: Is ready to make responsible decisions at work, guaranteeing the safety of himself and others - K10</p>
Didactic methods	<p><u>Lecture:</u></p> <ul style="list-style-type: none"> <li>▪ Informative lecture with multimedia presentation</li> <li>▪ Problem-based lecture</li> </ul> <p><u>Tutorials:</u></p> <ul style="list-style-type: none"> <li>▪ Assisted learning with the elements of multimedia presentation</li> <li>▪ Discussion method teaching</li> <li>▪ Case study</li> <li>▪ Discussion of scientific literature</li> <li>▪ Problem-based learning</li> </ul>

Preliminary requirements	Student should be familiar with the basic knowledge in the field of anatomy, physiology, biology, biochemistry, analytical chemistry.
Brief course description	During the course, students learn about the fate of the drug in the body, from its administration through absorption, distribution, metabolism, and excretion. Students will gain knowledge about the basic mechanisms of therapeutic action and drug side effects, various types of interactions, and will learn what methods are used in drug research. Most of the classes will be devoted to antibacterial drugs such as antibiotics, sulfonamides, quinolones.
Entire course description	In this course, students will master the theoretical underpinnings of the mechanisms responsible for the metabolism of drugs in the body. Topics of classes will include physiological factors affecting the fate of the drug in the body, mechanisms of drug action, issues regarding receptors and receptor theories, drug-specific and dose-related adverse reactions, drug-related diseases, secondary adverse effects; allergic and pseudoallergic reactions, drug interactions, adverse drug reactions during various periods of pregnancy, the postpartum period and breastfeeding; drug bioavailability and bioequivalence.. Students will also learn about experimental methods used in pharmacology and the principles of pre-clinical and clinical research. Students will familiar with medications used in infections and invasive diseases, including $\beta$ -lactam antibiotics, aminoglycosides, tetracyclines, chloramphenicol, macrolides, ketolides, and lincosamides.
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Bertram Katzung, Susan Masters, Anthony Trevor Basic and Clinical Pharmacology.</li> <li>2. James Ritter, Rod Flower, Graeme Henderson, Yoon Kong Loke, David MacEwan, Humphrey Rang - Rang &amp; Dale's Pharmacology.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Ernst Mutschler and Hartmut Derendorf, Drug Actions; Basic Principles and Therapeutic Aspects.</li> </ol>
Methods and criteria of evaluation	<p>The basis for passing the subject Pharmacology with Pharmacodynamics is compliance with the principles set out in the didactic regulations of the Department of Pharmacodynamics and Molecular Pharmacology.</p> <p>Lectures: Admission to the lecture colloquium is based on the obligatory presence at lectures. The colloquium consists of test questions (one-choice answer) in the field of knowledge acquired during lectures. The student scores one point for every correct answer. To pass the lectures 60% of points are necessary. The obtained grade is a component of the final grade in the semester.</p> <p>Tutorials: The short written tests take place at the end of the classes that cover the topics of the current classes. Those tests are scored on a scale of 0 to 5 points, which gives 25 points in total for 5 classes. These points are taken into account when calculating the grade for the tutorials in the semester. Completing tutorials &gt; 60% of the points one can get in classes.</p>



	<p>Tutorial colloquium consists of 25 questions (written tests: open and / or closed single choice questions). The student scores one point for every correct answer. 60% of points are required to pass the colloquium. Tutorials grade is calculated on the basis of points obtained from short tests at the end of each class and tutorial test.</p> <p>Marks are given in accordance with following assessment scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>85-89%</td> <td>Very good (4.5)</td> </tr> <tr> <td>80-84%</td> <td>Good (4)</td> </tr> <tr> <td>75-79%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-74%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table> <p>Graded credit: the grade is calculated from the average grade obtained from lectures and tutorials.</p>	Percentage of points	Grade	90-100%	Excellent (5)	85-89%	Very good (4.5)	80-84%	Good (4)	75-79%	Satisfactory (3.5)	60-74%	Acceptable (3)	0-59%	Fail (2)
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0-59%	Fail (2)														
Practical training as part of course	Not applicable according to the educational program														

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	3 <sup>rd</sup> year, 6 <sup>th</sup> semester (spring)
Form of crediting a subject in the cycle	Graded credit: the grade is calculated from the average grade obtained from lectures and tutorials.
Form(s) and number of course hours as well as the form of crediting	Lecture – 30 hours- credit Tutorials – 15 hours- credit
Course coordinator(s)	Barbara Bojko, Ph.D., D.Sc.
Subject Teachers	Lecture: Krzysztof Goryński, Ph.D. Tutorials: Barbara Bojko, Ph.D., D.Sc., Karol Jaroch, Ph.D,
Course form (character)	Obligatory
Limit of places available in each group	Lectures: all students of 3rd year of Pharmacy Tutorials: groups up to 30 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Lectures: W1-W6, U1-U3, U6-U8 Tutorials: W2, W4-W7, U1, U3-U8, K1-K4

<p>Methods and criteria of the evaluation for the given course form</p>	<p>The basis for passing the subject Pharmacology with Pharmacodynamics is compliance with the principles set out in the didactic regulations of the Department of Pharmacodynamics and Molecular Pharmacology.</p> <p>Lectures: Admission to the lecture colloquium is based on the obligatory presence at lectures. The colloquium consists of test questions (one-choice answer) in the field of knowledge acquired during lectures. The student scores one point for every correct answer. To pass the lectures 60% of points are necessary. The obtained grade is a component of the final grade in the semester.</p> <p>Tutorials: The short written tests take place at the end of the classes that cover the topics of the current classes. Those tests are scored on a scale of 0 to 5 points, which gives 25 points in total for 5 classes. These points are taken into account when calculating the grade for the tutorials in the semester. Completing tutorials &gt; 60% of the points one can get in classes.</p> <p>Tutorial colloquium consists of 25 questions (written tests: open and / or closed single choice questions). The student scores one point for every correct answer. 60% of points are required to pass the colloquium. Tutorials grade is calculated on the basis of points obtained from short tests at the end of each class and tutorial test.</p> <p>Marks are given in accordance with following assessment scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>85-89%</td> <td>Very good (4.5)</td> </tr> <tr> <td>80-84%</td> <td>Good (4)</td> </tr> <tr> <td>75-79%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-74%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table> <p>Graded credit: the grade is calculated from the average grade obtained from lectures and tutorials.</p>	Percentage of points	Grade	90-100%	Excellent (5)	85-89%	Very good (4.5)	80-84%	Good (4)	75-79%	Satisfactory (3.5)	60-74%	Acceptable (3)	0-59%	Fail (2)
Percentage of points	Grade														
90-100%	Excellent (5)														
85-89%	Very good (4.5)														
80-84%	Good (4)														
75-79%	Satisfactory (3.5)														
60-74%	Acceptable (3)														
0-59%	Fail (2)														
<p>List of topics</p>	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Definition of the drug and pharmacological effect. The fate of the drug in the LADME system. Physiological factors affecting the fate of the drug in the body;</li> <li>2. Mechanisms of drug action. Receptors and receptor theories;</li> <li>3. Drug side effects (drug-specific and dose-dependent side effects, drug-induced diseases, secondary side effects; allergic and pseudoallergic reactions);</li> <li>4. Drug interactions: pharmacokinetic, pharmacodynamic, chronopharmacological;</li> </ol>														

	<p>5. Adverse drug effects during embryonic and fetal development, as well as in the postpartum and breastfeeding periods;</p> <p>6. Bioavailability and bioequivalence of drugs;</p> <p>7. Experimental methods in pharmacology (pharmacometry). Preclinical and clinical drug testing;</p> <p>8. Introduction to chemotherapy for infections and invasive diseases. General principles of chemotherapy. B-lactam antibiotics;</p> <p>9. Aminoglycoside antibiotics. Tetracycline. Chloramphenicol. Macrolide antibiotics. Ketolides. Lincosamides. streptogramins;</p> <p>10. Peptide antibiotics. Rifamycin. Glycopeptide antibiotics. Fusidic acid. Oxazolidinone derivatives. Mupirocin.</p> <p>Tutorials:</p> <p>1. Antibiotics - mechanism of action, range of action, side effects - beta-lactam antibiotics;</p> <p>2. Antibiotics - mechanism of action, range of action, side effects - aminoglycosides, tetracyclines, chloramphenicol, macrolides, ketolides, lincosamides, straptogramins, linezolid;</p> <p>3. Antibiotics - mechanism of action, range of action, side effects - peptide and glycopeptide antibiotics, rifampicins, fusidic acid, oxazolidinone derivatives, mupirocin, tuberculosis treatment;</p> <p>4. Antibiotics - mechanism of action, range of action, side effects - quinolones and fluoroquinolones, sulfonamides, trimethoprim, metronidazole, drugs for peptic ulcer disease (eradication of h. Pylori);</p> <p>5. Antiviral drugs, antiprotozoal drugs, anthelmintics, antifungals.</p>
Didactic methods	The same as in part A
References	The same as in part A

## Pharmacology with farmacodynamics II

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmacology with farmacodynamics II</b> (Farmakologia z farmakodynamiką II)
Unit offering the subject	Faculty of Pharmacy Department of Pharmacodynamics and Molecular Pharmacology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle

Subject code	1724-F4-FARMF-J, 1724-F4-FARMFL-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	11
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module D</b> Biopharmacy and the effects of drug activities
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– lectures participation – 95 hours</li> <li>– laboratory classes participation – 75 hours</li> <li>– tutorials participation – 15 hours,</li> <li>– scientific - research consultations participation</li> <li>– (discussion of scientific literature on the given topic, analyzing and <i>interpreting</i> of the obtained research results, supplementation the knowledge on the assessment of the therapeutic effect of drugs - personalized therapy, monitoring of treatment, drug interactions and side effects „case study”) – 10 hours</li> </ul> <p>The workload related to activities requiring the direct participation of academic teachers is <b>195 hours</b>, which corresponds to <b>6,5 ECTS points</b></p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– lecture participation – 95 hours,</li> <li>– laboratory classes participation – 75 hours,</li> <li>– tutorials participation – 15 hours,</li> <li>– scientific - research consultations participation – 10 hours,</li> <li>– preparation for classes – 35 hours,</li> <li>– preparation for tests - 35 hours,</li> <li>– preparation for the exam - 40 hours,</li> <li>– reading selected literature: 25 hours</li> </ul> <p>Total student workload is <b>330 hours</b>, which corresponds to <b>11 ECTS points</b>.</p> <p>3. Workload related to the conducted scientific research:</p> <ul style="list-style-type: none"> <li>– reading the indicated scientific literature – 15 hours,</li> <li>– lecture participation (including research methodology, research results, reports) – 55 hours,</li> <li>– scientific-research consultations – 20 hours,</li> <li>– classes involving scientific-research activity participation (including research methodology, research results, reports) – 65 hours,</li> </ul>

	<ul style="list-style-type: none"> <li>– preparation for classes involving scientific-research activity: 20 hours,</li> <li>– preparation for completion of the implemented subject in the field of research and scientific aspects – 20 hours,</li> </ul> <p>Total student workload related to the conducted scientific research is <b>225 hours</b>, which corresponds to <b>7.50 ECTS points</b></p> <p>4. Time required for preparation and participation in the evaluating process:</p> <ul style="list-style-type: none"> <li>– classes preparation – 35 hours</li> <li>– tests preparation – 35 hours</li> <li>– exam preparation – 40 hours</li> </ul> <p>Total student workload related to the preparation and participation in the evaluating process is <b>110 hours</b>, which corresponds to <b>3.67 ECTS points</b></p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the target points and mechanisms of drug action including the achievement of structural biology in this field - K_D.W12</p> <p>W2: Knows the division and pharmacological properties of known drug groups -K_D.W13</p> <p>W3: Knows the determinants of drug action in the pharmacodynamic phase, taking into account the hereditary factors of molecularly targeted therapy and drug resistance mechanisms - K_D.W14, K_D.W15</p> <p>W4: Knows the route of administration, indicating differences between them affecting pharmacotherapy, skillfully distinguishes drug dosing methods and is able to explain the assumptions of personalized therapy - K_D.W14- K_D.W16</p> <p>W5: Knows the terms of indications, contraindications and drug-specific and dose-related adverse reactions Understands the classification of adverse reactions - K_D.W18- K_D.W17</p> <p>W6: Knows the term of polypragmasia, as well as the rules for the correct association of drugs and the possibility of drug interactions and avoidance - K_D.W19</p> <p>W7: Knows and understands the basic concepts of pharmacogenetics and pharmacogenomics and is aware and familiar with new developments in the field of pharmacology - K D.W20</p>
Learning outcomes - abilities	<p>U1: Is able to specify the causes and effects of drug interactions and interprets the impact of factors on drug action - K_D.U9</p> <p>U2: Explains the pharmacological properties of the drug based on the target point and mechanism of action - K_D.U11</p> <p>U3: Is able to propose the necessity to change the drug dosage resulting from physiological and pathological conditions as well as genetic factors - K D.U12</p>

	<p>U4: Can capture the possibility of adverse effects of individual groups of drugs depending on the dose and mechanism of action - K_D.U13</p> <p>U5: Notes the possibility of adverse effects, determine their causes and effects in the pharmacodynamic phase, and identify ways to prevent these interactions - K_D.U14</p> <p>U6: Independently constructs information necessary to provide the patient with indications and contraindications for the use of drugs and in the scope of their proper dosage and intake - K_D.U15</p> <p>U7: Is able to present information on pharmacology in a way understandable to the patient - K_D.U16</p> <p>U8: Is able to establish interpersonal contacts necessary in contacts with representatives of other medical professions in the scope of ensuring safety and effectiveness of pharmacotherapy - K_D.U17</p>
Learning outcomes – social skills	<p>K1: Is ready to use the experience gained in the implementation of the principles of professional camaraderie and cooperation in a team of specialists, including representatives of other medical professions, also in a multicultural and multinational environment - K3</p> <p>K2: Skilfully uses objective sources of information including Evidence Based Medicine in their daily duties - K7</p> <p>K3: Formulates the conclusions from own research and available in literature as well as from observation of the environment and at work - K8</p> <p>K4: Is ready to make responsible decisions at work, guaranteeing the safety of himself and others - K10</p>
Didactic methods	<p><u>Lecture:</u></p> <ul style="list-style-type: none"> <li>– Informative lecture (conventional) with the elements of multimedia presentation</li> <li>– Problem lecture</li> </ul> <p><u>Lab:</u></p> <ul style="list-style-type: none"> <li>– observation method</li> <li>– practical exercises</li> <li>– exposing methods: film, screening</li> <li>– observation method</li> <li>– case study</li> </ul> <p><u>Tutorials:</u></p> <ul style="list-style-type: none"> <li>– assisted learning with a multimedia presentation</li> <li>– teaching discussion method</li> <li>– case study</li> <li>– discussion of scientific publications</li> <li>– classical problem method</li> </ul>
Preliminary requirements	<p>It is necessary to have basic knowledge in the field of anatomy, physiology, biology, biochemistry, analytical chemistry.</p>

Brief course description	<p>As part of the course, students learn about the basic groups of drugs, their mechanisms of action, dosage, interactions and side effects. Lectures will focus mainly on the pharmacological treatment of diseases related to the functioning of the nervous system, because this issue requires in-depth explanation of the mechanisms by the teacher. Tutorials will also include groups of drugs used in infectious diseases, drugs affecting smooth and skeletal muscles, and drugs widely available for sale without a prescription, with particular emphasis on nonsteroidal anti-inflammatory drugs. Laboratory classes will enable understanding the mechanism of drug-protein and drug-drug interactions, drugs and prodrugs metabolism, first pass, the effect of the drug on general changes in the body (metabolomics) and gaining knowledge on new directions of pharmacology, i.e. reducing the side effects of chemotherapy and the use of drugs routinely used in therapy of a given disease entity as indicators of organ function.</p>
Entire course description	<p>During the course, students will acquire knowledge in the field of drugs affecting the activity of the central and peripheral nervous system, including psychotropic, neuroleptic, anxiolytic, sedative, hypnotic, antiepileptic, psychostimulant and psychodysleptic drugs, drugs used in the pharmacotherapy of Parkinson's disease, Alzheimer's disease and other neurodegenerative diseases, muscle relaxants, general and local anesthetic. Discussed issues will also include opioid drugs, painkillers with particular emphasis on their addictive mechanism, as well as nonsteroidal anti-inflammatory drugs with emphasis on the risks associated with their common access and use. Topics will also include anti-tuberculosis, anti-fungal, anti-viral, anti-parasitic, antiprotozoal, anti-epithelial, anthelmintic, antimycotic and anthelmintic drugs. Classes on each topic assume a part devoted to discussing the mechanisms of action of a given group of drugs against the background of the physiology of a given system, the principles of dosage of therapeutic agents, therapeutic effects and side effects along with the principles of their prevention, as well as the possibility of drug interactions.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>3. Bertram Katzung, Susan Masters, Anthony Trevor Basic and Clinical Pharmacology.</li> <li>4. James Ritter, Rod Flower, Graeme Henderson, Yoon Kong Loke, David MacEwan, Humphrey Rang - Rang &amp; Dale's Pharmacology.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Ernst Mutschler and Hartmut Derendorf, Drug Actions; Basic Principles and Therapeutic Aspects.</li> </ol>
Methods and criteria of evaluation	<p>The basis for passing the subject Pharmacology with pharmacodynamics II is compliance with the rules set out in the didactic regulations of the Department of Pharmacodynamics and Molecular Pharmacology.</p> <p>The condition of completion the subject is passing the exam covering the material in semesters VII and VIII.</p>

	<p>The exam in semester VIII: The student is allowed to take the exam if:</p> <ul style="list-style-type: none"> <li>– actively participates in laboratories, tutorials and lectures,</li> <li>– passes all the Colloquia in semesters VII and VIII.</li> </ul> <p>The exam consists of test questions (one-choice answer) and a short answer regarding knowledge gained during lectures and practical classes. The student scores one point for every correct answer. 60% of the points are necessary to obtain a positive grade. Marks are given in accordance with the following assessment scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>85-89%</td> <td>Very good (4.5)</td> </tr> <tr> <td>80-84%</td> <td>Good (4)</td> </tr> <tr> <td>75-79%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-74%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table> <p>The final grade for the subject Pharmacology is calculated on the basis of the following formula:</p> $grade = exam\ grade \times 0.7 + average\ of\ grades\ from\ tests\ VII\ and\ VIII \times 0.2 + grade\ from\ the\ sixth\ semester \times 0.1$ <p>Not passing the final exam is tantamount to obtaining an unsatisfactory grade and the need to retake an exam.</p> <p>Colloquia: &gt;60% Final exam: &gt;60%</p>	Percentage of points	Grade	90-100%	Excellent (5)	85-89%	Very good (4.5)	80-84%	Good (4)	75-79%	Satisfactory (3.5)	60-74%	Acceptable (3)	0-59%	Fail (2)
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0-59%	Fail (2)														
Practical training as part of course	Not applicable according to the educational program														

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	4 <sup>th</sup> year, 7 <sup>th</sup> semester (fall)
Form of crediting a subject in the cycle	Lectures: passing Labs: passing Tutorials: passing
Form(s) and number of course hours as well as the form of crediting	Lectures: 45 hours - passing Labs: 30 hours- passing Tutorials: 15 hours- passing
Course coordinator(s)	Dr hab. Barbara Bojko, prof. UMK
Subject Teachers	Lectures: Dr Anna Sloderbach  Laboratories: Dr hab. Barbara Bojko, prof. UMK



	<p>Dr Anna Sloderbach Dr Krzysztof Goryński</p> <p>Tutorials: Dr hab. Barbara Bojko, prof. UMK Dr Krzysztof Goryński Dr Karol Jaroch</p>														
Course form (character)	Obligatory														
Limit of places available in each group	<p>Lectures: students of the 4<sup>th</sup> year, 7<sup>th</sup> semester Labs: groups of up to 15 students Tutorials: groups of up to 30 students</p>														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods	Not applicable														
Subject website	Not applicable														
Learning outcomes determined for the given course form	<p>Lectures: W1-W7, U1-U5, K2-K4 Laboratories: W1-W5, U1-U8, K1-K3 Tutorials: W1-W5, U1-U8, K1-K3</p>														
Methods and criteria of the evaluation for the given course form	<p>Lectures: credited on the basis of obligatory attendance.</p> <p>Labs and Tutorials: The short written tests take place at the end of the classes and cover the topics of the current classes. Those tests are scored on a scale from 0 to 3 points, the pass is given on receiving a minimum of 2 points.</p> <p>The student is required to pass a minimum of 3 test from 5 for Laboratory classes and 7 out of 10 for Laboratory classes.</p> <p>There are 2 laboratory classes colloquia and 1 auditorium classes one during the semester. Colloquia are graded on the basis of tests (written tests: open and closed single-choice questions); passing &gt; 60%</p> <p>In the case of colloquia, the points obtained are converted into grades according to the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>85-89%</td> <td>Very good (4.5)</td> </tr> <tr> <td>80-84%</td> <td>Good (4)</td> </tr> <tr> <td>75-79%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-74%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table> <p>Learning outcomes implemented in the 7th semester will be verified during the exam completing the course of learning the subject as described in part A.</p>	Percentage of points	Grade	90-100%	Excellent (5)	85-89%	Very good (4.5)	80-84%	Good (4)	75-79%	Satisfactory (3.5)	60-74%	Acceptable (3)	0-59%	Fail (2)
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60-74%	Acceptable (3)														
0-59%	Fail (2)														

List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. The basics of neuropsychopharmacology. Neurotransmitters in CNS and their role in action of psychotropic drugs. Neuroleptics;</li> <li>2. Antidepressants;</li> <li>3. Anxiolytic, sedatives, hypnotics;</li> <li>4. Anticonvulsants.</li> <li>5. Pharmacology of the extrapyramidal system. Drugs used in Parkinson's disease.</li> <li>6. Nootropic and precognitive drugs. Pharmacotherapy of Alzheimer's disease.</li> <li>7. Psychostimulants and psychodysleptic. Cannabinoides.</li> <li>8. Opioid analgesics.</li> <li>9. Nonsteroidal anti-inflammatory drugs.</li> <li>10. General and local anaesthetics.</li> <li>11. Muscle relaxants of spinal and supraspinal mechanism of action.</li> <li>12. Introduction into the autonomic nervous system. Neurotransmitters and their receptors in ANS.</li> <li>13. Parasympathomimetic drugs.</li> <li>14. Sympathomimetic drugs.</li> </ol> <p>Labs:</p> <ol style="list-style-type: none"> <li>1. Vascular, cardiac, anti-arrhythmic drugs;</li> <li>2. Therapeutic drug monitoring - determination of the selected drug concentration over time in cardiological patients;</li> <li>3. Determination of drug-protein binding parameters on the example of selected drug groups;</li> <li>4. Physiology of the autonomic system and drugs of the parasympathetic system;</li> <li>5. Sympathetic nervous system drugs;</li> <li>6. Antidepressants;</li> <li>7. Autacoids, kinins, prostanoids. Antihistamines. Antiserotonin drugs;</li> <li>8. Assessment of the effect of the selected drug on the patient's clinical condition - the use of metabolomics to indicate changes in the patient's biochemical pathways after pharmacotherapy with the selected drug;</li> <li>9. Psychotropic drugs, neuroleptics;</li> <li>10. Opioid analgesics;</li> </ol> <p>Tutorials:</p> <ol style="list-style-type: none"> <li>1. Introduction to psychoneuropharmacology;</li> <li>2. Anaxolytic, sedatives, hypnotics, analeptics and nootropics;</li> <li>3. Antiepileptic drugs, antiparkinsonian, drugs for Alzheimer's disease and other neurodegenerative diseases;</li> <li>4. Anti-tuberculosis, anti-fungal, anti-viral, anti-parasitic, antiprotozoal, anti-amoebic, anthelmintic, anti-dab, anthelmintic drugs;</li> <li>5. Antibiotics;</li> </ol>
Didactic methods	Lecture:

	<ul style="list-style-type: none"> <li>- Informative lecture (conventional) with the elements of multimedia presentation</li> <li>- Problem lecture</li> </ul> <p><u>Lab:</u></p> <ul style="list-style-type: none"> <li>- observation method</li> <li>- practical exercises</li> <li>- exposing methods: film, screening</li> <li>- observation method</li> <li>- case study</li> </ul> <p><u>Tutorials:</u></p> <ul style="list-style-type: none"> <li>- assisted learning with a multimedia presentation</li> <li>- teaching discussion method</li> <li>- case study</li> <li>- discussion of scientific publications</li> <li>- classical problem method</li> </ul>
References	The same as in part A

#### Course description in the didactic cycle

Space name	Comment
Didactic cycle	4 <sup>th</sup> year, 8 <sup>th</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures: passing Labs: passing
Form(s) and number of course hours as well as the form of crediting	Lectures: 50 hours - passing Labs: 45 hours- passing
Course coordinator(s)	Dr hab. Barbara Bojko, prof. UMK
Subject Teachers	Lectures: Dr hab. Barbara Bojko, prof. UMK Dr Anna Sloderbach  Laboratories: Dr Anna Sloderbach Dr Karol Jaroch
Course form (character)	Obligatory
Limit of places available in each group	Lectures: students of the 4 <sup>th</sup> year, 8 <sup>th</sup> semester Labs: groups of up to 15 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Lectures: W1: Knows the target points and mechanisms of drug action including the achievement of structural biology in this field - K_D.W12 W2: Knows the division and pharmacological properties of known drug groups -K_D.W13 W3: Knows the determinants of drug action in the pharmacodynamic phase, taking into account the hereditary

factors of molecularly targeted therapy and drug resistance mechanisms - K\_D.W14, K\_D.W15

W4: Knows the route of administration, indicating differences between them affecting pharmacotherapy, skillfully distinguishes drug dosing methods and is able to explain the assumptions of personalized therapy - K\_D.W14- K\_D.W16

W5: Knows the terms of indications, contraindications and drug-specific and dose-related adverse reactions Understands the classification of adverse reactions - K\_D.W18- K\_D.W17

W6: Knows the term of polypragmasia, as well as the rules for the correct association of drugs and the possibility of drug interactions and avoidance - K\_D.W19

W7: Knows and understands the basic concepts of pharmacogenetics and pharmacogenomics and is aware and familiar with new developments in the field of pharmacology - K\_D.W20

U1: Is able to specify the causes and effects of drug interactions and interprets the impact of factors on drug action - K\_D.U9

U2: Explains the pharmacological properties of the drug based on the target point and mechanism of action - K\_D.U11

U3: Is able to propose the necessity to change the drug dosage resulting from physiological and pathological conditions as well as genetic factors - K\_D.U12

U4: Can capture the possibility of adverse effects of individual groups of drugs depending on the dose and mechanism of action - K\_D.U13

U5: Notes the possibility of adverse effects, determine their causes and effects in the pharmacodynamic phase, and identify ways to prevent these interactions - K\_D.U14

K2: Skillfully uses objective sources of information including Evidence Based Medicine in their daily duties - K7

K3: Formulates the conclusions from own research and available in literature as well as from observation of the environment and at work - K8

K4: Is ready to make responsible decisions at work, guaranteeing the safety of himself and others - K10

Labs:

W1: Knows the target points and mechanisms of drug action including the achievement of structural biology in this field - K\_D.W12

W2: Knows the division and pharmacological properties of known drug groups -K\_D.W13

W3: Knows the determinants of drug action in the pharmacodynamic phase, taking into account the hereditary factors of molecularly targeted therapy and drug resistance mechanisms - K\_D.W14, K\_D.W15

W4: Knows the route of administration, indicating differences between them affecting pharmacotherapy, skillfully distinguishes drug dosing methods and is able to explain the assumptions of personalized therapy - K\_D.W14- K\_D.W16

W5: Knows the terms of indications, contraindications and drug-specific and dose-related adverse reactions Understands the classification of adverse reactions - K D.W18- K D.W17

	<p>U1: Is able to specify the causes and effects of drug interactions and interprets the impact of factors on drug action - K_D.U9</p> <p>U2: Explains the pharmacological properties of the drug based on the target point and mechanism of action - K_D.U11</p> <p>U3: Is able to propose the necessity to change the drug dosage resulting from physiological and pathological conditions as well as genetic factors - K_D.U12</p> <p>U4: Can capture the possibility of adverse effects of individual groups of drugs depending on the dose and mechanism of action - K_D.U13</p> <p>U5: Notes the possibility of adverse effects, determine their causes and effects in the pharmacodynamic phase, and identify ways to prevent these interactions - K_D.U14</p> <p>U6: Independently constructs information necessary to provide the patient with indications and contraindications for the use of drugs and in the scope of their proper dosage and intake - K_D.U15</p> <p>U7: Is able to present information on pharmacology in a way understandable to the patient - K_D.U16</p> <p>U8: Is able to establish interpersonal contacts necessary in contacts with representatives of other medical professions in the scope of ensuring safety and effectiveness of pharmacotherapy - K_D.U17</p> <p>K1: Is ready to use the experience gained in the implementation of the principles of professional camaraderie and cooperation in a team of specialists, including representatives of other medical professions, also in a multicultural and multinational environment - K3</p> <p>K2: Skilfully uses objective sources of information including Evidence Based Medicine in their daily duties - K7</p> <p>K3: Formulates the conclusions from own research and available in literature as well as from observation of the environment and at work - K8</p>				
<p>Methods and criteria of the evaluation for the given course form</p>	<p>Lectures: credited on the basis of obligatory attendance.</p> <p>Labs: The short written tests take place at the end of the classes and cover the topics of the current classes. Those tests are scored on a scale from 0 to 3 points, the pass is given on receiving a minimum of 2 points.</p> <p>The student is required to pass a minimum of 3 test from 5 for Laboratory classes and 7 out of 10 for Laboratory classes.</p> <p>There are 2 laboratory classes colloquia and 1 auditorium classes one during the semester. Colloquia are graded on the basis of tests (written tests: open and closed single-choice questions); passing &gt; 60%</p> <p>In the case of colloquia, the points obtained are converted into grades according to the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Excellent (5)</td> </tr> </tbody> </table>	Percentage of points	Grade	90-100%	Excellent (5)
Percentage of points	Grade				
90-100%	Excellent (5)				

85-89%	Very good (4.5)
80-84%	Good (4)
75-79%	Satisfactory (3.5)
60-74%	Acceptable (3)
0-59%	Fail (2)

Learning outcomes implemented in the eighth semester will be verified during the exam completing the course of learning the subject as described in part A.

The exam consists of test questions (one-choice answer) and a short answer regarding knowledge gained during lectures and practical classes. The student scores one point for every correct answer. 60% of the points are necessary to obtain a positive grade.

Marks are given in accordance with the following assessment scale:

Percentage of points	Grade
90-100%	Excellent (5)
85-89%	Very good (4.5)
80-84%	Good (4)
75-79%	Satisfactory (3.5)
60-74%	Acceptable (3)
0-59%	Fail (2)

The final grade for the subject Pharmacology is calculated on the basis of the following formula:

$$\text{grade} = \text{exam grade} \times 0.7 + \text{average of grades from tests VII and VIII} \times 0.2 + \text{grade from the sixth semester} \times 0.1$$

Not passing the final exam is tantamount to obtaining an unsatisfactory grade and the need to retake an exam.

List of topics

Lectures:

1. Antihistamines. Antiserotonin drugs.
2. Antihypertensive drugs.
3. Cardiac and heart failure drugs.
4. Antiarrhythmics. Coronary artery disease treatment.
5. Antiatherosclerotic drugs. Peripheral circulation regulators.
6. Diuretics.
7. Expectorants and antitussives.
8. Drugs used in asthma and COPD.
9. Drugs used in gastrointestinal diseases.
10. Insulin and oral antidiabetic drugs.
11. Steroid hormones.
12. Pharmacodynamics of blood coagulation system drugs.
13. Anticancer drugs.
14. Immunotropic drugs.

Labs:

	<ol style="list-style-type: none"> <li>1. Drugs affecting the parasympathetic and sympathetic nervous system - reminder sem. I. Ganglioplegic drugs.</li> <li>2. Respiratory system drugs.</li> <li>3. Drugs used in gastrointestinal diseases.</li> <li>4. Diuretics. Infusions. Therapy for disturbances of water, electrolyte and acid/base regulation. Drugs used for urinating due to prostatic hyperplasia. Urinary incontinence drugs.</li> <li>5. Insulin and oral antidiabetic drugs.</li> <li>6. Coagulation and hematopoietic agents.</li> <li>7. Drugs used for dyslipidemia treatment.</li> <li>8. Drugs affecting smooth and skeletal muscles. Local and general anesthetics. Sensory ends irritants.</li> <li>9. Protein and steroid hormones (high molecular weight analogues of gonadoliberin, thyrotropin, thyroid hormones and drugs used to treat hyperthyroidism and hypothyroidism; antidiuretic hormone; mineralocorticosteroids and glucocorticosteroids).</li> <li>10. Nonsteroidal anti-inflammatory drugs.</li> <li>11. Drugs for RA and gout.</li> <li>12. Vitamins and minerals.</li> <li>13. Dermatologicals, including biopharmaceuticals in dermatology (acne, psoriasis); ophthalmic drugs; ear medicines.</li> <li>14. Drug metabolism - in vitro metabolism generating systems - differences in drug and prodrug metabolism, first-pass effect - part 1.</li> <li>15. Drug metabolism - in vitro metabolism generating systems - differences in drug and prodrug metabolism, first-pass effect - part 2.</li> </ol>
Didactic methods	<p>Lecture:</p> <ul style="list-style-type: none"> <li>- informative lecture (conventional) with the elements of multimedia presentation</li> <li>- problem lecture</li> </ul> <p>Lab:</p> <ul style="list-style-type: none"> <li>- observation method</li> <li>- practical exercises</li> <li>- exposing methods: film, screening</li> <li>- observation method</li> <li>- case study</li> </ul>
References	The same as in part A

## Medicines of Natural Origin

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Medicines of Natural Origin</b> (Leki pochodzenia naturalnego)

Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1713-F4-LPN-J
ERASMUS code	
ISCED code	
Number of ECTS points	2
Form of crediting	Credit for a grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module D</b> Biopharmacy and the effects of drug activities
Total student workload	<p>1. The workload related to activities requiring the direct participation of academic teachers is:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 10 hours,</li> <li>– participation in seminars: 20 hours,</li> <li>– additional opportunity to consult with tutors: 2 hours.</li> </ul> <p>The workload related to the activities requiring the direct participation of academic teachers is 32 hours, which corresponds to 1.28 ECTS points.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 10 hours,</li> <li>– participation in seminars: 20 hours,</li> <li>– additional opportunity to consult with tutors: 2 hours</li> <li>– preparation of materials for classes: 3 hours,</li> <li>– repetition of material required: 5 hours,</li> <li>– reading the indicated literature: 10 hours,</li> </ul> <p>The total student workload is 50 hours, which corresponds to 2 ECTS credits.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– reading of the indicated scientific literature: 5 hours,</li> <li>– research and scientific consultations: 2 hours,</li> <li>– participation in lectures (including research methodology, research results, studies): 10 hours,</li> <li>– participation in seminars covered by scientific activity (including research methodology, research results, studies): 10 hours,</li> <li>– preparation of seminars covered by scientific activity: 10 hours,</li> <li>– preparation to pass in the field of research and development for the subject: 3 hours.</li> </ul> <p>The total student workload related to the conducted research is 40 hours, which corresponds to 1.6 ECTS points</p>



	<p>4. Time required to prepare and participate in the assessment process:  – prepare for seminars and pass: 15 hours,</p> <p>The time required to prepare and participate in the assessment process is 15 hours, which corresponds to 0.6 ECTS points.</p> <p>5. Time required for the practical training completion – not applicable.  Total work amount: 65 hours (2 ECTS point)</p>
<p>Learning outcomes – knowledge</p>	<p>W1: Knows raw materials of natural origin used in medicine and used in the pharmaceutical, cosmetics and food industries - K_D.W38</p> <p>W2: Knows the rules for composing complex plant preparations, including the chemical composition of plant raw materials, their dosage, side effects and interactions with other drugs - K_D.W38</p> <p>W3: Knows the criteria for assessing the quality of medicinal plant products and dietary supplements - K_D.W39</p> <p>W4: Knows the chemical structures of compounds found in medicinal plants, their action and application - K_D.W39</p> <p>W5: Knows pharmacopoeial and non-pharmacopoeial medicinal plant materials and methods of assessing their quality and medicinal value - K_D.W39</p> <p>W6: Knows groups of chemical compounds - primary and secondary metabolites that determine the biological and pharmacological activity of plant raw materials - K_D.W40</p> <p>W7: Knows strong and very strong plant materials, as well as chemical composition, healing properties and toxicity of narcotic plants - K_D.W40</p> <p>W8: Knows the mechanisms of action of plant substances at the biochemical and molecular level - K_D.W40</p> <p>W9: Knows the problems of natural medicines and dietary supplements containing medicinal plant materials and their use in the prevention and therapy of various disease entities - K_D.W41</p> <p>W10: Knows the rules of use and dosage of medicinal plant materials, their toxicity, effects of side effects and interactions with synthetic drugs, other raw materials and substances of plant origin - K_D.W41</p> <p>W11: He knows the differences between the leaflet about the drug and the leaflet attached to dietary supplements and other products available in the pharmacy - K_D.W41</p> <p>W12: Knows market medicinal products of plant origin and methods of their production - K_D.W41</p> <p>W13: Knows the issues of clinical trials of plant medicines and the position and importance of phytotherapy in the conventional medicine system - K_D.W42</p> <p>W14: Knows the rules of placing medicinal plant products and dietary supplements containing plant materials on the market - K_D.W43</p> <p>W15: Knows and understands the principles of marketing medicinal products, medical devices, cosmetics and dietary supplements - K_D.W43</p>

	<p>W16: Knows the basic sources of information about the drug (books, magazines, databases) - K_D.W44</p> <p>W17: Knows the current direction of the search for plant medicines used in the therapy of various diseases, as well as achievements in this field - K_D.W44</p>
Learning outcomes - abilities	<p>U1: Designs the composition of a plant preparation with a specific action - K_D.U33</p> <p>U2: Performs standardization procedure for medicinal plant product and prepares application for its registration - K_D.U33</p> <p>U3: Evaluates the action profile of a specific preparation based on knowledge of its composition - K_D.U34</p> <p>U4: Formulates research problems related to herbal medicine - K_D.U34</p> <p>U5: Uses various sources of information on medicines, including in English, and interprets this information critically - K_D.U34</p> <p>U6: Uses domestic and foreign scientific literature - K_D.U34</p> <p>U7: Uses information technologies to search for necessary information and to independently and creatively solve problems - K_D.U35</p> <p>U8: Provides information on medicinal plant material, determines its chemical composition, medicinal properties, side effects and interactions - K_D.U35</p> <p>U9: searches in the literature for scientific information, selects and assesses them, and uses them for practical purposes - K_D.U35</p> <p>U10: Provides complete information on the marketed herbal preparation, gives its medicinal use, describes interactions and effects of side effects - K_D.U35</p> <p>U11: Provides advice on the use, contraindications, interactions and adverse effects of plant-derived drugs - K_D.U35</p> <p>U12: Presents information on a medicine of natural origin in an accessible way and adapted to the level of recipients - K_D.U35</p>
Learning outcomes – social skills	<p>K1: Accurately formulates conclusions from own research and available in literature as well as from observation of the environment and at work - K8</p> <p>K2: He is ready to make responsible decisions at work, guaranteeing the safety of himself and others - K10</p>
Didactic methods	<p><u>Lecture:</u></p> <ul style="list-style-type: none"> <li>▪ Informative lecture,</li> <li>▪ Problem lecture with the elements of multimedia presentation</li> </ul> <p><u>Seminars:</u></p> <ul style="list-style-type: none"> <li>▪ classic (problem) exercise method,</li> <li>▪ didactic discussion, multimedia presentations (presented by students)</li> </ul>
Preliminary requirements	<p>To implement the described subject it is necessary to have basic knowledge of the subject of Pharmacognosy.</p> <p>In addition, the student should have the knowledge and skills acquired in the subjects: Pharmacology, Pharmaceuticals Technology.</p>
Brief course description	<p>Subject matter covers the principles of using natural (mainly plant) medicines in the prevention and treatment of various</p>

	diseases due to their action. Skills obtained in the course of the classes are necessary during the performance of professional work in distribution of products authorized for marketing at the pharmacy. Over-the-counter dispensing of widely represented preparations herbal medicine requires advice from a pharmacist regarding the efficacy and safety of using the medicine.
Entire course description	The subject is implemented in the form of lectures and seminar classes. During the course, the student learns about the products prepared based on plant materials, characterizes the action of plant medicines based on composition. Learns the principles of designing preparations plant with specific action and use, as well as general principles of phytotherapy (dosage of plant preparations, indications, contraindications, side effects, interactions). Seminars allow to shape the skills of individual work and teamwork.
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Matławska I. (red) Farmakognozja. UM Poznań 2005, 2006, 2008.</li> <li>2. Lamer- Zarawska E. i inni: Fitoterapia i lek roślinny, Wydawnictwo Lekarskie PZWL, 2007</li> <li>3. Błęcha K., Wawer I. Profilaktyka zdrowotna i fitoterapia, Bonimed, 2011</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Farmakopea Polska VI (2002), VII (2006), VIII (2008), IX (2011), XI (2017)</li> <li>2. Kompendium Leków PHARMINDEX, Medimedia, 2004</li> <li>3. Chwalibogowska-Podlowska A., Podlewski J. K.: Leki współczesnej terapii, Split Trading sp. z o. o., wyd. XVI, Warszawa 2003</li> <li>4. Borkowski B., Lutomski J (red.): Rośliny lecznicze w fitoterapii, Instytut Roślin i Przetworów Zielarskich, Poznań, 2000</li> <li>5. Ulotki i materiały informacyjne preparatów pochodzenia naturalnego.</li> </ol>
Methods and criteria of evaluation	<p>Practical performance of tutorials: ongoing preparation for classes</p> <p>Credit for a grade: written test on all material (lectures and exercises) after the classes</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

### C. Course description in the didactic cycle

Space name	Comment
Didactic cycle	4 <sup>st</sup> year, 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Credit grade
Form(s) and number of course hours as well as the form of crediting	Lectures: 10 h Seminaries: 20 h
Course coordinator(s)	Dr Maciej Balcerek
Subject Teachers	Dr Maciej Balcerek, Dr Daniel Modnicki

Course form (character)	Obligatory														
Limit of places available in each group	15														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs, Ludwik Rydygier Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods															
Subject website	<a href="https://www.wf.cm.umk.pl/kizf/">https://www.wf.cm.umk.pl/kizf/</a>														
Learning outcomes determined for the given course form	Lectures: W1 – W17, Tutorials: W1 – W17, U1 – U12														
Methods and criteria of the evaluation for the given course form	<p>The condition of passing the course is: attendance (two absences in the first semester are the basis for not passing this semester), preparing and delivering presentations, active participation in classes (participation in discussions).</p> <p>Lectures: assessment criteria: passing a grade in the form of a test (open and closed questions).</p> <p>Seminars: assessment criteria: credit based on active participation in class.</p> <p>In the case of credit grade in writing, the points obtained are converted into grades on the following scale:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>84-91%</td> <td>Very good (4.5)</td> </tr> <tr> <td>76-83%</td> <td>Good (4)</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-67%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table>	Percentage of points	Grade	92-100%	Excellent (5)	84-91%	Very good (4.5)	76-83%	Good (4)	68-75%	Satisfactory (3.5)	60-67%	Acceptable (3)	0-59%	Fail (2)
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68-75%	Satisfactory (3.5)														
60-67%	Acceptable (3)														
0-59%	Fail (2)														
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Basic definitions in the field of herbal medicine. Medicine and dietary supplement.</li> <li>2. Safety in the use of plant medicines and other preparations containing ingredients of natural origin.</li> <li>3. Principles of rational phytotherapy - possibilities and limitations in the context of using medicines of natural origin.</li> <li>4. The market of medicinal preparations of natural origin in Poland and in the world.</li> <li>5. Quality and durability of medicinal preparations of natural origin.</li> </ol> <p>Seminars:</p> <ol style="list-style-type: none"> <li>1. A herbal medicine and dietary supplement. Plant preparations used in disorders of the nervous system.</li> <li>2. Plant preparations used in diseases of the genitourinary system, plant preparations used in respiratory tract infections.</li> <li>3. Plant preparations affecting the work of the circulatory system.</li> </ol>														

	<p>4. Plant preparations used in digestive tract disorders and motion sickness. Plant preparations improving metabolism.</p> <p>5. Plant preparations used in skin diseases.phytotherapy</p>
Didactic methods	The same as in part A
References	The same as in part A

## Toxicology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Toxicology</b> (Toksykologia)
Unit offering the subject	Faculty of Pharmacy Department of Toxicology and Bromatology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-F4-TOKS-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	5
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module D</b> Biopharmacy and the effects of drug activities
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lecture participation – 35 hours</li> <li>– Tutorials participation – 55 hours,</li> <li>– Scientific and research consultations participation – 2 hours,</li> <li>– Course credit (colloquium + exam): 2 hours + 1 hour = 3 hours</li> </ul> <p>The total student workload related to activities requiring direct participation of academic teachers is 95 hours, which corresponds to 3.8 ECTS points.</p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– Lecture participation – 35 hours</li> <li>– Tutorials participation – 55 hours</li> </ul>

	<ul style="list-style-type: none"> <li>- Preparation for tutorials and completion of notes – 5 hours,</li> <li>- preparation of assignments given by lecturers: – 2 hours,</li> <li>- reading the recommended literature: – 3 hours,</li> <li>- participation in scientific and research consultations: – 2 hours,</li> <li>- preparation for colloquium: – 6 hours,</li> <li>- preparation for examination and exam: 15 hours + 1 hour = 16 hours.</li> </ul> <p>The total student workload is <b>124 hours</b>, which corresponds to <b>5.0 ECTS points</b>.</p> <p>3. Time required for the scientific research:</p> <ul style="list-style-type: none"> <li>- Lecture participation (including research methodology, interpretation of results of conducted analyzes: – 20 hours,</li> <li>- carrying out scientific and research aspects as part of tutorials: – 30 hours,</li> <li>- scientific and research consultations: – 1 hour,</li> <li>- reading literature as part of aspects of scientific research: – 15 hours,</li> <li>- preparation to complete the course in the field of research and development for the subject: – 15 hours.</li> </ul> <p>Total time related to the conducted research: <b>81 hours, 3.24 ECTS points</b>.</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- Test preparation – 6 hours,</li> <li>- Course preparation – 16 hours</li> </ul> <p>The total time required to prepare and to participate in the assessment process is 22 hours, which corresponds to 0.88 ECTS points.</p> <p>5. Time required for the practical training completion – not applicable.</p> <p>Total work amount: 124 hours (5 ECTS point)</p>
Learning outcomes – knowledge	<p>In terms of knowledge, the graduate knows and understands:</p> <p>W1: the basic concepts related toxicokinetics, toxicometry and toxicogenetics- D.W21;</p> <p>W2: processes to which xenobiotic in the body is subject, with particular emphasis on biotransformation processes, depending on the route of administration or exposure; - D.W22;</p> <p>W3: issues related to the type of exposure to poisons (acute toxicity, chronic toxicity, distant effects); - D.W23;</p> <p>W4: endogenous and exogenous factors modifying the activity of xenobiotic metabolizing enzymes D.W.24;</p> <p>W5: toxic effects of selected drugs, addictive substances, psychoactive substances and other chemical substances as well as rules of conduct in poisoning; D.W.25;</p>

	<p>W6: principles and methods of air monitoring and biological monitoring in assessing exposure to selected xenobiotics; D.W.26;</p> <p>W7. in vitro and in vivo methods used in xenobiotics toxicity studies D.W.27;</p> <p>W8. planning principles and methodology for toxicological tests required in the process of searching for and registering new drugs; D.W.28;</p> <p>W9. health threats and consequences related to environmental pollution; D.W.29.</p>
Learning outcomes - abilities	<p>In terms of skills, the graduate can:</p> <p>U1: assess the risks associated with environmental pollution by environmental poisons and medicinal substances and their metabolites D.U.18;</p> <p>U2: characterize the biotransformation of xenobiotics and assess its importance in metabolic activation and detoxification; D.U.19;</p> <p>U3: predict the direction and potency of the xenobiotic's toxic effect depending on its chemical structure and type of exposure D.U.20;</p> <p>U4: isolate poisons from biological material and select the appropriate detection method; D.U.21;</p> <p>U5: perform exposure assessment (biological monitoring) based on toxicological analysis in biological material; D.U.22.</p>
Learning outcomes - social skills	<p>K1: Is ready to take a position and form opinions on various aspects of professional activity - K 9</p> <p>K2: Is ready to use team action to carry out tasks and is responsible for their results - K 3</p> <p>K3: Is ready for a clear knowledge-based formulation of conclusions supported by the results of own measurements or observations - K 8</p>
Didactic methods	<p>Lecture:</p> <ul style="list-style-type: none"> <li>• Informative lecture (conventional),</li> <li>• Problem lecture with the elements of multimedia presentation.</li> <li>•</li> </ul> <p>Labs:</p> <ul style="list-style-type: none"> <li>• classes,</li> <li>• work in groups and individually,</li> <li>• measurement and analysis of results.</li> </ul>
Preliminary requirements	<p>Before starting the course in toxicology, student has basic knowledge in the field of analytical chemistry, organic chemistry, biochemistry and clinical chemistry. The student should have skills in calibration (validation) of analytical methods; precise weighing and measuring; preparing solutions; performing quantitative analyzes and qualitative by classic weight and titration methods, as well as instrumental methods; calculating the results of quantitative analysis.</p>
Brief course description	<p>The purpose of teaching the subject Toxicology is to equip the student in knowledge of basic toxicological terms, mechanisms of xenobiotics toxic action and health threats (acute and chronic poisoning, distant effects) caused by chemical substances. Particular attention is paid to the toxicity of medicinal products, and above all to drugs, which are the most common cause of</p>

	<p>poisoning and addiction. In addition, issues related to the interaction of toxic substances with drugs and the role of systemic metabolic systems, mainly microsomal enzymes, in the biotransformation of chemical substances and the impact of these processes on the effects of xenobiotic toxic effects are presented. Students learn the principles of occupational health and safety with regard to toxic substances and biological material, and how to provide first aid to poisoned persons, including the correct selection of antidotes and methods of assessing exposure to toxic substances.</p>
Entire course description	<p>The lecture is designed to provide knowledge about general and detailed toxicology. Issues in general toxicology include the objectives and tasks of toxicology, basic concepts of toxicology, the fate of xenobiotics in the body (absorption, distribution, metabolism, accumulation and excretion), mechanisms of toxic effects of xenobiotics (including the role of microsomal enzymes in the bioactivation of toxic compounds), distant effects (mutagenic, teratogenic and carcinogenic effects) and basics of toxicometry. The curriculum content of lectures in detailed toxicology includes drug toxicity (including mechanisms of action, intoxication symptoms, effects of distant exposures, and methods of diagnosing poisoning and first aid). Lecture topics also concern problems related to the phenomenon of toxicomania, with particular emphasis on drug addiction.</p> <p>The laboratories are dedicated to the objectives and tasks of toxicological analysis, types of research material (biological material, pharmaceutical preparations, environmental tests), the principles of its selection and distribution, methods of conducting toxicological analysis focused on a specific substance and in the case of identification of unknown compounds, methods of detection and determination of selected groups drugs in biological material, methods of detection and determination of other toxic substances (organic solvents with particular emphasis on alcohols, drugs) and methods of detecting the effects of exposure to toxic substances. Teaching also aims to master the student's practical knowledge of the methods of isolation, detection and quantification of toxic substances, with particular emphasis on drugs, and assessment of their effects using modern analytical apparatus, and to prepare students for the correct interpretation of test results.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Moffat AC, Osselton MD, Widdop B: Clarke's Analysis of Drugs and Poisons. Pharmaceutical Press, London 2004, 2011</li> <li>2. Flangan RJ, Taylor A, Watson ID, Whelpton R: Fundamental of analytical toxicology. JohnWhiley &amp; Sons, Chichester, 2007</li> </ol> <p>Supplementary literature:</p>
Methods and criteria of evaluation	<p>The basis for passing the toxicology subject is compliance with the principles set out in the Didactic Regulations of the Department of Toxicology and Bromatology.</p>



	<p>The condition of passing the course is: passing laboratory classes getting over 60% of 4 written tests and obtaining a positive grade from the final exam.</p> <p>Lectures: Completion based on two written tests and a final exam in the form of a single-choice test (open and closed single-choice questions).</p> <p>Points obtained from the exam are converted into grades on the following scale:</p> <table> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>84-91%</td> <td>Very good (4.5)</td> </tr> <tr> <td>76-83%</td> <td>Good (4)</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-67%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table> <p>The final retake exam takes place in the retake session. A student may take an exam in so-called zero date, when he obtained a total of more than 90% of the points from the colloquium and the Head of the Department of Toxicology and Bromatology gave the appropriate consent. There are no exemptions from the exam.</p> <p>Labs: Credit based on the practical part of the laboratory classes and passing two written tests.</p> <p>Continuous assessment during classes in the form of short written or oral tests: The student receives credit after obtaining &gt; 70% of correct answers. The student is entitled to retake a short test after failing to pass it on the first date, that takes place within the time limit set by the teacher, but before the date of the colloquium from laboratory classes.</p> <p>Final exam:&gt; 60% (W1-W9, U1-U5) Lecture colloquium:&gt; 70% (W1-W9, U1- U5) Laboratory colloquium:&gt; 70% (U1-U5, W1-W9) Written tests:&gt; 70% (W1- W9, U1-U5)</p> <p>Criteria of evaluation are given in part B</p>	Percentage of points	Grade	92-100%	Excellent (5)	84-91%	Very good (4.5)	76-83%	Good (4)	68-75%	Satisfactory (3.5)	60-67%	Acceptable (3)	0-59%	Fail (2)
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0-59%	Fail (2)														
Practical training as part of course	Not applicable according to the educational program														

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	4 <sup>th</sup> year, 1 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Lecture: examination Labs: assessment
Form(s) and number of course hours as well as the form of crediting	Lecture: 35 hours - examination Labs: 55 hours - assessment

Course coordinator(s)	Marcin Koba, prof. NCU														
Subject Teachers	Lectures: Marcin Koba, prof. NCU Labs: Marcin Koba, prof. NCU Piotr Kośliński, Ph.D. Marcin Gackowski, Ph.D.														
Course form (character)	Obligatory														
Limit of places available in each group	Lectures: all 4 <sup>th</sup> year students Labs: groups of up to 12 students														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Ludwik Rydygier Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods															
Subject website															
Learning outcomes determined for the given course form	Lectures: W1-W9, U1-U6 Labs: U1-U6, W1-W9, K1-K3														
Methods and criteria of the evaluation for the given course form	<p>The basis for passing the toxicology subject is compliance with the principles set out in the Didactic Regulations of the Department of Toxicology and Bromatology.</p> <p>The condition of passing the course is: passing laboratory classes getting over 60% of 4 written tests and obtaining a positive grade from the final exam.</p> <p>Lectures: Completion based on two written tests and a final exam in the form of a single-choice test (open and closed single-choice questions).</p> <p>Points obtained from the exam are converted into grades on the following scale:</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>84-91%</td> <td>Very good (4.5)</td> </tr> <tr> <td>76-83%</td> <td>Good (4)</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-67%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table> <p>The final retake exam takes place in the retake session. A student may take an exam in so-called zero date, when he obtained a total of more than 90% of the points from the colloquium and the Head of the Department of Toxicology and Bromatology gave the appropriate consent. There are no exemptions from the exam.</p> <p>Seminars: Not applicable.</p> <p>Labs:</p>	Percentage of points	Grade	92-100%	Excellent (5)	84-91%	Very good (4.5)	76-83%	Good (4)	68-75%	Satisfactory (3.5)	60-67%	Acceptable (3)	0-59%	Fail (2)
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	<p>Credit based on the practical part of the laboratory classes and passing two written tests.</p> <p>Continuous assessment during classes in the form of short written or oral tests: The student receives credit after obtaining &gt; 70% of correct answers. The student is entitled to retake a short test after failing to pass it on the first date, that takes place within the time limit set by the teacher, but before the date of the colloquium from laboratory classes.</p> <p>Final exam: &gt; 60% (W1-W9, U1-U5) Lecture colloquium: &gt; 70% (W1-W9, U1- U5) Laboratory colloquium: &gt; 70% (U1-U5, W1-W9) Written tests: &gt; 70% (W1- W9, U1-U5)</p>
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Historical overview.</li> <li>2. Goals and tasks of toxicology in health care and environmental protection.</li> <li>3. Terms: poisons, poisoning.</li> <li>4. Impact of physico-chemical and biological factors and on the action of poisons.</li> <li>5. The fate of toxic compounds in the body.</li> <li>6. Mechanisms of toxic effects of chemical substances.</li> <li>7. Toxicogenetics.</li> <li>8. Relationship between dose and toxicity.</li> <li>9. Effects of toxic substances.</li> <li>10. Adverse drug reactions and the risks of abuse.</li> <li>11. Tolerance and drug addiction.</li> <li>12. Side effects of selected drugs.</li> <li>13. First aid in poisoning.</li> <li>14. Toxicity assessment of chemical substances (toxicometry).</li> <li>15. Qualitative and quantitative methods for the detection of toxic compounds.</li> <li>16. Risk estimation.</li> <li>17. Toxicological legislation.</li> <li>18. Basics of environmental toxicology.</li> <li>19. Poisons most commonly found in the environment (pesticides, heavy metals, vapors, gases, solvents, plastics).</li> </ol> <p>Labs:</p> <ol style="list-style-type: none"> <li>1. Goals and tasks of toxicological analysis.</li> <li>2. The course of action when searching for an unknown poison.</li> <li>3. Methods for isolating toxic substances from biological material (SPE methods).</li> <li>4. Detection of some organic poisons (by HPLC and TLC).</li> <li>5. Methods for rapid detection of given toxic substances in biological material. Determination of toxic compounds in biological samples by spectrophotometric method.</li> <li>6. Diagnosis of alcohol intoxication. Determination of methanol, ethanol and ethylene glycol (Widmark's method, titration and colorimetric method).</li> </ol>

	7. Diagnostics of poisoning with organophosphorus compounds and carbamates. Determination of acetylcholine esterase activity. 8. Determination of urinary delta-aminolevulinic acid as an indicator of lead exposure.
Didactic methods	The same as in part A
References	The same as in part A

**Course module E**  
Pharmaceutical Practice

## Ethics of the Profession

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Ethics of the Profession</b> (Etyka zawodu)
Unit offering the subject	Faculty of Medicine. Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-F5-ETYKA-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	2
Form of crediting	credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module E</b> Pharmaceutical practice
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Lecture participation – 25 hours,</li> <li>– Tutorials participation – 10 hours,</li> <li>– Consultations – 2 hours</li> </ul> <p>A total work amount: <b>37 hours</b> which corresponds to <b>1.48 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– Lecture participation – 25 hours,</li> <li>– Tutorials participation – 10 hours,</li> <li>– Preparation for exercises, reading the indicated literature: 6 hours,</li> <li>– Preparation to pass the course and credit: 7 hours</li> <li>– Consultations – 2 hours</li> </ul> <p>The total student workload is <b>50 hours</b>, which corresponds to <b>2.0 ECTS points</b>.</p> <p>3. Workload related to conducting research: 0 hours</p> <p>4. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– Preparation for tutorials – 10 hours,</li> <li>– Time required for the preparation and participation in evaluating process – 25 hours</li> </ul> <p>Total time spent by the student on the individual work is <b>25 hours</b> which corresponds to <b>1 ECTS point</b>.</p>

	5. Time required for the practical training completion – not applicable.
Learning outcomes – knowledge	W1: Knows the basic concepts of ethics, deontology and bioethics, as well as the issues of the historical development of ethical systems - K_E.W28 W2: Knows the ethical principles of modern pharmaceutical marketing - K_E.W29 W3: Understands the need to develop ethical and moral attitudes and sensitivity in professional practice - K_E.W28
Learning outcomes - abilities	U1: Understands the need for the code of ethics in professional practice - K_E.U30, U2: Applies to the Code of Ethics of the Apothecary of the Republic of Poland - K_E.U30; U3: Refers to the pharmacist's professional ethics and patient's rights in relation to the patient and medical staff - K_E.U30
Learning outcomes – social skills	K1: Adheres to the confidentiality regarding patient's health and rights - K4 K2: Presents an ethical and moral attitude consistent with ethical principles - K5 K3: Takes action based on the code of ethics in professional practice - K5
Didactic methods	Lecture <ul style="list-style-type: none"> <li>▪ informative lecture (traditional) with a multimedia presentation</li> </ul> Tutorials: <ul style="list-style-type: none"> <li>• tutorials with multimedia presentations</li> <li>• conversation lecture</li> </ul>
Preliminary requirements	General knowledge at high school level
Brief course description	Ethics is defined as the science of morality or, in reference to the Platonic-Aristotelian tradition, as the science of good. In its source meaning, dating back to the Heraclitian times, it defines the proper place for man to live in a harmoniously tuned cosmos. Therefore, it is practical knowledge about how to harmoniously shape relations with the environment in order to live in accordance with nature given to man. Professional ethics (applied) is an adaptation of the rules and principles developed by general ethics to the ethical requirements related to the profession (performed social role).
Entire course description	The ethics of the pharmacist profession, although it is designed, in accordance with its deontological character, to define the ethical duties of pharmacists and to suggest appropriate ways to implement them, it is rooted in the old deontological tradition dating back to the hypocrite times as a special type of medical ethics. Thus, as a special form of medical ethics, it participates in resolving those issues that have absorbed and still absorb medics of all specialties.  The aim of the classes on pharmaceutical ethics is to reach those sources and reveal what constitutes the essence of the profession of a pharmacist in an ethical perspective as such, i.e. to define the good it serves, to deepen knowledge about its purpose.

	Lectures and exercises will explain terms and ethical concepts, reveal their meanings, consider ethical dilemmas that pharmacists may encounter in their work, and how to resolve them.												
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Daniel Star, History of Ethics, 2020</li> <li>2. Charlotte B. Becker, A History of Western Ethics, 2003</li> <li>3. Aristotle, Nicomachean Ethics, 2012</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Michael Slote, Essays on the History of Ethics, 2010</li> <li>2. Lewis Vaughn, Bioethics: Principles, Issues and Cases, 2015</li> </ol>												
Methods and criteria of evaluation	<p>The student receives credit based on the result of the test covering the issues of lectures and seminars. The condition of participation in the final test is attendance at lectures and practical classes.</p> <p>Test - closed (multiple choice) and open questions (0 - 30 points):</p> <p>Points: Grade:</p> <table> <tr> <td>&gt;18</td> <td>Fail (2)</td> </tr> <tr> <td>18-20</td> <td>Acceptable (3)</td> </tr> <tr> <td>21-23</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>24-26</td> <td>Good (4)</td> </tr> <tr> <td>27-28</td> <td>Very good (4.5)</td> </tr> <tr> <td>29-30</td> <td>Excellent (5)</td> </tr> </table> <p>100% presence at the lecture Written test - multiple-choice test solution - approx. 20 questions).</p> <p>The condition of passing the test is to obtain a minimum of 65% correct answers.</p>	>18	Fail (2)	18-20	Acceptable (3)	21-23	Satisfactory (3.5)	24-26	Good (4)	27-28	Very good (4.5)	29-30	Excellent (5)
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Practical training as part of course	Not applicable according to the educational program												

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5 <sup>st</sup> year, 9 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	credit for a grade
Form(s) and number of course hours as well as the form of crediting	Lecture: 25 hours Tutorials: 10 hours
Course coordinator(s)	Mgr Paweł Drygas
Subject Teachers	Lecture: Mgr Paweł Drygas Tutorials: Mgr Paweł Drygas
Course form (character)	Obligatory
Limit of places available in each group	Lecture: fifth year students, semester 9 Laboratory tutorials: groups of 12-15 students

Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Ludwik Rydygier Collegium Medicum in Bydgoszcz NCU in Toruń												
Number of hours of classes conducted using e-learning methods	Not applicable												
Subject website	Not applicable												
Learning outcomes determined for the given course form	Lecture: W1, W2, W3 Tutorials:U1, U2, U3, K1, K2, K3												
Methods and criteria of the evaluation for the given course form	<p>The student receives credit based on the result of the test covering the issues of lectures and seminars. The condition of participation in the final test is attendance at lectures and practical classes.</p> <p>Test - closed (multiple choice) and open questions (0 - 30 points):</p> <p>Points: Grade:</p> <table> <tr> <td>&gt;18</td> <td>Fail (2)</td> </tr> <tr> <td>18-20</td> <td>Acceptable (3)</td> </tr> <tr> <td>21-23</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>24-26</td> <td>Good (4)</td> </tr> <tr> <td>27-28</td> <td>Very good (4.5)</td> </tr> <tr> <td>29-31</td> <td>Excellent (5)</td> </tr> </table> <p>100% presence at the lecture Written test - multiple-choice test solution - approx. 20 questions). The condition of passing the test is to obtain a minimum of 65% correct answers.</p>	>18	Fail (2)	18-20	Acceptable (3)	21-23	Satisfactory (3.5)	24-26	Good (4)	27-28	Very good (4.5)	29-31	Excellent (5)
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21-23	Satisfactory (3.5)												
24-26	Good (4)												
27-28	Very good (4.5)												
29-31	Excellent (5)												
List of topics	<p>Lecture:</p> <ol style="list-style-type: none"> <li>1. The ethical calling of medicine: from the Hippocratic Oath to modern medical ethics (the Hippocratic Oath, good in the sense of Hippocratic medicine, values that fund medical ethics in the meaning of modern medicine (Cartesian and modern model), the role of medicine in the technologically interpreted world, medicine in the post-modern era, paternalistic position, ethics, consent, ethics of care, medical ethics in the face of the growing importance of patient autonomy, the problem of medicalization, life).</li> <li>2. Medical ethics as applied ethics (definition of a medical order (classic and extended medical order), interpretation of a medical order due to the way of establishing medical ethics (consequentialist, absolutist), the limits of the medical order in a situation of conflict of values (conflict with individual, social good) ).</li> <li>3. Medicine towards the phenomenon of procreation - ethical controversies, ethical controversies around medical technologies supporting procreation, contraception, ethical dispute about the admissibility of abortion (positions: prochoice, prolife, pro-motherhood, Catholic) - argumentation assessment, principle of potentiality, principle of double effect).</li> <li>4. Ethical problems of death and dying (cultural models for death and dying, modern medicine's attitude towards the phenomenon of death ("medicalization" of death and dying),</li> </ol>												



futile therapy, ordinary and extraordinary therapeutic measures, euthanasia, doctor's help in suicide, palliative care problems, principle of double effect).

5. Iatrogen problem - pharmacological aspect (impact of invasiveness of medical therapies on iatrogenesis, assessment of pharmacological treatment from the perspective of Hippocratic medicine, problem of side effects in pharmacological treatment - ways of estimating the risk related to pharmacological treatment (weighting of benefits and losses in probabilistic inference) on examples of various therapy (e.g. transplant therapy, pain therapy).

6. Medical support for the quality of life (ethical controversy around: cosmetic procedures, the use of means that increase the efficiency of the body (the problem of pharmacological doping in sport), the fight against pain and depression, the impact of aggressive advertising of pharmaceuticals and parapharmaceuticals on the phenomenon of drug addiction).

7. Medicine and economics: the ethical dimension of "medicine of shortage" (the problem of permanent deficit of medical resources and limited access of patients to them, and the related need to select patients, criteria for fair selection of patients, rational management of medical resources, allocation and proper distribution of medical resources, definition fair medicine, "marketized medicine", utilitarian concept of social solidarity).

8. Health care in market economy conditions: on the relationship between medical ethics and business ethics (economic and ethical consequences of medicine technology, health care facilities as enterprises, economic calculation, profitability, profit, health security, ethical aspects of managerial management of institutions, plants, and related enterprises) with health care).

9. Ethical controversies around the drug policies of pharmaceutical companies (the role of chemotherapy in modern therapies: clinical and economic aspects, the problem of generic drugs, "orphan drugs", the participation of the pharmaceutical industry in the phenomenon of medicalization of everyday life, pharmaceutical advertising and the threat of drug pathology ("Goździkowa syndrome").

Bioethics as normative ethics - analysis of selected deontological documents and bioethical conventions (bioethics as an attempt at institutional defense of dignity and quality of life, the concept of dignity, a bioethical vision of harmonious coexistence of man and the world, bioethics against civilization threats, the structure of deontological codes, the European Bioethical Convention and its importance for modern vision of bioethics).

Tutorials:

1. Ethical controversy around medical support for quality of life - pharmacological aspect.
2. Health care in market economy conditions: on the relationship between medical ethics and business ethics.
3. Good in medicine: ethics of duty and respect for patient autonomy.

	4. Are we at risk of pharmacolization of everyday life? Ethical controversy related to this phenomenon. 5. Analysis of the most important deontological documents regulating pharmaceutical practice.
Didactic methods	The same as in part A
References	The same as in part A

## Clinical Pharmacy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Clinical Pharmacy</b> Farmacja Kliniczna
Unit offering the subject	Faculty of Health Sciences Department of Cardiology and Clinical Phamacology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	3
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module E</b> Pharmaceutical practice
Total student workload	<p>1. The workload related to activities requiring the direct participation of academic teachers is:</p> <ul style="list-style-type: none"> <li>- - participation in lectures: 20 hours,</li> <li>- - participation in seminars: 15 hours,</li> <li>- - practical classes: 6 hours,</li> <li>- - consultations: 5 hours,</li> </ul> <p>The workload related to activities requiring direct participation of academic teachers is <b>46 hours</b>, which corresponds to <b>1.84 ECTS</b> points.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>- participation in lectures: 20 hours,</li> <li>- participation in seminars: 15 hours,</li> <li>- practical classes: 6 hours,</li> <li>- consultations: 5 hours,</li> <li>- preparation for seminars and practical classes: 10 hours,</li> <li>- reading of the indicated literature: 5 hours,</li> <li>- preparation to pass the course and credit: 14 hours</li> </ul> <p>The total student workload is <b>75 hours</b>, which corresponds to <b>3.0 ECTS credits</b>.</p>

	<p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– reading of the indicated scientific literature: 3 hours,</li> <li>– research and scientific consultations: 2 hours,</li> <li>– participation in seminars (including research methodology, research results, studies): 12 hours,</li> <li>– participation in lectures covered by scientific activity: 15 hours,</li> <li>– preparation for seminars covered by scientific activity: 8 hours,</li> <li>– preparation to pass in the field of research and science for the subject: 10 hours.</li> </ul> <p>The total workload related to the conducted research is <b>50 hours</b>, which corresponds to <b>2 ECTS points</b>.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>– preparation for exercises: 10 hours,</li> <li>– preparation to complete the course: 15 hours</li> </ul> <p><b>(25 hours in total, which corresponds to 1 ECTS point).</b></p> <p>5. Time required to complete the compulsory apprenticeship - not applicable</p>
Learning outcomes – knowledge	<p>W1: microbiological methods of testing mutagenic effects of drugs (K_A.W23);</p> <p>W2: correlation between chemical structure, physicochemical properties and mechanisms of medicinal substances effect (K_C.W3);</p> <p>W3: methods used in pharmaceutical quality assessment and in the analysis of medicinal substances and the ways of validating those methods(K_C.W6);</p> <p>W4: methods of controlling the quality of drugs marked by isotopes (K_C.W7);</p> <p>W5: types of drug packaging and dosage systems (K_C.W32);</p> <p>W6: factors determining drug stability and methods of testing (K_C.W35);</p> <p>W7: determinants of drug action in pharmacodynamics phase including hereditary factors and objectives of personalised therapy (K_D.W14);</p> <p>W8: routes of drug administration and drug dosage (K_D.W16);</p> <p>W9: indications, contraindications and side effects characteristic to the drug and dependant on the dosage (K_D.W17);</p> <p>W:10 classification of adverse drug reactions (K_D.W19);</p> <p>W:11 principles of drug combination, types of drug interactions, factors influencing their occurrence and possibilities of their avoidance (K_D.W20);</p>

	<p>W12: toxic effects of selected drugs, addictive, psychoactive and other chemical substances and the procedures in case of poisoning (K_D.W25);</p> <p>W13: basics of drug-food interaction (K_D.W35);</p> <p>W14: medicinal products of natural origin and therapeutic indications for their use (K_D.W41)</p>
Learning outcomes - abilities	<p>U1: use mathematical, statistical and computer tools to develop, interpret and present results of experiments, analyses and measurements (K_B.U11);</p> <p>U2: make use of pharmacopoeias, guidelines and literature related to assessment of pharmacological substance quality and medicinal product (K_C.U4);</p> <p>U3: propose an appropriate drug form depending on a medicinal substance properties and its purpose; (K_C.U15)</p> <p>U4: manufacture prescription drugs, select packaging and determine their shelf life and method of storage (K_C.U16);</p> <p>U5: assess the quality and durability of a medicinal substance obtained biotechnologically and propose its specification; (K_C.U13)</p> <p>U6: use national and international specialist research literature (K_F.U3)</p>
Learning outcomes – social skills	<p>K1: establishing relationships with the patient and colleagues based on mutual trust and respect (K1);</p> <p>K2: notice and recognize their own limitations, make a self-assessment of deficits and educational needs (K2);</p> <p>K3: implement the principles of collegueship and co-operation in a team of professionals, including representatives of other medical professions, also in a multicultural and multinational environment (K3);</p> <p>K4: observe secrecy concerning health, patient's rights and rules of professional ethics (K4)</p>
Didactic methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>- informative lecture,</li> <li>- multimedia lecture,</li> </ul> <p>Tutorials:</p> <ul style="list-style-type: none"> <li>- practical lessons with patients: case studies, method of didactic discussion, text analysis</li> </ul>
Preliminary requirements	To implement the described subject it is necessary to have basic knowledge in the field of anatomy, physiology as well as pharmacokinetics and pharmacodynamics.
Brief course description	Pharmacotherapy and information about medicines is one of the leading elements in the field of Pharmacy. Subject expanded knowledge acquired in previous years about the mechanism of action and side effects of drugs, and an easier treatment regimen with various types of drugs.
Entire course description	<p>As part of the lecture on the subject, students will learn about such issues as medical standards can help in pharmaceutical care based on the latest guidelines.</p> <p>Practical classes from clinical pharmacy include participation in the work of clinicians, nurses and laboratory diagnostics, and are held at the university hospital. Students have the opportunity to learn about the pharmacist's work in closed conditions.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Basic &amp; Clinical Pharmacology, 12e, BG Katzung (EN)</li> <li>2. www.mp.pl</li> </ol>

	Supplementary literature: 1. Heart Disease; Braunwald, Zipes and Libby 2. Pharmaceutical publications available in the Medical Library CM UMK
Methods and criteria of evaluation	Special requirements and suggestions: – All practical lessons begin with “entrance” colloquium comprising 5 single choice questions. For each good answer student gets one point. – Students pass the clinical part of the course after collecting 75 % of all points from “entrance “ colloquia  Assessment methods: – lectures (W1-W14) – ungraded credit: – practical lessons (W1-W14, U1-U6, K1-K4) – ungraded credit (presence, activity, colloquium): – credit with grade, test comprising 20 single choice question (W1-W14, U1-U6, K1-K4): Scoring system: 20-19 points 5,0 18-17 points 4,5 16-15 points 4,0 14-13 points 3,5 12-11 points 3,0 <11 points – 2,0
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	4 <sup>th</sup> year, 8 semester
Form of crediting a subject in the cycle	Credit with grade
Form(s) and number of course hours as well as the form of crediting	Seminar (15 h) + practical lessons (6 h); credit (written test) Lectures (20 h): credit with grade
Course coordinator(s)	prof. Grzegorz Grzešek
Subject Teachers	Joanna Banach, PhD, MD Wojciech Gilewski, PhD, MD Marta Bilska, PhD, MD Mateusz Kusiak, MD
Course form (character)	Obligatory
Limit of places available in each group	Distribution of occupational groups students to cycle of teaching
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	not applicable
Subject website	<a href="https://www.wnoz.cm.umk.pl/2katkardio/">https://www.wnoz.cm.umk.pl/2katkardio/</a>
Learning outcomes determined for the given course form	<u>Lectures:</u> W1-W14 <u>Tutorials:</u> W1-W14, U1-U6, K1-K4
Methods and criteria of the evaluation for the given course form	Special requirements and suggestions:

	<p>a. All practical lessons begin with “entrance” colloquium comprising 5 single choice questions. For each good answer student gets one point.</p> <p>b. Students pass the clinical part of the course after collecting 75 % of all points from “entrance “ colloquia.</p> <p>Assessment methods:</p> <ul style="list-style-type: none"> <li>- lectures (W1-W14) – ungraded credit:</li> <li>- practical lessons (W1-W14, U1-U6, K1-K4) – ungraded credit (presence, activity, colloquium):</li> <li>- credit with grade, test comprising 20 single choice question (W1-W14, U1-U6, K1-K4):</li> </ul> <p>Scoring system:</p> <table style="margin-left: 40px;"> <tr><td>20-19 points</td><td>5,0</td></tr> <tr><td>18-17 points</td><td>4,5</td></tr> <tr><td>16-15 points</td><td>4,0</td></tr> <tr><td>14-13 points</td><td>3,5</td></tr> <tr><td>12-11 points</td><td>3,0</td></tr> <tr><td>&lt;11 points</td><td>2,0</td></tr> </table>	20-19 points	5,0	18-17 points	4,5	16-15 points	4,0	14-13 points	3,5	12-11 points	3,0	<11 points	2,0
20-19 points	5,0												
18-17 points	4,5												
16-15 points	4,0												
14-13 points	3,5												
12-11 points	3,0												
<11 points	2,0												
List of topics	List of topics for lectures and practical exercises: 1. Selected issues in clinical pharmacology and drug information												
Didactic methods	The same as in part A												
References	The same as in part A												

## Practical Pharmacy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Practical Pharmacy</b> Farmacja Praktyczna
Unit offering the subject	Faculty of Pharmaceutical Technology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1720-F5-FARMP-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	4
Form of crediting	Graded credit
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module E</b> Pharmaceutical practice
Total student workload	1. Obligatory hours realized with the teacher participation

	<ul style="list-style-type: none"> <li>- Lecture participation - 8 hours,</li> <li>- Seminars participation – 27 hours,</li> <li>- Laboratories participation – 48 hours,</li> <li>- Practical classes participation – 4 hours,</li> <li>- Consultations – 1 hours,</li> <li>- Evaluation participation – 1 hour,</li> </ul> <p>The workload related to activities requiring direct participation of academic teachers is <b>89 hours</b>, which corresponds to <b>3.56 ECTS points</b>.</p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>- Lecture participation - 8 hours,</li> <li>- Seminars participation – 27 hours,</li> <li>- Laboratories participation – 48 hours,</li> <li>- Practical classes participation – 4 hours,</li> <li>- Preparation to laboratories and practical classes – 4 hours</li> <li>- Reading literature – 4 hours</li> <li>- Consultations – 1 hours,</li> <li>- Preparation and participation in evaluation – 3+1 hours.</li> </ul> <p>Total work amount: <b>100 hours</b> (4.0 ECTS points)</p> <p>3. Time spent by the student on the research activity:</p> <ul style="list-style-type: none"> <li>- Reading referenced literature – 3 hours</li> <li>- Consultations – 1 hour</li> <li>- Seminars participation (including research methodology, results, conclusions) – 23 hours</li> <li>- Lecture participation – 4 hours,</li> <li>- Participation for laboratories and practical classes including research activity (including research methodology, results, conclusions) – 43 hours</li> <li>- Preparation for laboratories and practical classes including research activity – 5 hours</li> <li>- Preparation for evaluation in research aspect – 5 hours</li> </ul> <p>Total work amount: <b>84 hours</b> (3.36 ECTS points)</p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- Preparation for laboratories and practical classes + preparation to evaluation + evaluation – 12+5+1=18 hours</li> </ul> <p>Total work amount: 18 hours (0.72 ECTS points)</p> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the rules of dispensing drugs from a pharmacy based on a medical order and without a prescription, as well as the drug distribution system in Poland - K_E.W1</p> <p>W2: Knows the principles of drug application depending on the type of medicine form, as well as the type of packaging and dispensing system - K_E.W17</p>

	<p>W3: Knows and understands the legal bases and principles of practicing the profession of pharmacist - K_E.W4</p> <p>W4: Understand the role of pharmacist in the health care system - K_E.W6</p> <p>W5: Knows drug management at the pharmacy - K_E.W7</p>
Learning outcomes - abilities	<p>U1: Differentiates the categories of availability of medicinal products and medical devices and discusses the basic principles of drug management in hospitals - K_E.U1</p> <p>U2: Determines the scope of duties of individual persons belonging to professional staff in pharmacies, including indicates the division of responsibility in the area of dispatching drugs from the pharmacy and providing information about medicines - K_E.U3</p> <p>U3: Indicates medicinal products and medical devices requiring special storage conditions - K_E.U4</p> <p>U4: Indicates the right way to handle the medicine during use, describes the stages of dealing with the drug in an open and hospital pharmacy from the moment of ordering to delivery to the patient, demonstrates how to use medical devices and diagnostic tests, and conducts a conversation with the patient to advise the medicinal product or other product at the pharmacy - K_D.U35</p> <p>U5: Implements a medical prescription using a pharmacy computer program and provides relevant information regarding the medicine dispensed, including the method of taking it, depending on its pharmaceutical form - K_E.U2</p> <p>U6: Conducts a pharmaceutical consultation while dispensing a medicine without a prescription (OTC) - K_E.U14</p> <p>U7: Indicates the correct way of handling medicine by healthcare system employees - K_E.U13</p> <p>U8: Is able to use IT tools in work - K_E.U15</p> <p>U9: Is able to provide information related to complications of pharmacotherapy to healthcare system employees, patients or their families - K_E.U17</p> <p>U10: Is able to conduct a critical analysis of publications on medicines - K_E.U28</p> <p>U11: Is able to comply with the principles of pharmacy ethics - K_E.U30</p>
Learning outcomes – social skills	<p>K1: Is aware of the social conditions and restrictions resulting from the disease and the need to promote health-oriented behavior in the practice of the pharmacist profession - K5</p> <p>K2: Has a habit of supporting assistance and remedial actions in the prevention of diseases and health-promoting activities -K6</p> <p>K3: Has a habit of using information technologies (pharmacy programs) to search and select information related to the dispensing of medicinal products and medical devices - K8</p>
Didactic methods	<p><u>Laboratories:</u></p> <ul style="list-style-type: none"> <li>▪ exploratory teaching methods</li> <li>▪ classic problem methods</li> </ul> <p><u>Seminars:</u></p> <ul style="list-style-type: none"> <li>▪ seminar methods</li> </ul> <p><u>Practical classes:</u></p> <ul style="list-style-type: none"> <li>▪ exploratory teaching methods.</li> </ul>



Preliminary requirements	For the realization of the described subject it is necessary to have basic knowledge about pharmacological and pharmacokinetic properties of drugs, interactions between drugs, ways of their administration, as well as knowledge of physiology, pathophysiology and microbiology.
Brief course description	The subject is aimed at preparing students to practice in a pharmacy. Introduction to issues related to the marketing of medicines, types of prescriptions, the principles of their issuance, implementation, control and recording, types of payment and teaching the use of this knowledge in practice. Teaching the use of various pharmacy computer programs. To provide knowledge about the principles of operation of medical devices and diagnostic tests available in a pharmacy and to teach the patient how to use them.
Entire course description	<p>During the seminars, the student learns the basics of diagnosing and differentiating disease units, i.e. skin disorders, allergic diseases, colds, gastrointestinal tract disorders, nervous system disorders, pain states, urinary tract disorders, blood circulation disorders. The student learns about the laboratory tests available in the pharmacy and the rules of their use, and is introduced to the principles of good pharmacy practice and proper interpersonal communication.</p> <p>During the laboratories, the student acquires the skills of using pharmacy computer programs, rules of recipe execution and applications. On the basis of the prescription, the student analyses for interactions in the pharmacokinetic and pharmacodynamic phase, learns how to prevent interactions, and provides information about the drug and medical devices in the pharmacy. The student learns the rules of proper use and storage of the drug form, as well as nutrition and treatment of pregnant women and children. During practical classes in the pharmacy, the student has the opportunity to learn about the requirements for the management of the pharmacy and the warehouse of ready-made drugs, with particular emphasis on transplantation drugs.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Bouwman Y., Fenton-May V. Le Brun P.(Eds.): Practical Pharmaceutics, 2015</li> <li>2. Hess C. T.; Clinical Guide: Skin &amp; Wound Care, 2012</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>4. Ford S. M.: Roach's Introductory Clinical Pharmacology 2017</li> <li>5. Kominiarek M.A., Rajan P. Nutrition Recommendations in Pregnancy and Lactation. Med Clin North Am. 2016;100(6):1199-1215.</li> <li>6. Sachdeva P., Patel B. G., Patel B. K. Drug use in pregnancy; a point to ponder!. Indian Journal of Pharmaceutical Sciences, 2009, 71(1), 1–7.</li> </ol>

	<p>7. Ritter J., Flower R., Henderson G., Loke Y.K., MacEwan D., Rang H., Rang &amp; Dale's Pharmacology, 2019</p> <p>8. Chisholm-Burns M., Schwinghammer T., Wells B., Malone P., DiPiro J., Kolesar J.M.: Pharmacotherapy Principles and Practice, 2013</p>
Methods and criteria of evaluation	<p>Credit for a grade: W 1-5, U 1-11, Observations: K1-K3</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5 <sup>th</sup> year, 2 <sup>nd</sup> semester (winter)
Form of crediting a subject in the cycle	Graded credit
Form(s) and number of course hours as well as the form of crediting	Laboratories + Practical classes: 49 hours + 1 hour - credit Seminars: 21 hours - Graded credit
Course coordinator(s)	Prof. Jerzy Krysiński
Subject Teachers	<p>Laboratories: Piotr Bilski, PhD Jakub Płaczek, PhD Maciej Karolak, MPharm Marta Czapiewska, MPharm</p> <p>Seminars: Prof. Jerzy Krysiński Piotr Bilski, PhD</p> <p>Practical classes: Prof. Michał Marszał</p>
Course form (character)	Obligatory
Limit of places available in each group	Laboratories: 8 persons Seminars: 30 persons Practical classes: 4 persons
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Laboratories: W 1-5, U 1-11, K 1-3 Seminars: W 1-5, U 1-11, K 1-3 Practical classes: W 1-5, U 1-11, K 1-3
Methods and criteria of the evaluation for the given course form	Laboratories + Practical classes: credit, W 1-5, U 1-11, K 1-3 Seminars: Graded credit, W 1-5, U 1-11, K 1-3  Assessment criteria:

	<p>2 - fail – below 2,99 (below 59,9%)  3 - acceptable – 3,0 – 3,49 (60%-69,9%)  3,5 – satisfactory – 3,50 – 3,83 (70%-76,7%)  4 – good – 3,84 - 4,16 (76,8%-83,3%)  4,5 – very good – 4,17-4,50 (83,4%-90%)  5 – excellent – above 4,50 (above 90%)</p>
List of topics	<p>Laboratories:</p> <ol style="list-style-type: none"> <li>1. Exercises in the use of pharmacy computer programs. Rules of dispensing prescription drugs.</li> <li>2. Analysis of prescriptions in terms of pharmacokinetic and pharmacodynamic phase interactions, ways of preventing interactions, information about the drug.</li> <li>3. Good pharmacy practice.</li> <li>4. Selected medical devices in the pharmacy.</li> <li>5. Providing advice on the correct use and storage of the medicine.</li> <li>6. Selected issues concerning nutrition and treatment of pregnant women and children.</li> </ol> <p>Seminars:</p> <ol style="list-style-type: none"> <li>I. Basics of diagnosing and differentiating selected disease units - family doctor - first seminar.</li> <li>II. Counselling in self-treatment of selected disease units - use of over-the-counter products - topics of students' presentations as a basis for discussion.</li> </ol> <p>Skin disorders, allergic diseases, colds:</p> <ol style="list-style-type: none"> <li>1. Skin allergies, urticaria, acne;</li> <li>2. Itching, atopic skin, excessive sweating;</li> <li>3. Foot mycosis, dermatophytosis;</li> <li>4) Dandruff, hair loss, lice;</li> <li>5. Skin inflammation, herpes, insect bites;</li> <li>6) Psoriasis, sunburn, brittleness and nail discoloration;</li> <li>7. Bedsores, imprints, abrasions, blisters, injuries to the athlete;</li> <li>8. Cuts, disinfectants;</li> <li>9. Care, treatment of wounds and scars;</li> <li>10. Colds, flu - fever, sore throat, hoarseness (children and adults);</li> <li>11. Rhinitis, coughing (children and adults), hay fever;</li> </ol> <p>Gastrointestinal disorders, nervous system disorders, painful states:</p> <ol style="list-style-type: none"> <li>1. Nausea, vomiting, travel sickness;</li> <li>2. Hemorrhoids;</li> <li>3. Obesity;</li> <li>4. Stomach pain, flatulence, heartburn;</li> <li>5. Diarrhea, constipation;</li> <li>6. Gallbladder disorders, lack of appetite;</li> <li>7. Halitosis, toothache, gingivitis,</li> <li>8. Nasal bleeding, xerostomia, aphtha;</li> <li>9. Memory impairment, performance impairment;</li> <li>10. Hypotonia, sluggishness, fatigue;</li> <li>11. Nervousness, anxiety, sleep disorders, depression;</li> <li>12. Headaches, migraine pains;</li> <li>13. Muscular, backache, back, spine, joint pains;</li> <li>14. Earaches.</li> </ol>

	<p>Urinary tract disorders, blood circulation disorders,</p> <ol style="list-style-type: none"> <li>1. Bladder inflammation, incontinence, "weak" bladder;</li> <li>2. Andropause, prostate hypertrophy;</li> <li>3. Menopause, menstrual pains;</li> <li>4. Intimate hygiene;</li> <li>5. Advice for pregnant women (cold, pain, nausea);</li> <li>6. Eye diseases - conjunctival irritation, dry eye syndrome, barley;</li> <li>7. Weakened immune resistance;</li> <li>8. Blood circulation disorders (brain, limbs, varicose veins);</li> <li>9. Nicotine addiction;</li> <li>10. Rheumatic diseases;</li> <li>11. Travel first-aid kit, first-aid kit for the craft industry.</li> <li>12. Basics of interpersonal communication.</li> </ol> <p>Practical classes:</p> <ol style="list-style-type: none"> <li>1. Pharmacy classes.</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

## Pharmacoeconomics

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmacoeconomics</b> Farmakoekonomika
Unit offering the subject	Faculty of Pharmacy Department of Pharmaceutical Technology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1720-f4-FAREKO-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	3
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module E</b> Pharmaceutical practice
Total student workload	1. The workload related to activities requiring the direct participation of academic teachers is: <ul style="list-style-type: none"> <li>– participation in lectures: 26 hours,</li> <li>– participation in exercises: 15 hours,</li> <li>– consultations: 2 hours,</li> <li>– completion of the test: 2 hours.</li> </ul>

	<p>The workload related to activities requiring the direct participation of academic teachers is <b>45 hours</b>, which corresponds to <b>1.50 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 26 hours,</li> <li>– participation in exercises: 15 hours,</li> <li>– preparation for exercises: 5 hours,</li> <li>– reading the indicated literature: 5 hours,</li> <li>– consultations: 2 hours,</li> <li>– preparation to pass and credit: 5 + 2 hours</li> </ul> <p>The total student workload is <b>60 hours</b>, which corresponds to <b>2.00 ECTS credits</b></p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– reading of the indicated scientific literature: 2 hours</li> <li>– research and scientific consultations: 2 hours,</li> <li>– participation in lectures (including research methodology, research results, studies): 26 hours,</li> <li>– participation in exercises covered by scientific activity (including research methodology, research results, studies): 15 hours,</li> <li>– preparation for exercises covered by scientific activity: 2 hours,</li> <li>– preparation to pass in the field of research - science for the subject: 5 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>52 hours</b>, which corresponds to <b>1.73 ECTS points</b></p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>– preparation for exercises + preparation for passing + credit: 6+ 5 + 2 = <b>13 hours (0.43 ECTS point)</b>.</li> </ul> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the difference between health care systems and specific methods of drug management - K_E.W7</p> <p>W2: Knows the basics of health economics and pharmacoeconomics - K_E.W19</p> <p>W3: Distinguishes methods and tools for assessing costs and effects used in economic analyzes of health programs - K_E.W20</p> <p>W4: Knows guidelines for conducting health technology assessment - K_E.W21</p>
Learning outcomes - abilities	<p>U1: Is able to estimate the costs and effects of pharmacotherapy, calculate and interpret cost and effectiveness factors, and assess the chance of implementing a new medical technology into the health care system - K_E.U27;</p> <p>U2: Perform a critical analysis of publications regarding to efficacy, security and economic aspects of pharmacotherapy</p>

	as well as publications regarding to work practice and pharmaceutical market – K_E.U28;
Learning outcomes – social skills	K1: Assesses actions and resolves moral dilemmas related to the costs of treatment processes based on ethical norms and principles - K5 K2: Uses objective sources of information to obtain current knowledge in the field of pharmacoeconomics - K7
Didactic methods	<u>Lectures:</u> <ul style="list-style-type: none"> <li>▪ informative lecture (conventional)</li> <li>▪ multimedia presentation</li> </ul> <u>Practicals:</u> <ul style="list-style-type: none"> <li>▪ classic problem method</li> </ul>
Preliminary requirements	Mathematics Statistics Pharmacology and pharmacodynamics
Brief course description	The course aims to familiarize the student with the drug policy of the state, the basic methods of pharmacoeconomic analysis in the context of rationalizing the cost of pharmacotherapy, transfer of knowledge about the economic basis of the pharmacy and pharmaceutical warehouse and the principles of marketing in pharmacy.
Entire course description	Lectures include the following program content: <ul style="list-style-type: none"> <li>• Fundamentals of pharmacy and medicine economics</li> <li>• Patent protection</li> <li>• Economic issues of refunding the cost of medicines</li> <li>• Drug market in the world and in Poland</li> <li>• Drug distribution market</li> <li>• Promotion and advertising of medicinal products</li> <li>• Parallel import</li> <li>• Drug policy</li> <li>• Hospital prescription as the basis for drug management.</li> </ul> <p><b>The practicals cover the following topics:</b>  Costs in pharmacoeconomics - division, discounting.  Sources of treatment outcome data - phase I, II, III and IV clinical trials, epidemiological studies, quality of life assessment.  Types of pharmacoeconomic analyzes.  Cost analysis of the disease, cost minimization analysis.  Cost effectiveness analysis.  Cost utility analysis.  Cost benefit analysis.  Cost and consequence analysis.  Utility and preferences of health conditions.  Usability measurement.  Direct methods of measuring preferences.  Indirect methods for measuring preferences.  Modeling in pharmacoeconomics.  Cost calculation guidelines.  Guidelines on good pharmacoeconomic practice.  Application of pharmacoeconomic analysis.</p>
References	Primary literature:

	<p>1. Rascati K.L. Essentials of Pharmacoeconomics, Wolters Kluwer/William and Wilkins, Philadelphia , Baltimore, London 2013.</p> <p>2. Arnold Renee J.G. Pharmacoeconomics: from Theory to Practice. CRC Press, London, New York 2009</p> <p>3. Peshek S., Morrison J. A Practical Guide to Pharmacoeconomics, APhA, Washington 2020.</p> <p>Supplementary literature:</p> <p>1. Neudecker K.: Apotheken – Marketing, Deutscher Apotheker Verlag, Stuttgart 2001</p>
Methods and criteria of evaluation	<p>Lectures: Written exam W1 – W4, U1 – U2 Observation: K1, K2</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### G. Course description in the didactic cycle

Space name	Comment
Didactic cycle	4 <sup>st</sup> year, 2 <sup>st</sup> semester (spring)
Form of crediting a subject in the cycle	Lectures and practicals: exam
Form(s) and number of course hours as well as the form of crediting	Lecture: 26 hours - exam Practicals: 15 hours - credit
Course coordinator(s)	Prof. dr hab. Jerzy Krysiński
Subject Teachers	Lecture: Prof. dr hab. Jerzy Krysiński Practicals: Dr farm. Jakub Płaczek
Course form (character)	Obligatory
Limit of places available in each group	Lectures: 4th year students of VIII semester Practicals: groups of 24 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Lectures: K_E.W7, K.E.W19 Practicals: K E.W20, K E.W21, K E.W24
Methods and criteria of the evaluation for the given course form	<p>Lectures: written exam, W1-W4</p> <p>Practicals: written exam, W1-W4, U1-U2, K1-K2</p> <p>Assessment criteria: 2 - insufficient - up to 2.99 (up to 59.9%) 3 - sufficient - 3.0 - 3.49 (60% -69.9%) 3.5 - satisfactory plus - 3.50 - 3.83 (70% -76.7%)</p>

	<p>4 - good - 3.84 - 4.16 (76.8% -83.3%)</p> <p>4.5 - good plus - 4.17-4.50 (83.4% -90%)</p> <p>5 - very good - above 4.50 (above 90%)</p>
List of topics	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Basics of pharmacy and medicine economics</li> <li>2. Patent protection for medicinal products</li> <li>3. Economic issues of reimbursement of drug costs</li> <li>4. Drug market in the world and in Poland</li> <li>5. Drug distribution market</li> <li>6. Promotion and advertising of medicinal products</li> <li>7. Drug policy</li> <li>8. Hospital prescription as the basis for drug management</li> </ol> <p>Practicals:</p> <p>I. Introduction.</p> <ol style="list-style-type: none"> <li>1. Costs in pharmacoeconomics - division, discounting;</li> <li>2. Sources of treatment outcome data - phase I, II, III and IV clinical trials, epidemiological studies, quality of life assessment.</li> </ol> <p>II. Types of pharmacoeconomic analyzes:</p> <ol style="list-style-type: none"> <li>1. Cost analysis of the disease, cost minimization analysis;</li> <li>2. Cost effectiveness analysis;</li> <li>3. Cost utility analysis;</li> <li>4. Cost efficiency analysis</li> <li>5. Costs and consequences analysis.</li> </ol> <p>III. Utility and health preferences:</p> <ol style="list-style-type: none"> <li>1. Usability measurement;</li> <li>2. Direct methods of measuring preferences;</li> <li>3. Indirect methods for measuring preferences;</li> <li>4. Modeling in pharmacoeconomics (2x).</li> </ol> <p>IV.</p> <ol style="list-style-type: none"> <li>1. Guidelines for calculating costs;</li> <li>2. Guidelines for good pharmacoeconomic practice;</li> <li>3. Application of pharmacoeconomic analysis.</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

## Pharmacoepidemiology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmacoepidemiology</b> Farmakoepidemiologia
Unit offering the subject	Faculty of Health Sciences Department of Hygiene, Epidemiology, Ergonomics and Postgraduate Education Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun



Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy full-time studies, long cycle
Subject code	1700-F5-FARME-J
Cod ISCED	(0916) Pharmacy
Number of ECTS points	2
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module E</b> Pharmaceutical practice
Total student workload	<p>1. Obligatory hours realized with the teacher participation:</p> <ul style="list-style-type: none"> <li>– Lecture participation: 20 hours,</li> <li>– Tutorials participation: 20 hours,</li> <li>– Additional possibility for the consultations with the course conducting persons: 2 hours,</li> <li>– Exam: 2 hours.</li> </ul> <p>The workload related to activities requiring direct participation of academic teachers is <b>44 hours</b>, which corresponds to <b>1.47 ECTS points</b>.</p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– Lecture participation: 20 hours,</li> <li>– Tutorials participation: 20 hours,</li> <li>– Preparation and completion of notes: 2 hours,</li> <li>– Collecting and choosing the right materials for classes: 2 hours,</li> <li>– Repetition of material required: 3 hours,</li> <li>– Consultation: 2 hours,</li> <li>– Reading the indicated literature: 2 hours,</li> <li>– Preparation to exam and exam: 7 + 2 = 9 hours.</li> </ul> <p>The total student workload is <b>60 hours</b>, which corresponds to <b>2.00 ECTS credits</b>.</p> <p>3. Workload related to research:</p> <ul style="list-style-type: none"> <li>– reading the indicated scientific literature: 4 hours,</li> <li>– participation in lectures (including research methodology, research results, studies): 10 hours,</li> <li>– research and scientific consultations: 5 hours,</li> <li>– participation in classes covered by scientific activity (using the methodology of scientific research, research results, studies): 20 hours,</li> <li>– preparation for classes covered by scientific activities: 5 hours,</li> <li>– preparation to pass in the field of scientific and scientific research for the Pharmacoepidemiology: 10 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>54 hours</b>, which corresponds to <b>1.80 ECTS points</b>.</p>

	<p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>- preparation for classes + required repetition of material + preparation for exam and exam - 5 + 7 + 2 = <b>14 hours (0.47 ECTS point)</b>.</li> </ul> <p>5. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the principles of organization and financing of the health care system in the Republic of Poland and the role of a pharmacist in this system - K_E.W6</p> <p>W2: Knows and understands the principles of conducting and research organizations involving people, including descriptive and experimental research - K_E.W25</p> <p>W3: Knows and understands the importance of population health indicators - K_E.W24</p> <p>W4: Knows and understands the principles of safety of medicinal products after placing them on the market - K_E.W26</p> <p>W5: principles of health promotion, its objectives and the role of a pharmacist in promoting healthy lifestyle - K_E.W30</p>
Learning outcomes - abilities	<p>U1: Identifies methodological differences between different types of epidemiological studies - K_E.U.20</p> <p>U2: Defines the basic concepts of epidemiology, including pharmacoepidemiology and clinical epidemiology - K_E.U.24</p> <p>U3: Describes the principles of including meta-analysis from research experimental and descriptive - K_E.U.28</p> <p>U4: Describes the basic errors that appear in tests epidemiological and available participation in the promotion health - K_E.U.26</p>
Learning outcomes – social skills	<p>K1: use objective sources of information - K7</p>
Didactic methods	<p><u>Lecture:</u></p> <ul style="list-style-type: none"> <li>▪ informative lecture (conventional),</li> <li>▪ problem lecture with multimedia presentation.</li> </ul> <p><u>Tutorials:</u></p> <ul style="list-style-type: none"> <li>▪ presentations,</li> <li>▪ discussion and problem analysis.</li> </ul>
Preliminary requirements	<p>Knowledge and skills in the scope of included subjects: pharmacology, toxicology, statistics.</p>
Brief course description	<p>The subject of the course is to become familiar with the concepts of health and diseases and how to assess the impact of health. Developing the ability to recognize the state of health threat. Presented methodologies for epidemiological studies as well as methodologies for assessing results and risk estimation. Presented roles and tasks of the epidemiological category in combining the spread of infectious diseases. Presentation of the potential epidemiological used taking into account civilian diseases. Safety in the use of medicines. Pharmacovigilance - monitoring drug activities. Presentation of the pharmaceutical role in the use of drugs in the population. Methodology for assessing the impact of drugs on the health of the population. Principles of good clinical practice in the field of drug testing.</p>
Entire course description	<p>The lectures are designed to:</p> <ul style="list-style-type: none"> <li>- presentation of basic content in the field of epidemiology and their locations, division of epidemiological studies and rules for their</li> </ul>

	<p>implementation, introduction to statistics as part of epidemiological studies, epidemiology of infectious diseases, epidemiology and prevention of selected civilization diseases.</p> <p>-Farmakoepidemiologia. Methodology for assessing the impact of drugs on the health of the population. Drug safety and monitoring of their covered activities. Pharmaceutical tasks in the use of drugs in the population. Drug clinical trials - organization, supervision and monitoring. Performance and risk assessment methods. EBM - medicine used on facts in the field of drug research. The role and tasks of the State Pharmaceutical Inspection in quality control.</p> <p>The seminars are designed to:  Methods of epidemiological studies in environmental reviews: retro and prospective studies. Relative and assigned risk. Screening tests. Diagnostic tests. Measurements of population health.  Recognizing used medicine. Drug morbidity and mortality. Ways to minimize the risk of drug errors.  Clinical epidemiology: clinical drug testing, good clinical practice. Methodology for assessing the impact of drugs on the health of the population.</p>														
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. D. Celentano "Gordis epidemiology" 6th edition, 2018, Elsevier</li> <li>2. R. Beaglehole „Basic epidemiology" 2nd edition, 2006, WHO.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. K. Rothman, Epidemiology: An Introduction, 2012, Oxford University Press</li> <li>2. B. Strom "Textbook of Pharmacoepidemiology", 2013, John Wiley &amp; Sons Ltd</li> </ol>														
Methods and criteria of evaluation	<p>The condition of passing the course is active participation in didactic classes and extending the number of points.</p> <p>Seminars: discussion, development of materials prepared by the seminar teacher.</p> <p>Lectures: Written exam-5 descriptive questions 0-3 points</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>88-100%</td> <td>Very good</td> </tr> <tr> <td>81-87%</td> <td>Good plus</td> </tr> <tr> <td>74-80%</td> <td>Good</td> </tr> <tr> <td>67-73%</td> <td>Satisfactory plus</td> </tr> <tr> <td>60-66%</td> <td>Satisfactory</td> </tr> <tr> <td>0-59%</td> <td>Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Rating	88-100%	Very good	81-87%	Good plus	74-80%	Good	67-73%	Satisfactory plus	60-66%	Satisfactory	0-59%	Unsatisfactory
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0-59%	Unsatisfactory														
Practical training as part of course	Not applicable according to the educational program														

B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5 <sup>th</sup> year, IX <sup>th</sup> semester (winter)

Form of crediting a subject in the cycle	Exam														
Form(s) and number of course hours as well as the form of crediting	Lecture: 10 hours - Exam Tutorial: 20 hours - Pass without a grade														
Course coordinator(s)	dr n. med. Małgorzata Szady-Grad														
Subject Teachers	dr n. med. Małgorzata Szady-Grad dr n. med. Małgorzata Andrzejewska														
Course form (character)	Obligatory														
Limit of places available in each group	Lecture: students 5 <sup>th</sup> year, IX <sup>th</sup> semester (winter) Tutorial: groups of students 11-15														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using distance learning methods and techniques	Not applicable														
Course website	Not applicable														
Learning outcomes determined for the given course form	Lecture: W1, W2, W3, W4, W5, K2 Tutorials: U1, U2, U3, U4, K1														
Methods and criteria of the evaluation for the given course form	The condition of passing the course is active participation in didactic classes and extending the number of points. Seminars: discussion, development of materials prepared by the seminar teacher. Lectures: Written exam-5 descriptive questions 0-3 points <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>88-100%</td> <td>Very good</td> </tr> <tr> <td>81-87%</td> <td>Good plus</td> </tr> <tr> <td>74-80%</td> <td>Good</td> </tr> <tr> <td>67-73%</td> <td>Satisfactory plus</td> </tr> <tr> <td>60-66%</td> <td>Satisfactory</td> </tr> <tr> <td>0-59%</td> <td>Unsatisfactory</td> </tr> </tbody> </table>	Percentage of points	Rating	88-100%	Very good	81-87%	Good plus	74-80%	Good	67-73%	Satisfactory plus	60-66%	Satisfactory	0-59%	Unsatisfactory
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74-80%	Good														
67-73%	Satisfactory plus														
60-66%	Satisfactory														
0-59%	Unsatisfactory														
List of topics	<u>Topics of lectures:</u> 1. Division of epidemiological studies and principles of their performance. 2. Introduction to statistics as part of epidemiological studies. 3. Epidemiology of infectious diseases. 4. Epidemiology and prevention of selected civilization diseases. 5. Safety of medicines and monitoring of their activities covered. 6. Pharmaceutical tasks in the use of drugs in the population. 7. Clinical trials of medicines - organization, supervision and monitoring. 8. Methods for assessing results and risk assessment. 9. EBM - medicine used on facts in the field of drug research. 10. The role and tasks of the State Pharmaceutical Inspection in quality control. <u>Seminar topics:</u> 1. Retro and prospective studies.														

	2. Relative and assigned risk. 3. Screening tests. 4. Measurements of population health. 5. Standardization of coefficients. 6. Statistics in epidemiology. 7. Planning an epidemiological study. 8. Principles of pharmaceutical supervision. 9. Good distribution practice - quality assurance in a pharmaceutical warehouse. 10. Clinical epidemiology: clinical trials of drugs, good clinical practice. 11. Methodology for assessing the impact of drugs on public health.
Didactic methods	The same as in part A
References	The same as in part A

## Pharmacotherapy and drug information

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmacotherapy and drug information</b>
Unit offering the subject	Faculty of Pharmacy Department of Pharmacodynamics and Molecular Pharmacology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1724-F5-FARINL-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	2
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module E</b> Pharmaceutical practice
Total student workload	1. The workload related to activities requiring the direct participation of academic teachers is: <ul style="list-style-type: none"> <li>– participation in lectures: 20 hours,</li> <li>– participation in laboratories: 25 hours,</li> <li>– participation in exercises: 30 hours,</li> <li>– participation in practical classes in the hospital ward: 6 hours,</li> <li>– participation in scientific and research consultations: 1 hour.</li> </ul>

	<p>The workload related to activities requiring direct participation of academic teachers is <b>82 hours</b>, which corresponds to <b>3.28 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>- participation in lectures: 20 hours,</li> <li>- participation in laboratories: 25 hours,</li> <li>- participation in exercises: 30 hours,</li> <li>- participation in practical classes in the hospital ward: 6 hours,</li> <li>- participation in scientific and research consultations: 1 hour,</li> <li>- preparation for classes: 10 hours,</li> <li>- preparation for tests: 8 hours.</li> </ul> <p>The total student workload is <b>100 hours</b>, which corresponds to <b>4.00 ECTS credits</b>.</p> <p>3. The workload related to conducted scientific research</p> <ul style="list-style-type: none"> <li>- reading of the indicated scientific literature: 1 hour,</li> <li>- participation in lectures (including research methodology, research results, studies): 10 hours,</li> <li>- research and scientific consultations: 1 hour</li> <li>- participation in classes covered by scientific activity (including research methodology, research results, studies): 22 hours,</li> <li>- preparation for classes covered by scientific activity: 6 hours,</li> <li>- preparation to pass in the field of research and development for the subject: 2 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>42 hours</b>, which corresponds to <b>1.68 ECTS points</b>.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>- preparation for classes - 4 hours,</li> <li>- preparation for tests - 8 hours,</li> </ul> <p>The total student workload related to the conducted research is <b>12 hours</b>, which corresponds to <b>0.48 ECTS points</b>.</p> <p>5. Time required to complete the compulsory apprenticeship (s) - not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the possible risks associated with the independent use of drugs by patients, as well as possible ways to prevent them - K_E.W15</p> <p>W2: Knows the frequency and genesis of addiction to drugs and other substances, and skillfully defines the position and role of the pharmacist in combating addiction and the skillful use of indicators helpful in determining the health of the population - K_E.W16, K_E.W24</p> <p>W3: Knows the different stages of drug research, experimental research and involving people along with the definition of</p>

	<p>ethical and legal principles and the role of the pharmacist in conducting them - K_E.W22, K_E.W23</p> <p>W4: Knows the principles of monitoring the safety of medicinal products after placing them on the market - K_E.W26</p>
Learning outcomes - abilities	<p>U1: Is able to efficiently use various sources of information about a drug by critically interpreting this information; accurately and quickly search for available scientific information on medicinal substances and products and prepare a pharmacotherapy monitoring plan based on them - K_E.U25, K_C.U34</p> <p>U2: Is able to determine the methods and principles of assessing the effectiveness and safety of therapy and predict the impact of various factors on the pharmacokinetic and pharmacodynamic properties of drugs - K_E.U9, K_E.U16</p> <p>U3: Is able to independently propose optimal and individual pharmacotherapy for the patient and explain the individualization of drug dosage in the patient in clinical settings - K_E.U10, K_E.U-16</p> <p>U4: Is able to cooperate with employees of the healthcare system, including actively participating in the work of the therapeutic team and clinicians - K_E.U23</p> <p>U5: Is able to propose a plan for conducting clinical trials, in particular in the scope of supervising the quality of the investigational medicinal product, and monitoring the clinical trial, and skilfully proposes techniques for managing the management of medicinal products and medical devices intended for clinical trials - K_E.U24</p>
Learning outcomes – social skills	<p>K1: Is ready to establish correct interpersonal relations based on mutual respect and trust, including confidentiality regarding health, patient rights and principles of professional ethics - K1, K4</p> <p>K2: Is ready to use the team potential to act to achieve successful tasks - K3</p> <p>K3: Uses objective sources of information in his daily duties including Evidence Based Medicine - K7</p> <p>K4: Is ready to make responsible decisions at work, guaranteeing the safety of himself and others - K10</p>
Didactic methods	<p>Lecture:</p> <ul style="list-style-type: none"> <li>- informative lecture (conventional) with the elements of multimedia presentation,</li> <li>- problem lecture.</li> </ul> <p>Tutorials:</p> <ul style="list-style-type: none"> <li>- teaching assisted with a multimedia presentation,</li> <li>- teaching discussion method,</li> <li>- case studies,</li> <li>- analysis of texts with discussion.</li> </ul> <p>Labs:</p> <ul style="list-style-type: none"> <li>- teaching assisted with a multimedia presentation,</li> <li>- teaching discussion method,</li> <li>- case studies,</li> <li>- analysis of texts with discussion.</li> </ul> <p>Practicals at the hospital ward:</p> <ul style="list-style-type: none"> <li>- case studies,</li> <li>- teaching discussion method.</li> </ul>

Preliminary requirements	Basic knowledge in the field of anatomy, physiology as well as pharmacokinetics and pharmacodynamics.
Brief course description	Pharmacotherapy and drug information is one of the leading subjects in the field of Pharmacy. The course extends the knowledge acquired in previous years of studies by the mechanisms of action and side effects of drugs, and allows you to understand the treatment regimens based on using various drugs. Due to the complexity of the issues, students use knowledge acquired in other subjects, such as physiology, biochemistry, biology, etc. Active participation in the exercises enables discussion on a given topic, especially the issues related to the mechanisms of drug action and drug resistance, which are the subject of constant research and require updating knowledge based on most recent scientific publications. The subject matter includes mainly clinical issues, which are the most important problems from a civilization diseases perspective (cancer, cardiovascular diseases, diabetes).
Entire course description	As part of the lectures, students will learn about the following issues: how medical standards can help in the pharmaceutical care based on the latest ESC guidelines for the hypertension treatment; treatment of lipid disorders; current standards of coronary heart disease and myocardial infarction treatment; treatment and prevention of venous thromboembolism; current guidelines for the prevention and treatment of diabetes; pharmacotherapy of asthma and selected allergic diseases; basic principles of pain management; the importance of OTC drugs, herbal and homeopathic preparations in contemporary pharmaceutical care; ways to deal with disease symptoms often reported by patients at the pharmacy: cough, diarrhea, constipation; the problem of addiction and drug abuse. Tutorials will allow students to become familiar with the issues of: carcinogenesis mechanisms and drug resistance phenomenon; mechanisms of action of particular groups of anticancer drugs and their side effects; pain treatment in oncology, as well as treatment of various types of osteoporosis. Practical classes include participation in the work of clinicians, nurses and laboratory diagnosticians at the university hospital ward. Students will have the opportunity to learn about the pharmacist's work in the hospital conditions.
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Bertram Katzung, Susan Masters, Anthony Trevor Basic and Clinical Pharmacology.</li> <li>2. James Ritter, Rod Flower, Graeme Henderson, Yoon Kong Loke, David MacEwan, Humphrey Rang - Rang &amp; Dale's Pharmacology.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Ernst Mutschler and Hartmut Derendorf, Drug Actions; Basic Principles and Therapeutic Aspects.</li> </ol>
Methods and criteria of evaluation	The basis for passing the subject of Pharmacotherapy and drug information is compliance with the rules set out in the didactic regulations of the Department of Pharmacodynamics and Molecular Pharmacology.



	<p>Colloquia: test form, minimum passing threshold: 60% correct answer to the questions; the obligation to pass each colloquium entitles to pass this part of the subject and take the exam.</p> <p>Final exam: The course ends with an exam. Descriptive form - 5-6 questions; minimum passing threshold: 60% of correct answers to questions.</p> <p>The point values of individual grades are as follows:</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>90-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>85-89%</td> <td>Very good (4.5)</td> </tr> <tr> <td>80-84%</td> <td>Good (4)</td> </tr> <tr> <td>75-79%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-74%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table> <p>Colloquia: &gt;60% Final exam: &gt;60%</p>	Percentage of points	Grade	90-100%	Excellent (5)	85-89%	Very good (4.5)	80-84%	Good (4)	75-79%	Satisfactory (3.5)	60-74%	Acceptable (3)	0-59%	Fail (2)
Percentage of points	Grade														
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80-84%	Good (4)														
75-79%	Satisfactory (3.5)														
60-74%	Acceptable (3)														
0-59%	Fail (2)														
Practical training as part of course	Not applicable according to the educational program														

#### H. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5 <sup>th</sup> year, 9 <sup>th</sup> semester (winter)
Form of crediting a subject in the cycle	Lecture: exam resulting with a final grade Tutorials: credit Labs: credit Practicals at the hospital ward: credit
Form(s) and number of course hours as well as the form of crediting	Lecture: 20 hours – exam resulting with a final grade Tutorials: 25 hours – credit Labs: 15 hours – credit Practicals at the hospital ward: 6 hours – credit
Course coordinator(s)	Prof. dr hab. Grzegorz Grzešek
Subject Teachers	<p>Lecture: prof. dr hab. Grzegorz Grzešek</p> <p>Tutorials: dr Anna Sloderbach</p> <p>Labs: dr hab. Barbara Bojko, prof. UMK dr Anna Sloderbach dr Krzysztof Goryński</p> <p>Practicals at the hospital ward: prof. dr hab. Grzegorz Grzešek dr Marta Bilka dr Wojciech Gilewski lek. Mateusz Kusiak</p>
Course form (character)	Obligatory
	Lecture: all students of 5 <sup>th</sup> year of pharmacy studies

Limit of places available in each group	Tutorials: groups of max 12 students Labs: groups of max 30 students Practicals at the hospital ward: groups of max 6 students
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	
Subject website	<a href="https://www.wf.cm.umk.pl/kfifm/">https://www.wf.cm.umk.pl/kfifm/</a>
Learning outcomes determined for the given course form	<b>Lectures:</b> W1-W7, U1-U5, K2-K4 <b>Laboratories:</b> W1-W5, U1-U8, K1-K3
Methods and criteria of the evaluation for the given course form	The condition of passing the course is active participation in classes (obligatory attendance) and achieving the result of minimum 60% of the correct answers on each colloquium (test form), and then minimum 60% of the correct answers on final exam (descriptive form).
List of topics	Lectures: 1. Treatment of hypertension. 2. Treatment of lipid metabolism disorders, current standards of treatment of coronary heart disease and myocardial infarction. 3. Treatment and prevention of venous thromboembolism; Current guidelines for the prevention and treatment of diabetes. 4. Pharmacotherapy of asthma and selected allergic diseases. 5. Drug groups, their use, interactions and side effects based on clinical cases.  Tutorials: 1. Molecular mechanisms and genes involved in the process of carcinogenesis. DNA repair systems. Stages of carcinogenesis. Angiogenesis in cancer development. 2. Anti-cancer drugs: alkylating drugs, anti-metabolites, topoisomerase-active drugs. Cytostatic antibiotics. Taxanes. Side effects of anti-cancer drugs. Resistance to selected anti-cancer drugs. 3. Targeted therapies in oncology. 4. Treatment of pain and vomiting in oncology.  Labs: 1. Osteoporosis - types, treatment. 2. Diabetes – treatment. 3. Pharmacotherapy of gastrointestinal diseases. 4. New registrations in selected disease entities. 5. Pharmacotherapy of thyroid disease. 6. Pharmacotherapy of respiratory diseases. 7. Antibiotic therapy of systemic infections. 8. Pharmacotherapy of cardiovascular diseases.  Practicals at the hospital ward: 1. Selected issues of clinical pharmacology – part 1. 2. Selected issues of clinical pharmacology – part 2.
Didactic methods	Lecture: - informative lecture (conventional) with the elements of multimedia presentation,

	<ul style="list-style-type: none"> <li>- problem lecture.</li> </ul> <p>Tutorials:</p> <ul style="list-style-type: none"> <li>- teaching assisted with a multimedia presentation,</li> <li>- teaching discussion method,</li> <li>- case studies,</li> <li>- analysis of texts with discussion.</li> </ul> <p>Labs:</p> <ul style="list-style-type: none"> <li>- teaching assisted with a multimedia presentation,</li> <li>- teaching discussion method,</li> <li>- case studies,</li> <li>- analysis of texts with discussion.</li> </ul> <p>Practicals at the hospital ward:</p> <ul style="list-style-type: none"> <li>- case studies,</li> <li>- teaching discussion method.</li> </ul>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Basic &amp; Clinical Pharmacology, 12e, BG Katzung (EN)</li> <li>2. Katzung BG: Farmakologia ogólna i kliniczna- Wydanie I polskie, Czelej 2012 (PL)</li> <li>3. Janiec W. Farmakodynamika. Podręcznik dla studentów farmacji- Wydanie 1, PZWL 2009</li> <li>4. www.mp.pl</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Farmakologia i toksykologia Red. E Mutschler i wsp., red. nauk. W. Buczko (wydanie III poprawione i uzupełnione).</li> </ol>

## History of Pharmacy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>History of Pharmacy</b> (Historia farmacji)
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	9001-eBHP
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	1
Form of crediting	Grading
Language of instruction	English
Designation whether a subject may be credited more than once	No

Subject group	<p style="text-align: center;">Obligatory course <b>Course module E</b> Pharmaceutical Practice</p>
Total student workload	<p>1. The workload related to activities requiring the direct participation of academic teachers is:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 15 hours,</li> <li>– additional opportunity to consult with tutors: 1 hours</li> <li>– participation in test: 1,5 hours</li> </ul> <p>The workload related to the activities requiring the direct participation of academic teachers is <b>17.5 hours</b>, which corresponds to <b>0.70 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 15 hours,</li> <li>– preparation of materials for classes: 1 hours,</li> <li>– repetition of material required: 2 hours,</li> <li>– additional opportunity to consult with tutors: 1 hours</li> <li>– reading the indicated literature: 2 hours,</li> <li>– preparation to pass and participation in test: 2 + 2 = 4 hours.</li> </ul> <p>The total student workload is <b>25 hours</b>, which corresponds to <b>1.00 ECTS credits</b>.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– reading of the indicated scientific literature: 2 hours,</li> <li>– research and scientific consultations: 0 hours,</li> <li>– participation in lectures (including research methodology, research results, studies): 2,5 hours,</li> <li>– gathering and choosing the right materials for classes: 5 hours,</li> <li>– preparation to pass in the field of research and development for the subject: 0 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>9.5 hours</b>, which corresponds to <b>0.37 ECTS points</b></p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>– prepare for test: 6 hours,</li> </ul> <p>The time required to prepare and participate in the assessment process is <b>6 hours</b>, which corresponds to <b>0.24 ECTS points</b>.</p> <p>5. Time required to undergo compulsory practice: not applicable</p>
Learning outcomes – knowledge	W1: knows the directions of development of professional and scientific pharmacy, as well as the development of historical philosophical thought and ethical grounds for

	<p>resolving moral dilemmas related to the profession of pharmacist and medical professions. K_E.W27</p> <p>W2: knows the psychological and sociological conditions of an individual's functioning in society. K_A.W28</p>
Learning outcomes - abilities	U1: initiates and supports group activities, influences the formation of attitudes and assistance and remedial actions, and knows how to manage human teams. K_A.U22
Learning outcomes – social skills	<p>K1: assesses actions and resolves moral dilemmas based on ethical norms and principles. K_A.K1</p> <p>K2: is aware of social conditions and restrictions resulting from the disease and the need to promote health-promoting behaviors K_A.K2</p>
Didactic methods	Problem-based lecture with multimedia presentation.
Preliminary requirements	
Brief course description	The subject "history of pharmacy" raises ten issues related to the shaping and development of pharmacy (protopharmacy) from the time of the earliest civilizations (around 3000 - 2500 B.C.) to the beginning of the 20th century AD.
Entire course description	<p>The lectures are designed to:</p> <ul style="list-style-type: none"> <li>- familiarize students with knowledge of the history of pharmacy from prehistoric times to the mid-20th century AD,</li> <li>- cause students to understand the processes taking place in the field of pharmacy (protopharmacy) from around 3000-2500 B.C. until the beginning of the 20th century CE,</li> <li>- develop students' ability to apply knowledge related to the past of pharmacy in order to create a proper perspective regarding the current situation,</li> <li>- develop students' ability to analyze processes occurring in the history of pharmacy and to synthesize data in order to draw conclusions and assess the past and the current situation</li> <li>- teach students how to evaluate former pharmacy and, in relation to them, contemporary pharmacy,</li> <li>- make students more sensitive to the fate / fate of man and society.</li> </ul>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Anderson S. Making medicines: A brief history of Pharmacy and Pharmaceuticals, 1<sup>st</sup> edition,</li> <li>2. Bousset P. History of Pharmacy and the Pharmaceutical Industry, 1983</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Griggs B. Green Pharmacy: The History and Evolution of Western Herbal Medicine</li> <li>2. Brown Xramis V. Medicine and Pharmacy, 1956</li> </ol>
Methods and criteria of evaluation	Test: Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5 <sup>st</sup> year, 9 <sup>st</sup> semester (fall)
Form of crediting a subject in the cycle	Lecture: credit with a grade
Form(s) and number of course hours as well as the form of crediting	Lecture: 15 hours, credit with a grade
Course coordinator(s)	Mgr Paweł Drygas
Subject Teachers	Mgr Paweł Drygas
Course form (character)	Obligatory
Limit of places available in each group	Lectures: 5th year students, 9th (winter) semester
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Lectures: W1-W2, U1, K1-K2
Methods and criteria of the evaluation for the given course form	Lectures: Obligatory presence. oral test - 3 descriptive questions 0-10 points, 4 descriptive questions 0-5 points, total > 60%.
List of topics	<p>Topics of lectures</p> <ol style="list-style-type: none"> <li>1. The birth of the drug, ancient therapies, medicine and medicine in antiquity,</li> <li>2. The period of domination of Galen's teachings,</li> <li>3. The importance and contribution of Arabic science to the development of the drug form,</li> <li>4. The development of modern medicine - the activities and views of Paracelsus, Andreas Vesalius and William Harvey,</li> <li>5. The evolution of the concepts of health and disease from prehistoric times to the 20th century AD,</li> <li>6. Development of clinical medicine and related specialties,</li> <li>7. Achievements in medicine and basic sciences (history of pain management, antiseptics and aseptics),</li> <li>8. Medical microbiology - activities and views of Ludwik Pasteur, Robert Koch, Odo Bujwid and Rudolf Weigel,</li> <li>9. The development of pharmacy in recent times - organic synthesis, achievements of world research on drugs in the 20th century - discoveries of enzymes, hormones, vitamins, sulfonamides and antibiotics,</li> <li>10. Natural and unconventional methods of treatment. History and the present.</li> </ol>
Didactic methods	<ol style="list-style-type: none"> <li>1. Conducting lectures using elements of problem teaching.</li> <li>2. Introducing multimedia support.</li> </ol>
References	The same as in part A

## Pharmaceutical Care

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmaceutical Care</b> (Opieka farmaceutyczna)
Unit offering the subject	Faculty of Pharmacy Department of Pharmaceutical Technology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1720-F5-OPF-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	2
Form of crediting	Graded credit
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module E</b> Pharmaceutical Practice
Total student workload	<p>1. Obligatory hours realized with the teacher participation</p> <ul style="list-style-type: none"> <li>– Laboratories participation – 25 hours</li> <li>– Consultations – 2 hour</li> <li>– Evaluation participation – 1 hour</li> </ul> <p>Total work amount: <b>28 hours (1.00 ECTS point)</b></p> <p>2. Time spent by the student on the individual work:</p> <ul style="list-style-type: none"> <li>– Laboratories participation – 25 hours</li> <li>– Preparation and completion of notes – 11 hours</li> <li>– Obligatory material revision – 15 hours</li> <li>– Consultations – 2 hour</li> <li>– Preparation and participation in evaluation – 2+1 hours</li> </ul> <p>Total work amount: <b>56 hours (2.00 ECTS points)</b></p> <p>3. Time spent by the student on the research activity:</p> <ul style="list-style-type: none"> <li>– Reading referenced literature – 3 hours</li> <li>– Consultations – 1 hour</li> <li>– Laboratories participation (including research methodology, results, conclusions) – 25 hours</li> </ul>

	<ul style="list-style-type: none"> <li>– Preparation for laboratories including research activity – 5 hours</li> <li>– Preparation for evaluation in research aspect – 2 hours</li> </ul> <p><b>Total work amount: 36 hours (1.28 ECTS points)</b></p> <p>4. Time required for the preparation and participation in evaluating process:</p> <ul style="list-style-type: none"> <li>– Preparation for laboratories – 10 hours</li> <li>– Test preparation – 2+1 hours</li> </ul> <p><b>Total work amount: 13 hours (0.46 ECTS points)</b></p> <p>2. Time required for the practical training completion – not applicable.</p>
Learning outcomes – knowledge	<p>W1: Knows the idea of pharmaceutical care and concepts related to pharmaceutical care, in particular relating to problems and needs associated with the use of medicines; K_E.W8.</p> <p>W2: Knows the principles of monitoring the effectiveness and safety of patient's pharmacotherapy in the pharmaceutical care process; K_E.W9.</p> <p>W3: Knows the principles of individualization of pharmacotherapy taking into account the differences in drug effects caused by physiological factors in disease states in clinical conditions; K_E.W10.</p> <p>W4: Knows the basic scientific sources of information on medicines; K_E.W11.</p> <p>W5: Knows the principles of evidence-based therapeutic management; K_E.W12.</p> <p>W6: Knows standards and guidelines for therapeutic management; K_E.W13.</p> <p>W7: Knows the role of pharmacist and representatives of other medical professions in the therapeutic team; K_E.W14.</p> <p>W8: Knows the principles of health promotion, its tasks and the role of a pharmacist in promoting a healthy lifestyle. K_E.W30.</p>
Learning outcomes - abilities	<p>U1: Is able to plan, organize and conduct pharmaceutical care; K_E.U5.</p> <p>U2: Is able to conduct pharmaceutical consultations in the process of pharmaceutical care and pharmaceutical consulting; K_E.U6.</p> <p>U3: Is able to cooperate with a doctor in the field of optimization and rationalization of therapy in closed and open treatment; K_E.U7.</p> <p>U4: Is able to select over-the-counter medications for medical conditions that do not require medical consultation; K_E.U8.</p> <p>U5: Is able to prepare a pharmacotherapy monitoring plan; K_E.U9.</p> <p>U6: Is able to perform and explain the individualization of drug dosage; K_E.U10.</p>



	<p>U7: Can choose the form of drug for the patient, taking into account clinical recommendations, patient needs and product availability; K_E.U11.</p> <p>U8: Can indicate the right way to handle the drug during its use by the patient and provide information about the drug; K_E.U12.</p> <p>U9: Can predict the impact of various factors on the pharmacokinetic and pharmacodynamic properties of drugs; K_E.U16.</p> <p>U10: Is able to identify the risks associated with the use of pharmacotherapy in various groups of patients and plan preventive actions; K_E.U18.</p> <p>U11: Is able to participate in activities for the promotion of health and prevention; K_E.U26.</p> <p>U12: Knows how to comply with the rights of the patient in the pharmacy; K_E.U31.</p>
Learning outcomes – social skills	<p>K1: Is aware of social conditions and restrictions resulting from the disease and the need to promote health-promoting behaviors implemented as part of pharmaceutical care.</p> <p>K2: Has a habit of using information technologies to search and select information on medicines, side effects, interactions and current health recommendations during the implementation of the pharmaceutical care program.</p> <p>K3: Has the ability to work in a therapeutic team consisting of representatives of medical professions and patients.</p>
Didactic methods	<p><u>Laboratories:</u></p> <ul style="list-style-type: none"> <li>▪ classic problem method</li> </ul>
Preliminary requirements	<p>Pharmacodynamics</p> <p>Pharmacotherapy</p> <p>Sociology</p>
Brief course description	The idea of pharmaceutical care. Practical aspects of conducting pharmaceutical care in the Polish health system.
Entire course description	<p>Students become familiar with the idea of pharmaceutical care, its definition and basic assumptions.</p> <p>Students learn to detect and prevent drug problems, provide the patient with information about the drug to improve the effectiveness and safety of medicinal products. The problem of multi-drug therapy is discussed.</p> <p>Students learn to set therapeutic goals and monitor their implementation.</p>
References	<p>Primary literature:</p> <ol style="list-style-type: none"> <li>1. Alves da Costa, F., van Mil, J.W.F., Alvarez-Risco, A. The Pharmacist Guide to Implementing Pharmaceutical Care, Springer, 2019.</li> <li>2. Rutter, P. Community Pharmacy, Symptoms, Diagnosis and Treatment, 4<sup>th</sup> Edition, Elsevier, 2017.</li> </ol> <p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. PCNE Classification for Drug Related Problems</li> </ol>

	<ol style="list-style-type: none"> <li>2. The American Geriatrics Society (AGS) 2019 Updated Beers Criteria for Potentially Inappropriate Medication (PIM) Use in Older Adults, <i>JAGS</i>, 2019, 00:1-21.</li> <li>3. Renom-Guiteras, A., Meyer, G., Thürmann, P. A. The EU(7)-PIM list: a list of potentially inappropriate medications for older people consented by experts from seven European countries. <i>European Journal of Clinical Pharmacology</i>, 71(7), 2015, 861–875.</li> <li>4. Global Initiative for Chronic Obstructive Lung Disease, Guide to COPD diagnosis, management and prevention, 2019.</li> <li>5. Global Initiative for Asthma, Guide for Asthma Management and Prevention, 2019.</li> <li>6. Smolen J.S., Landewé R.B.M., Bijlsma J.W.J., et al. EULAR recommendations for the management of rheumatoid arthritis with synthetic and biological disease-modifying antirheumatic drugs: 2019 update, <i>Annals of the Rheumatic Diseases</i>.</li> </ol>
Methods and criteria of evaluation	<p>Test: W1-W8; U1-U12</p> <p>Practical performance of tutorials: K1-K3</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5 <sup>th</sup> year, 1 <sup>st</sup> semester (winter)
Form of crediting a subject in the cycle	Laboratories: Graded credit
Form(s) and number of course hours as well as the form of crediting	Laboratories: 25 hours, graded credit
Course coordinator(s)	Prof. Jerzy Krysiński
Subject Teachers	Laboratories: Maciej Karolak, MPharm Marta Czapiewska, MPharm
Course form (character)	Obligatory
Limit of places available in each group	Laboratories: 8
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Laboratories: W1-W8; U1-U12; K1-K3
Methods and criteria of the evaluation for the given course form	<p>Assessment criteria:</p> <p>2 – Fail – up to 2.99 (up to 59.9%)</p> <p>3 – Acceptable – 3.0 - 3.49 (60% -69.9%)</p>

	3.5 – Satisfactory – 3.50 - 3.83 (70% -76.7%) 4 – Good – 3.84 - 4.16 (76.8% -83.3%) 4.5 – Very good – 4.17-4.50 (83.4% -90%) 5 – Excellent – above 4.50 (above 90%)
List of topics	Laboratories: 1. Introduction to pharmaceutical care. Pharmacotherapy in pharmaceutical care. Giving advice in minor ailments. 2. Pharmaceutical care of patients with chronic diseases: hypertension, asthma, COPD, atrial fibrillation, IBS, Crohn's syndrome, schizophrenia, hyperthyroidism, hypothyroidism, hormonal contraception and others. 3. Practical application of pharmaceutical care principles during filling medical prescriptions. 4. Practical application of pharmaceutical care principles based on selected countries experience. 5. Theoretical and practical test covering issues from exercises 1-5.
Didactic methods	The same as in part A
References	The same as in part A

## Pharmaceutical Law

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Pharmaceutical Law</b> Prawo farmaceutyczne
Unit offering the subject	Faculty of Pharmacy Department of Pharmaceutical Technology Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1715-F5-PRFA-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	3
Form of crediting	Exam
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module E</b> Pharmaceutical Practice
Total student workload	1. The workload related to activities requiring the direct participation of academic teachers is: – participation in lectures: 26 hours – participation in classes: 24 hours – consultation: 2 hours – completion of the test: 2 hours.

	<p>The workload related to activities requiring direct participation of academic teachers is <b>54 hours</b>, which corresponds to <b>2.16 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>- participation in lectures: 26 hours,</li> <li>- participation in exercises: 24 hours,</li> <li>- preparation for exercises: 12 hours,</li> <li>- reading the indicated literature: 4 hours,</li> <li>- consultations: 2 hours,</li> <li>- preparation to pass and pass: 5 2 hours</li> </ul> <p>The total student workload is <b>75 hours</b>, which corresponds to <b>3 ECTS credits</b>.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>- reading of the indicated scientific literature: 4 hours,</li> <li>- research and scientific consultations: 2 hours</li> <li>- participation in lectures (including research methodology, research results, studies): 20 hours,</li> <li>- participation in exercises covered by scientific activity (including research methodology, research results, studies): 18 hours,</li> <li>- preparation for exercises covered by scientific activity: 8 hours,</li> <li>- preparation to pass in the field of research and development for the subject: 8 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>60 hours</b>, which corresponds to <b>2.40 ECTS points</b>.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>- preparation for classes preparation for passing credit: 4 5 2 = <b>11 hours (0.44 ECTS point)</b>.</li> </ul> <p>5. Time required to undergo compulsory practice:</p> <ul style="list-style-type: none"> <li>- not applicable</li> </ul>
Learning outcomes – knowledge	<p>Knows the legal basis and principles of organization of the pharmaceutical market in the field of retail trade in the Republic of Poland and the functioning of public and hospital pharmacies - K_E.W1</p> <p>Understands the principles of organization and functioning of the retail and wholesale pharmaceutical market in the Republic of Poland - K_E.W2</p> <p>Knows the rules for issuing, recording and implementing prescriptions and the rules for dispensing medicines from the pharmacy and other entities authorized to distribute medicines - K_E.W3</p> <p>Knows the legal basis and principles of practicing the profession of pharmacist, including regulations regarding obtaining the right to practice the profession of pharmacist and the functioning of the pharmacy self-government - K_E.W4</p> <p>Knows the organization of the production process of</p>

	<p>medicinal products and the legal regulations for their registration - K_E.W5</p> <p>Understands the role of pharmacist in the health care system - K_E.W6</p> <p>Distinguishes the rules of placing medicinal products on the market and the remaining range of pharmacies, i.e. medical devices, dietary supplements, foodstuffs for particular nutritional uses and cosmetics - K_E.W18</p> <p>Legal basis and principles of conducting and organising drug testing, including experimental testing and testing involving people – K_E.W22;</p> <p>Legal, ethical and methodological aspects of conducting clinical studies and the role of a pharmacist in such studies – K_E.W23;</p>
Learning outcomes - abilities	<p>Is able to monitor and report adverse drug effects - K_E.U17</p> <p>Is able to identify the role and tasks of individual pharmacy self-government bodies as well as the rights and obligations of its members - K_E.U19</p> <p>Is able to indicate the basic ethical problems related to modern pharmacy - K_E.U22</p>
Learning outcomes – social skills	<p>Observe secrecy concerning health, patient’s rights and rules of professional ethics – K4;</p>
Didactic methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>– informative lecture (conventional)</li> <li>– multimedia presentation</li> </ul> <p>Practicals:</p> <ul style="list-style-type: none"> <li>– classic problem method</li> </ul>
Preliminary requirements	<p>Librarian training</p>
Brief course description	<p>The course aims to familiarize the student with the role and function of law in the field of public health, transfer knowledge of legal acts in pharmacy, act in the conditions of respect and compliance with the law and conduct in the spirit of intellectual property protection in pharmacy.</p>
Entire course description	<p>Lectures include the following program content:</p> <p>Basic information about law, public health law.</p> <p>Legal acts regulating: activities of public and hospital pharmacies, production and marketing of medicinal products and medical devices, advertising of medicinal products, activities of pharmaceutical wholesalers.</p> <p>Pharmaceutical inspection law.</p> <p>Law on the profession of pharmacist and pharmacy self-government.</p> <p>Protection of intellectual property in pharmacy.</p> <p>Medical devices law.</p> <p>Rules for the reimbursement of medicines, foods for particular nutritional uses and medical devices.</p> <p>During the practicals the following program content is implemented:</p> <p>Legal basis: withholding and withdrawing medicinal products from the market, conducting pharmacies' controls, monitoring the safety of using medicinal products, issuing medical prescriptions.</p>

	<p>Good Distribution Practice, importing medicines from abroad, parallel import, non-pharmacy trade in medicinal products. Housing requirements of a generally accessible pharmacy, basic conditions for operating a pharmacy, principles of dispensing medicinal products and medical devices, categories of availability of medicinal products.</p> <p>Rules for the dispensing and storage of narcotic drugs and psychotropic substances, advertising of medicinal products and medical devices, requirements for labeling packaging of medicinal products, post-graduate training of pharmacists.</p>
References	<p>Primary literature: Lectures</p> <ol style="list-style-type: none"> <li>1. Paździoch S.: Prawo zdrowia publicznego. Zarys problematyki. Zdrowie i Zarządzanie, Kraków 2004.</li> <li>2. Ustawa Prawo Farmaceutyczne.</li> <li>3. Ustawa o izbach aptekarskich.</li> <li>4. Ustawa o wyrobach medycznych.</li> <li>5. Ustawa o przeciwdziałaniu narkomanii.</li> <li>6. Ustawa o kosmetykach.</li> <li>7. Rozporządzenia Ministra Zdrowia właściwe do funkcjonowania prawa farmaceutycznego.</li> </ol> <p>Supplementary literature: Health law and legal systems, WHO guidelines, <a href="http://www.WHO-health/law">www.WHO-health/law</a>. Informator prawny Gazety Farmaceutycznej</p>
Methods and criteria of evaluation	<p>Test: Practical performance of tutorials: Exam: K_E.W1, K_E.W2, K_E.W3, K_E.W4, K_E.W5, K_E.W18, K_E.W22, K_E.W23. Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5th year, 1 <sup>st</sup> semester (winter)
Form of crediting a subject in the cycle	Exam
Form(s) and number of course hours as well as the form of crediting	Lecture: 26 hours - written exam Practicals: 24 hours - credit
Course coordinator(s)	Prof. dr hab. farm. Jerzy Krysiński
Subject Teachers	Lectures: Prof. dr hab. farm. Jerzy Krysiński Practicals: Dr Jakub Płaczek
Course form (character)	Obligatory
Limit of places available in each group	Lectures: students of the 5th year of the IX semester Practicals: groups of 24 students

Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes determined for the given course form	Lectures and practicals: K.E.W1, K.E.W2, K.E.W3, K.E.W4, K.E.W5, K.E.W6, K.E.W18
Methods and criteria of the evaluation for the given course form	Lectures and practicals: written exam Assessment criteria: 2 - insufficient - up to 2.99 (up to 59.9%) 3 - sufficient - 3.0 - 3.49 (60% -69.9%) 3.5 - satisfactory plus - 3.50 - 3.83 (70% -76.7%) 4 - good - 3.84 - 4.16 (76.8% -83.3%) 4.5 - good plus - 4.17-4.50 (83.4% -90%)
List of topics	List of topics depends on Lectures: 1. Functions of law in the field of public health; 2. Insured's rights to use health services - Act on health care services financed from public funds; 3. Pharmaceutical Law; 4. Act on pharmacy chambers; 5. Act on counteracting drug addiction; 6. Act on medical devices; 7. Act on the reimbursement of medicines, foodstuffs intended for particular nutritional uses and medical devices 8. Act on biocidal products; 9. Act on the Agency for Registration of Medicinal Products, Medical Devices and Biocidal Products; 10. Law on cosmetics; 11. Code of Pharmaceutical Marketing Ethics; Practicals: Practicals No. 1 – The ordinance of the Ministry of Health on data required in the technical description of the premises intended for a generally accessible pharmacy (Journal of Laws of 2002, No. 161, item 1337); – The ordinance of the Ministry of Health on detailed requirements to be met by the pharmacy premises (Journal of Laws of 2002, No. 171, item 1395); – Ordinance of the Ministry of Health on the list of rooms included in the basic and auxiliary area of a pharmacy (Journal of Laws of 2002, No. 161, item 1338); – Regulation of the Ministry of Health on the basic conditions for operating a pharmacy (Journal of Laws of 2002, No. 187, item 1565); – Regulation of the Ministry of Health on the issue of medicinal products and medical devices from pharmacies; consolidated text (Journal of Laws of 2016, item 493); – Ordinance of the Ministry of Health on the pattern of keeping records of pharmacists and pharmaceutical

	<p>technicians employed in the pharmacy (Journal of Laws of 2002, No. 187, item 1566);</p> <ul style="list-style-type: none"> <li>– The ordinance of the Ministry of Health on the maximum amount of surcharges charged by a pharmacy for the dispatch of medicinal products at night and specification of a group of medicinal products for which no charge is charged at night; consolidated text (Journal of Laws of 2014, item 765);</li> </ul> <p>Practicals No. 2</p> <ul style="list-style-type: none"> <li>– Regulation of the Ministry of Health on the mail-order sale of medicinal products dispensed without a doctor's prescription (Journal of Laws of 2015, item 481);</li> <li>– Ordinance of the Ministry of Health on the specialization and obtaining the title of specialist by pharmacists (Journal of Laws of 2003, No. 101, item 941, as amended in 2007. Journal of Laws No. 71, item 480 and Journal of Laws No. 210, item 1539);</li> <li>– Ordinance of the Ministry of Health on continuous training of pharmacists employed in pharmacies and pharmaceutical wholesalers (Journal of Laws of 2003, No. 132, item 1238 with amendments in 2007, Journal of Laws No. 59, item 403);</li> <li>– Regulation of the Ministry of Health on the subject of professional apprenticeship in a pharmacy (Journal of Laws of 2009, No. 31, item 215);</li> <li>– Ordinance of the Ministry of Health on the practice of pharmacy by a pharmaceutical technician (Journal of Laws of 2002, No. 126, item 1082, as amended in 2005, Journal of Laws No. 122, item 1032);</li> <li>– Ordinance of the Ministry of Health on the criteria for classifying a medicinal product into individual accessibility categories (Journal of Laws of 2008, No. 206, item 1292 with amendments, Journal of Laws 2015, item 1949);</li> <li>– Ordinance of the Ministry of Health on the criteria for the classification of medicinal products that may be admitted to trading in non-pharmacy trading centers and pharmacy outlets (Journal of Laws of 2009, No. 24, item 151 as amended in 2009, Journal of Laws No. 155 , item 1234 and in 2010, Journal of Laws No. 204, item 1352);</li> </ul> <p>Practicals No. 3</p> <ul style="list-style-type: none"> <li>– Ordinance of the Ministry of Health on the qualifications of persons dispensing medicinal products in non-pharmacy distribution outlets, as well as the requirements to be met by premises and equipment of these outlets and pharmacy outlets (Journal of Laws of 2009 No. 21, item 118);</li> <li>– Ordinance of the Ministry of Health on drugs that can be treated as pharmaceutical raw materials when preparing prescription drugs Dz. Of Laws of 2012, item 1259)</li> <li>– Ordinance of the Ministry of Health on medicinal products subject to humanitarian aid (Journal of Laws of 2004 No. 13, item 115);</li> <li>– The ordinance of the Ministry of Health on importing from the world medicinal products necessary to save the</li> </ul>
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	<p>patient's life or health, admitted to trading without the need to obtain a permit (Journal of Laws from 2012, item 349);</p> <ul style="list-style-type: none"> <li>– Regulation of the Ministry of Health on the requirements for labeling medicinal product packaging and the content of the leaflet, consolidated text (Journal of Laws of 2015, item 1109);</li> <li>– Regulation of the Ministry of Health on the advertising of medicinal products (Journal of Laws of 2008 No. 210, item 1327);</li> <li>– Ordinance of the Ministry of Health on the list of medicinal products that may be provided on an ad hoc basis in connection with the provision of health services, and the list of medicinal products included in life-saving anti-shock kits (Journal of Laws of 2011 No. 18, item 94);</li> </ul> <p>Practicals No. 4</p> <ul style="list-style-type: none"> <li>– the ordinance of the Ministry of Health regarding entities authorized to purchase medicinal products in a pharmaceutical warehouse (Journal of Laws of 2002 No. 216, item 1831);</li> <li>– Regulation of the Ministry of Health on the procedures of Good Distribution Practice (Journal of Laws of 2015, item 381, as amended, Journal of Laws of 2016, item 872);</li> <li>– Regulation of the Ministry of Health on the definition of detailed rules and procedures for suspending and withdrawing medicinal products and medical devices from the market (Journal of Laws of 2008 No. 57, item 347);</li> <li>– Ordinance of the Ministry of Health on drugs, psychotropic substances, category 1 precursors and preparations containing these substances or substances, consolidated text (Journal of Laws of 2015, item 1889);</li> <li>– Ordinance of the Ministry of Health on detailed conditions and procedure for dealing with narcotic drugs, psychotropic substances and category 1 precursors, their mixtures and medicinal products, broken, falsified or which have expired, containing narcotic drugs, psychotropic substances or category 1 precursors ( Journal of Laws of 2012, item 236);</li> <li>– Ordinance of the Ministry of Health on the list of active substances contained in medicines, the list of foodstuffs for particular nutritional uses, the list of medical devices and the list of diagnostic tests.</li> <li>– The ordinance of the Ministry of Health on the determination of model documents related to the conduct of control and inspection by the State Pharmaceutical Inspection and a model decision on the result of qualitative testing of samples taken (Journal of Laws of 2009 No. 129, item 1069);</li> </ul> <p>Practicals No. 5</p> <ul style="list-style-type: none"> <li>– Ordinance of the Ministry of Health on the proceedings in matters of professional liability of pharmacists (Journal of Laws of 2003 No. 65, item 612)</li> <li>– Ordinance of the Ministry of Health on the list of medicines for the recipient holding the title of "Distinguished Honorary Blood Donor" or "Distinguished</li> </ul>
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	<p>Transplant Donor", consolidated text (Journal of Laws of 2015, item 2098);</p> <ul style="list-style-type: none"> <li>– Regulation of the Ministry of Health regarding information collected by pharmacies and information provided to the National Health Fund; consolidated text (Journal of Laws of 2014, item 122, as amended, Journal of Laws 2016, item 31 and item 1350);</li> <li>– Ordinance of the Minister of Health of December 8, 2011 on general terms and conditions of prescription contracts and framework contract template for prescriptions; consolidated text (Journal of Laws of 2013, item 364);</li> <li>– Regulation on the composition and labeling of dietary supplements; consolidated text (Journal of Laws of 2015, item 2032);</li> <li>– The ordinance of the Ministry of Health on the issue of prescriptions by veterinarians for medicinal products or prescription drugs intended for humans that will be used in animals (Journal of Laws of 2003 No. 97, item 891, as amended);</li> <li>– Code of Ethics for the Pharmacist of the Republic of Poland from January 21, 2012.</li> </ul>
Didactic methods	The same as in part A
References	The same as in part A

## Propaedeutics of Pharmacy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Propaedeutics of Pharmacy</b> Propedeutyka farmacji
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-PROPF-WF-l-j, 1700-F1-PROPF-JW
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	2
Form of crediting	Written crediting with evaluation
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Course module E</b> Pharmaceutical Practice
Total student workload	1. The workload related to activities requiring the direct participation of academic teachers is:

	<ul style="list-style-type: none"> <li>- participation in lectures: 14 hours</li> <li>- participation in seminars: 9 hours</li> <li>- consultation: 1 hour</li> </ul> <p>The workload related to the activities requiring the direct participation of academic teachers is <b>24 hours</b>, which corresponds to <b>0.96 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>- participation in lectures: 14 hours</li> <li>- participation in seminars: 9 hours</li> <li>- consultation: 1 hour,</li> <li>- preparation for seminars: 13 hours,</li> <li>- reading the indicated literature: 8 hours,</li> <li>- preparation to pass and pass: 5 hours</li> </ul> <p>The total student workload is <b>50 hours</b>, which corresponds to <b>2.00 ECTS points</b>.</p> <p>3. Workload related to conducted research:</p> <ul style="list-style-type: none"> <li>- reading of the indicated scientific literature: 2 hours,</li> <li>- research and scientific consultations: 1 hour</li> <li>- participation in lectures (including research methodology, research results, studies): 8 hours,</li> <li>- participation in seminars covered by scientific activity (including research methodology, research results, studies): 9 hours,</li> <li>- preparation for seminars covered by scientific activity: 8 hours,</li> <li>- preparation to pass in the area of research and science for the realized subject: 2 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>30 hours</b>, which corresponds to <b>1.20 ECTS points</b>.</p> <p>4. Time required to prepare and to participate in the assessment process:</p> <ul style="list-style-type: none"> <li>- preparation for seminars + preparation for credit + credit: 13 + 5 = <b>18 hours (0.72 ECTS point)</b>.</li> </ul> <p>5. Time required to undergo compulsory practice: -not applicable</p>
Learning outcomes – knowledge	<p>W1: Knows the structure of pharmacopoeia and its importance for the quality, analytics and technology of medicinal products - K_C.W5</p> <p>W2: Knows the legal basis of the pharmaceutical market in Poland and the place of pharmacy in the healthcare system - K_E.W1</p> <p>W3: Distinguishes the workplace of pharmacists, the principles of their organization and impact on the health care system K_E.W2</p> <p>W4: Knows the principles of functioning of the pharmacy self-government and other organizations shaping the pharmaceutical market - K_E.W4</p>
Learning outcomes - abilities	Is able to use the pharmacopoeia and search for scientific information on medicinal products - K_C.U34

	Is able to identify the tasks of individual bodies of professional self-government - K_E.U19
Learning outcomes – social skills	K1: notice and recognize their own limitations, make a self-assessment of deficits and educational needs
Didactic methods	<u>Lectures:</u> <ul style="list-style-type: none"> <li>▪ informative lecture (conventional)</li> <li>▪ multimedia presentation</li> </ul> <u>Seminars:</u> <ul style="list-style-type: none"> <li>▪ activating and problem methods, i.e. discussion, case method and classical problem method</li> <li>▪ individual work</li> </ul>
Preliminary requirements	No preliminary requirements
Brief course description	The purpose of the course is to show students all aspects of professional and scientific pharmacy
Entire course description	The subject is realized in the form of lectures and seminars. The lectures considered are: knowledge of the pharmaceutical market, place the pharmacy in the healthcare system, long-term learning in pharmacy, some aspects of pharmaceutical law. At seminars, students learn to work with pharmacopoeia and reliable sources of scientific data.
References	Primary literature: lectures Supplementary literature: USP43-NF38 English version, European Pharmacopoeia 10.0
Methods and criteria of evaluation	Crediting with evaluation Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

#### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Crediting with evaluation
Form(s) and number of course hours as well as the form of crediting	Lectures: 14 hours Seminars: 9 hours Crediting with evaluation at the end of the semester
Course coordinator(s)	Prof. Jerzy Krysiński
Subject Teachers	Lectures: dr Jakub Płaczek Seminars: dr Jakub Płaczek
Course form (character)	Obligatory
Limit of places available in each group	Lectures: all students Seminars: 25-30 students

Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods															
Subject website															
Learning outcomes determined for the given course form	W1-W4, U1, U2, K1														
Methods and criteria of the evaluation for the given course form	<p>The condition of passing the course is active participation in lectures and pass the exam including written answer for 4 questions.</p> <p>Seminars: discussion, development of materials prepared by the seminar teacher.</p> <table border="1"> <thead> <tr> <th>Percentage of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>88-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>81-87%</td> <td>Very good (4.5)</td> </tr> <tr> <td>74-80%</td> <td>Good (4)</td> </tr> <tr> <td>67-73%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-66%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table>	Percentage of points	Grade	88-100%	Excellent (5)	81-87%	Very good (4.5)	74-80%	Good (4)	67-73%	Satisfactory (3.5)	60-66%	Acceptable (3)	0-59%	Fail (2)
Percentage of points	Grade														
88-100%	Excellent (5)														
81-87%	Very good (4.5)														
74-80%	Good (4)														
67-73%	Satisfactory (3.5)														
60-66%	Acceptable (3)														
0-59%	Fail (2)														
List of topics	<p>List of topics of lectures:</p> <ol style="list-style-type: none"> <li>1. The schedule of pharmaceuticals studies</li> <li>2. Specializations and long-term learning in pharmacy</li> <li>3. Place the pharmacy in the healthcare system</li> <li>4. Basis of the pharmaceutical law</li> <li>5. Workplaces of pharmacists</li> <li>6. Pharmacy self-government and other pharmaceutical organizations.</li> </ol> <p>List of topics of seminars:</p> <ol style="list-style-type: none"> <li>1. Structure of pharmacopoeia and its importance for the quality, analytics and technology of medicinal products</li> <li>2. Basis of EBM. Medical and pharmaceutical literature</li> <li>3. Identify the tasks of pharmacists in different workplaces</li> </ol>														
Didactic methods	The same as in part A														
References	The same as in part A														

## Foreign language (Polish language for foreign students)

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Foreign language (Polish language for foreign students)</b> <b>Język obcy (język polski dla obcokrajowców)</b>
Unit offering the subject	Centre for Specialised Languages in Medicine Ludwig Rydygier Collegium Medicum In Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	
ISCED code	
Number of ECTS points	10
Form of crediting	Exam
Language of instruction	Polish/English
Indication whether attempts at obtaining course credit can be repeated	No
Subject group	<b>Course module E</b> <b>Pharmaceutical Practice</b>
Total student workload	<p>1. The workload related to activities requiring the direct participation of academic teachers is:</p> <ul style="list-style-type: none"> <li>– participation in classes: 150 hours</li> <li>– consultation: 2 hours.</li> </ul> <p>The workload related to activities requiring the direct participation of academic teachers is 152 hours, which corresponds to 6.08 ECTS points.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in classes: 150 hours</li> <li>– consultation: 2 hours</li> <li>– preparing and completing notes in advance: 13 hours</li> <li>– repetition of material required: 25 hours</li> <li>– preparation for course completion: 30</li> <li>– Preparation for the exam: 30</li> </ul> <p>The total student workload is 250 hours, which corresponds to 10 ECTS credits.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– collection and selection of appropriate materials for classes: 10 hours</li> <li>– reading and translating the indicated scientific literature: 40 hours</li> <li>– research and scientific consultations: 0 hours</li> <li>– preparation for exercises covered by scientific activity: 0 hours</li> </ul> <p>The total student workload related to the conducted research is 50 hours, which corresponds to 2 points. ECTS</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>– preparation for exercises: 25 hours,</li> </ul>

	<ul style="list-style-type: none"> <li>– preparation for course completion: 30</li> <li>– Preparation for the exam: 30</li> </ul> (85 hours 3.4 ECTS point).  5. Time required to complete the compulsory apprenticeship (s): not applicable
Learning outcomes – knowledge	The graduate knows and understands: W 1: the grammatical devices and rules relevant to the acquisition of Polish pharmaceutical terminology. W 2: basic pharmaceutical and medical terminology W 3 : the semantic structure of selected anatomical, clinical and Pharmaceutical terms.
Learning outcomes – abilities	The graduate knows is able to: U1: Communicates with the patient in Polish language - K.E.U32 U2: uses various sources of information on medicines, including in Polish language, and interprets this information critically - K.E.U32
Learning outcomes – social skills	K1: Is aware of the need to constantly supplement language knowledge in the field of occupation and self-education - K2 K2: Uses various sources of information about medicines, including in a foreign language, and interprets this information critically - K7 K3: He is ready to formulate conclusions from his own measurements and observations in a polish language - K8
Didactic methods	<ul style="list-style-type: none"> <li>– text analysis: reading, translation, pronunciation</li> <li>– presentations</li> <li>– papers</li> <li>– conversations - classes are conducted in Polish</li> <li>– drama</li> </ul>
Preliminary requirements	none
Brief course description	<p>The subject of Polish as a foreign language aims to introduce vocabulary related to the student's everyday life. The appropriate choice of vocabulary is to help the student to function in the reality surrounding him. The vocabulary is related to the student's everyday life and relates to shopping, eating, entertainment, way of spending free time, services and health.</p> <p>The aim of the course is to teach students specialized Polish in the field of pharmacy. The course aims to teach students how to use lexis and phraseology of the Polish language for pharmacy in dealing with patients, doctors and other students. The subject emphasizes the ability to use a specialized foreign language for pharmacy in speech and writing.</p>
Entire course description	<p>The Polish language as a foreign subject in 150 hours of classes prepares the student to use the language at A1 level. The student can apply basic expressions and build statements for satisfying specific needs. Student can lead a simple conversation with the patient and ask simple questions related to his private life, place of residence, family situation, health condition. Student learns basic medical and pharmaceutical vocabulary, knowledge of which is necessary during the internship. Maximilian Berlitz's method is applied, which consists in using in the first phase of teaching simple phrases necessary in simple communication. This method focuses on developing communication skills, and the phonic code is put above the graphic code. Teaching grammar is limited to the minimum necessary.</p> <p>The subject is designed to teach students in addition to basic language, also specialized Polish language for pharmacists. The course prepares the student to be familiar with and use a specialized foreign language in the field of pharmacy in a Polish spoken and written environment. After the Polish language course the student converts and reads correctly. The course teaches the skills of active</p>

	conversation with the patient, student and pharmacy specialists. Students learn how to talk about the causes, prevention and characteristics of a patient's ailments. Subject teaches how to express opinions in pharmaceuticals. Classes allow you to practice, teach how to prepare and present a paper and presentation. The course gives the opportunity to prepare for appearances at conferences and symposia in Poland in the field of pharmaceutical sciences.	
Literature	"Polish doesn't bite!", autor: Iwona Lewandowska wydawnictwo Edgard "Język polski w pigułce" język ogólny A1/A2 ,autor: Karolina Sołtowska, Tadeusz Jurek wydawnictwo Uniwersytet Medyczny im.Karola Marcinkowskiego w Poznaniu. Authentic documents	
Assessment methods And criteria	Colloquium, exam: W1-W3, U1, U2, K1 Correct execution of exercises: U1, U2 Activity: K1, K2, K3 Paper and presentation: K1-K3	
	% of points obtained	Grade
	86,00%	very good (5)
	76-86%	good plus (4+)
	75,00%	good (4)
	62-74%	satisfactory plus (3+)
	56-61%	satisfactory (3)
0-55%	fail (2)	
Work placement	not applicable	

### C. Course description in the didactic cycle

Field name	Comments
Didactic cycle	1 <sup>st</sup> year, 2 Semester (summer)
Form of crediting in the cycle	credit
Form(s) and number of course hours as well as the form of crediting	40 hours - credit
Name of course coordinator in the period of instruction	Dr hab. Anna Bączkowska, prof.UMK
Names of persons managing student groups for the course	Mgr Elżbieta Buttler
Course form (character)	Obligatory
Course groups including description and limit to the number of students within the groups	Limit of places - 30
Scheduled dates and places of course	Dates and locations are provided by the Didactic Department in Collegium Medicum in Bydgoszcz NCU in Toruń



Number of study hours involving e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes defined for a given form of classes within the course	W1, W2, U2, K1, K2
Assessment methods and criteria for a given form of classes within the course	The requirement for graded credit is: <ul style="list-style-type: none"> <li>- written tests during the semester</li> <li>- the semester ending test</li> <li>- active participation in tutorials</li> <li>- participation in classes.</li> </ul>
List of topics	<ol style="list-style-type: none"> <li>1. Repeat, please!</li> <li>2. What's your name?</li> <li>3. I have a question. What is this?</li> <li>4. Who are you?</li> <li>5. Do you have a brother? Family and friends.</li> <li>6. Home, town, neighbourhood and region, where it is and what it is like.</li> <li>7. What do you like doing?</li> <li>8. Can I have a bill, please?</li> <li>9. Free time active.</li> <li>10. Shopping, money.</li> <li>11. Healthy and unhealthy lifestyles and their consequences.</li> <li>12. Being environmentally friendly within the home and local area.</li> </ol>
Teaching methods	"The same as in part A"
Literature	"The same as in part A"

### B. Course description in the didactic cycle

Field name	Comments
Didactic cycle	2 year, 3 Semester (winter)
Form of crediting in the cycle	Credit with grade
Form(s) and number of course hours as well as the form of crediting	40 hours – credit with grade
Name of course coordinator in the period of instruction	Dr hab. Anna Bączkowska, prof.UMK
Names of persons managing student groups for the course	Mgr Elżbieta Buttler
Course form (character)	Obligatory
Course groups including description and limit to the number of students within the groups	Limit of places - 30
Scheduled dates and places of course	Dates and locations are provided by the Didactic Department in Collegium Medicum in Bydgoszcz NCU in Toruń
Number of study hours involving e-learning methods	Not applicable

Subject website	Not applicable
Learning outcomes defined for a given form of classes within the course	W1, W2, U2, K1, K2
Assessment methods and criteria for a given form of classes within the course	The requirement for graded credit is: <ul style="list-style-type: none"> <li>- written tests during the semester</li> <li>- the semester ending test</li> <li>- active participation in tutorials</li> <li>- participation in classes.</li> </ul>
List of topics	<ol style="list-style-type: none"> <li>1. Human anatomy - body parts.</li> <li>2. Anatomical description of individual organs (shape, structure, location).</li> <li>3. Organ functions and processes occurring in the human body.</li> <li>4. Pregnancy, growth, growing up and aging.</li> <li>5. Pain - description of ailments; treatment, self-healing.</li> <li>6. Introduction of terminology related to pharmacy as a science discipline. Vocabulary and phraseology related to the profession of a pharmacist (in Poland and English-speaking countries - comparison).</li> <li>7. Hospital pharmacy.</li> </ol>
Teaching methods	“The same as in part A”
Literature	“The same as in part A”

### B. Course description in the didactic cycle

Field name	Comments
Didactic cycle	2 year, 4 Semester (summer)
Form of crediting in the cycle	Credit with grade
Form(s) and number of course hours as well as the form of crediting	40 hours – credit with grade
Name of course coordinator in the period of instruction	Dr hab. Anna Bączkowska, prof.UMK
Names of persons managing student groups for the course	Mgr Elżbieta Buttler
Course form (character)	Obligatory
Course groups including description and limit to the number of students within the groups	Limit of places - 30
Scheduled dates and places of course	Dates and locations are provided by the Didactic Department in Collegium Medicum in Bydgoszcz NCU in Toruń
Number of study hours involving e-learning methods	Not applicable
Subject website	Not applicable

Learning outcomes defined for a given form of classes within the course	W1, W2, U2, K1, K2
Assessment methods and criteria for a given form of classes within the course	The requirement for graded credit is: <ul style="list-style-type: none"> <li>- written tests during the semester</li> <li>- the semester ending test</li> <li>- active participation in tutorials</li> <li>- participation in classes.</li> </ul>
List of topics	<ol style="list-style-type: none"> <li>1. Basic specialist terminology in chemistry. organic and inorganic, human biology and anatomy (simple substances, mixtures, Mendeleev's table, atom, molecule, valence, chemical elements, chemical and physical properties; chemical solutions: acids, bases and salts; fats, carbohydrates, proteins, hormones and vitamins) .</li> <li>2. Verbalization of mathematical determinations and operations, symbols, chemical compounds as well as units of measure and weight.</li> <li>3. Bacteria - terminology concerning general characteristics.</li> <li>4. Viruses and viral infections - description language.</li> <li>5. Various diseases - definitions; functional disorders, idioms, presentations of listeners</li> <li>7. Professional responsibility - pharmacist's most important tasks.</li> </ol>
Teaching methods	“The same as in part A”
Literature	“The same as in part A”

### B. Course description in the didactic cycle

Field name	Comments
Didactic cycle	3 year, 5 Semester (winter)
Form of crediting in the cycle	Exam
Form(s) and number of course hours as well as the form of crediting	30 hours – exam
Name of course coordinator in the period of instruction	Dr hab. Anna Bączkowska, prof.UMK
Names of persons managing student groups for the course	Mgr Elżbieta Buttler
Course form (character)	Obligatory
Course groups including description and limit to the number of students within the groups	Limit of places - 30
Scheduled dates and places of course	Dates and locations are provided by the Didactic Department in Collegium Medicum in Bydgoszcz NCU in Toruń

Number of study hours involving e-learning methods	Not applicable
Subject website	Not applicable
Learning outcomes defined for a given form of classes within the course	W1, W2, U2, K1, K2
Assessment methods and criteria for a given form of classes within the course	The requirement for graded credit is: <ul style="list-style-type: none"> <li>- written tests during the semester</li> <li>- the semester ending test</li> <li>- active participation in tutorials</li> <li>- participation in classes.</li> </ul>
List of topics	<ol style="list-style-type: none"> <li>1. Safety in the workplace.</li> <li>2. Aromatherapy and medicinal plants.</li> <li>3. Antibiotics.</li> <li>4. Probiotics.</li> <li>5. Drug effects, psychological factors, absorption, metabolism and drug excretion.</li> <li>6. Prescription.</li> <li>7. Interview for a job, how to write a CV and cover letter for the position of pharmacist.</li> </ol>
Teaching methods	“The same as in part A”
Literature	“The same as in part A”

## Latin language

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Latin language</b> Język łaciński
Unit offering the subject	Centre for Specialised Languages in Medicine Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	
ERASMUS code	
ISCED code	
Number of ECTS points	5
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course <b>Education module E</b> Pharmaceutical Practice
Total student workload	1. The workload related to activities requiring the direct participation of academic teachers is: <ul style="list-style-type: none"> <li>– participation in a language course: 45 hours,</li> </ul>

	<ul style="list-style-type: none"> <li>– additional opportunity to consult with tutors: 2 hours.</li> </ul> <p>The workload related to the activities requiring the direct participation of academic teachers is <b>47 hours</b>, which corresponds to <b>1.88 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– preparing and completing notes: 13 hours,</li> <li>– repetition of material required: 15 hours,</li> <li>– participation in a language course: 45 hours,</li> <li>– additional opportunity to consult with tutors: 4 hours,</li> <li>– preparation for classes: 20 hours</li> <li>– preparation for tests: 28 hours.</li> </ul> <p>The total student workload is <b>125 hours</b>, which corresponds to <b>5 ECTS credits</b>.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– reading of the indicated scientific literature: 3 hours,</li> <li>– participation in classes covered by scientific activity (including research methodology, research results, studies): 10 hours,</li> <li>– preparation for classes covered by scientific activity: 2 hours,</li> <li>– preparation to pass in the field of research and development for the subject: 10 hours.</li> </ul> <p>The total student workload related to the conducted research is <b>25 hours</b>, which corresponds to <b>1.00 ECTS points</b>.</p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>– preparation for classes: 20 hours,</li> <li>– preparation for tests: 28 hours.</li> </ul> <p><b>48 hours in total (1.92 ECTS)</b></p> <p>5. Time required to complete mandatory internships: not applicable</p>
Learning outcomes – knowledge	<p>The graduate knows and understands:</p> <p>W1: the grammatical devices and rules relevant to the acquisition of Greek-Latin pharmaceutical terminology.</p> <p>W2: basic pharmaceutical and medical terminology.</p> <p>W3: the semantic structure of selected anatomical, clinical and pharmaceutical terms.</p> <p>W4: Knows Latin chemical, botanical and pharmaceutical designation.</p> <p>W5: Knows the names of chemical elements and chemical compounds.</p>
Learning outcomes - abilities	<p>U1: Uses Latin terms in the international pharmaceutical and medical nomenclature.</p> <p>U2: Can read, write and translate a prescription on his own.</p> <p>U3: Recognizes and understands words of Latin origin in Romance languages and in English in specialist literature.</p>
Learning outcomes – social skills	<p>The graduate is ready to:</p> <p>K1: notice and recognize their own limitations, make a self-assessment of deficits and educational needs;</p>

	K2: implement the principles of collegueship and co-operation in a team of professionals, including representatives of other medical professions, also in a multicultural and multinational environment;
Didactic methods	Expository teaching methods: - informative lecture Exploratory teaching methods: - practical - experimental - brainstorming
Preliminary requirements	none
Brief course description	The aim of the course is to acquire elementary knowledge of Latin grammar, which enables students to understand the pharmaceutical terminology and the structure of medical prescriptions. Acquiring appropriate vocabulary helps students master and enlarge their knowledge of the medical and pharmaceutical sciences.
Entire course description	The aim of the course is to develop the language skills: - understanding of Latin texts, - using professional terms, - mastering vocabulary and grammar needed in pharmaceutical science, - correlation with the subject in the later years of study. Latin language course is to develop in students the ability to apply the acquired knowledge to self-linguistic work. Its aim is to help students understand the need for lifelong learning and self-education.
References	Primary literature: Małgorzata Budzowska, Medical Latin Course, Medical University of Łódź 2007.  Supplementary literature: G D A Sharpley, Get Started In Latin. Teach Yourself. 2010
Methods and criteria of evaluation	Test: W1-W5 Practical performance of tutorials: U1, U2, U3 Exam: not applicable Criteria of evaluation are given in part B and C
Practical training as part of course	Not applicable according to the educational program

#### B.Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 1 <sup>st</sup> semester (winter)
Form of crediting a subject in the cycle	credit
Form(s) and number of course hours as well as the form of crediting	Tutorials: 30 hours – credit
Course coordinator(s)	dr hab. Anna Bączkowska, prof. UMK

Subject Teachers	dr Katarzyna Jóskowska
Course form (character)	Obligatory
Limit of places available in each group	25
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	-
Subject website	-
Learning outcomes determined for the given course form	W1-W5, U2, K1 K2
Methods and criteria of the evaluation for the given course form	The requirement for graded credit is: - written tests during the semester - the semester-ending-test (at least 56% correctly) - active participation in tutorials - participation in language classes.
List of topics	<ul style="list-style-type: none"> <li>• Pronunciation, stress and intonation</li> <li>• Introduction to the study of Latin, noun and verb system</li> <li>• Declension 1-5</li> <li>• Conjugation of regular verbs ( 1<sup>st</sup> – 4<sup>th</sup> conjugation – indicative and infinitive of the present tense, imperative), irregular verb: esse</li> <li>• Adjectives of 1<sup>st</sup> and 2<sup>nd</sup> declension, adjectives of 3<sup>rd</sup> declension, comparison of adjectives</li> <li>• Numerals (especially cardinal and ordinal numerals, generally multiplicative and distributive numerals)</li> <li>• Prescription phrases I and their abbreviations</li> <li>• Names of selected medicinal plants</li> <li>• Overview of the most important remedies</li> <li>• Types and forms of medicinal preparations I</li> </ul>
Didactic methods	The same as in part A
References	The same as in part A

#### B.Course description in the didactic cycle

Space name	Comment
Didactic cycle	1st year, 2nd semester (summer)
Form of crediting a subject in the cycle	graded credit
Form(s) and number of course hours as well as the form of crediting	Tutorials : 15 hours – graded credit
Course coordinator(s)	dr hab. Anna Bączkowska, prof. UMK
Subject Teachers	dr Katarzyna Jóskowska
Course form (character)	Obligatory
Limit of places available in each group	25

Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	-
Subject website	-
Learning outcomes determined for the given course form	W1-W5, U1-U3, K1, K2
Methods and criteria of the evaluation for the given course form	The requirement for graded credit is: - written tests during the semester - the semester-ending-test (at least 56% correctly) - active participation in tutorials - participation in language classes.
List of topics	<ul style="list-style-type: none"> <li>- Subjunctive of present tense of both regular and irregular (taught previously) verbs</li> <li>- Verbs <i>fio, fieri</i> and its forms in the present tense</li> <li>- Assimilation of Greek words into Latin</li> <li>- Declension of substantives of Greek origin according to Latin declensions; and their irregularities</li> <li>- Derivation and compounding in Latin</li> <li>- Derivation and compounds of Greek origin, hybrids</li> <li>- Prescription phrases II and their abbreviations</li> <li>- Types and forms of medicinal preparations II</li> <li>- Selected anatomical terminology</li> <li>- Medical prescription and its structure from the view of the language (reading and writing)</li> </ul>
Didactic methods	The same as in part A
References	The same as in part A



## **Course module F**

Research methodology and master's seminar

(The curriculum taking into account the methodology of scientific research and the Master's seminar individually assigned to the student by the unit conducting the Master's thesis)

## Specialist Laboratory Classes and Research Methodology

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Specialist Laboratory Classes and Research Methodology</b> (Ćwiczenia specjalistyczne i metodologia badań naukowych)
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1700-F5-CSMB-J 1700-F5-CWSP-L-J
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	29
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Education module F Obligatory course
Total student workload	<p>1. The workload related to activities requiring the direct participation of academic teachers is:</p> <ul style="list-style-type: none"> <li>– participation in specialized exercises - 375 hours.</li> <li>– research consultation – 100 hours</li> </ul> <p>The workload related to activities requiring direct participation of academic teachers is <b>475 hours</b>, which corresponds to <b>19.0 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in specialized exercises - 375 hours.</li> <li>– research consultation – 100 hours</li> <li>– collecting, reading and translating the indicated literature: 250 hours,</li> </ul> <p>The total student workload is <b>725 hours</b>, which corresponds to <b>29 ECTS credits</b>.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>– participation in specialized exercises - 375 hours.</li> <li>– research consultation – 100 hours</li> <li>– collecting, reading and translating the indicated literature: 250 hours,</li> </ul> <p>The total student workload related to the conducted research is <b>725 hours</b>, which corresponds to <b>29.0 ECTS points</b></p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>- preparation for exercises: 60 hours,</li> <li>- preparation for crediting: 15 hours</li> </ul> <p><b>(75 hours in total, 3.00 ECTS points).</b></p>

	5. Time required to complete the compulsory apprenticeship (s): not applicable
Learning outcomes – knowledge	W1: Has expanded knowledge in selected areas of pharmaceutical sciences - K_F.W1 W2: Knows the research methods and techniques used within the framework of executed project - K_F.W1
Learning outcomes - abilities	U1: Interprets experimental data and relates them to the current state of knowledge in a given field of pharmacy - K_F.U2 U2: Uses domestic and foreign scientific literature - K_F.U3 U3: Independently conducts the experiment, interprets and documents the results of research - K_F.U4 U4: Prepares their master's thesis in accordance with the rules for editing scientific works - K_F.U4 U5: Presents research results - K_F.U5
Learning outcomes – social skills	K1: Has a habit of using objective sources of information - K7 K2: Draws and phrases conclusions from their own measurements and observations - K8
Didactic methods	<ul style="list-style-type: none"> <li>• activating didactic methods,</li> <li>• discussion</li> </ul>
Preliminary requirements	For the course, the student should have the basic knowledge and skills acquired in the course of subjects during the 1-4 year of study.
Brief course description	The purpose of the exercises is a critical approach to the results of measurements carried out during the experimental part of the MA thesis.
Entire course description	During the diploma seminars, students discuss the identification of research problems and the proper application of literature to work that is the subject of the problem. Students have the opportunity to analyze research results, evaluate and draw and present conclusions. Students learn how to create a consistent and logical statement using correct and professional terminology.
References	Primary literature: 1. Literature in the field in which the master's thesis is conducted, specialized articles in reputable medical journals.
Methods and criteria of evaluation	Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

#### D. Course description in the didactic cycle

Space name	Comment
Didactic cycle	5 <sup>st</sup> year, 9 <sup>st</sup> semester (winter)
Form of crediting a subject in the cycle	Specialized exercises: credit with grade
Form(s) and number of course hours as well as the form of crediting	Specialized exercises: 100 hours - credit with grade

Course coordinator(s)	Heads of Departments in which the master's thesis is carried out														
Subject Teachers	Heads of Departments in which the master's thesis is carried out														
Course form (character)	Elective														
Limit of places available in each group	Specialized exercises are conditioned by the organization of work of individual Departments														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods															
Subject website															
Learning outcomes determined for the given course form	Specialized exercises: W1-W2, U1-U5, K1-K2														
Methods and criteria of the evaluation for the given course form	<p>Presentations - W1-W2, U3, U5  Activity - W1, W3, U1-U6, K1-K2  In the case of graded credit in writing, the points obtained are converted into grades on the following scale</p> <table border="1"> <thead> <tr> <th>Percent of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>84-91%</td> <td>Very good (4.5)</td> </tr> <tr> <td>76-83%</td> <td>Good (4)</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-67%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table>	Percent of points	Grade	92-100%	Excellent (5)	84-91%	Very good (4.5)	76-83%	Good (4)	68-75%	Satisfactory (3.5)	60-67%	Acceptable (3)	0-59%	Fail (2)
Percent of points	Grade														
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76-83%	Good (4)														
68-75%	Satisfactory (3.5)														
60-67%	Acceptable (3)														
0-59%	Fail (2)														
List of topics	<ol style="list-style-type: none"> <li>1. Presentation of the objectives and hypotheses of the MA thesis,</li> <li>2. Presentation of the concept of master's thesis using audio-video techniques,</li> <li>3. Discussion on topics related to the thesis</li> </ol>														
Didactic methods	The same as in part A														
References	The same as in part A														
Space name	Comment														
Didactic cycle	5st year, 10st semester (spring)														
Form of crediting a subject in the cycle	Specialized exercises: credit with grade														
Form(s) and number of course hours as well as the form of crediting	Specialized exercises: 275 hours - credit with grade														
Course coordinator(s)	Heads of Departments in which the master's thesis is carried out														
Subject Teachers	Heads of Departments in which the master's thesis is carried out														
Course form (character)	Obligatory														
Limit of places available in each group	Specialized exercises are conditioned by the organization of work of individual Departments														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods															
Subject website															

Learning outcomes determined for the given course form															
Methods and criteria of the evaluation for the given course form	<p>Presentations - W1-W2, U3, U5 Activity - W1, W3, U1-U6, K1-K2 In the case of graded credit in writing, the points obtained are converted into grades on the following scale</p> <table border="1"> <thead> <tr> <th>Percent of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>84-91%</td> <td>Very good (4.5)</td> </tr> <tr> <td>76-83%</td> <td>Good (4)</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-67%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table>	Percent of points	Grade	92-100%	Excellent (5)	84-91%	Very good (4.5)	76-83%	Good (4)	68-75%	Satisfactory (3.5)	60-67%	Acceptable (3)	0-59%	Fail (2)
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76-83%	Good (4)														
68-75%	Satisfactory (3.5)														
60-67%	Acceptable (3)														
0-59%	Fail (2)														
List of topics	<ol style="list-style-type: none"> <li>1. Presentation of the objectives and hypotheses of the MA thesis,</li> <li>2. Presentation of the concept of master's thesis using audio-video techniques,</li> <li>3. Discussion on topics related to the thesis</li> </ol>														
Didactic methods	The same as in part A														
References	The same as in part A														

## Master`s seminar

### E. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Master`s seminar</b> (Seminarium magisterskie)
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	7
Form of crediting	Credit with grade
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Education module F Obligatory course
Total student workload	<ol style="list-style-type: none"> <li>1. The workload related to activities requiring the direct participation of academic teachers is: <ul style="list-style-type: none"> <li>– participation in seminars - 60 hours.</li> </ul> </li> </ol>

	<ul style="list-style-type: none"> <li>- research consultation – 15 hours</li> </ul> <p>The workload related to activities requiring direct participation of academic teachers is <b>75 hours</b>, which corresponds to <b>3.00 ECTS points</b>.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>- participation in seminars: 60 hours,</li> <li>- research consultation – 15 hours</li> <li>- reading the indicated literature: 65 hours,</li> <li>- collection and selection of appropriate materials for classes: 35 hours,</li> </ul> <p>The total student workload is <b>175 hours</b>, which corresponds to <b>7 ECTS credits</b>.</p> <p>3. The workload related to the scientific research carried out:</p> <ul style="list-style-type: none"> <li>- reading and translating the indicated scientific literature: 65 hours</li> <li>- research and scientific consultations: 15 hours</li> <li>- collection and selection of appropriate materials for classes: 35 hours</li> <li>- participation in classes covered by scientific activity (including research methodology, research results, studies): 60 hours,</li> </ul> <p>The total student workload related to the conducted research is <b>175 hours</b>, which corresponds to <b>7.0 ECTS points</b></p> <p>4. Time required to prepare and participate in the assessment process:</p> <ul style="list-style-type: none"> <li>- preparation for exercises: 20 hours,</li> <li>- preparation for crediting: 5 hours (1,0 ECTS points).</li> </ul> <p>5. Time required to complete the compulsory apprenticeship (s): not applicable</p>
Learning outcomes – knowledge	<p>W1: Has expanded knowledge in selected areas of pharmaceutical sciences - K_F.W1  W2: Knows the research methods and techniques used within the framework of executed project - K_F.W1</p>
Learning outcomes - abilities	<p>U1: Student plans an experiment and discusses its purpose and expected results – K.F.U1  U2: Interprets experimental data and relates them to the current state of knowledge in a given field of pharmacy - K_F.U2  U3: Uses domestic and foreign scientific literature - K_F.U3  U4: Independently conducts the experiment, interprets and documents the results of research - K_F.U4  U5: Prepares their master's thesis in accordance with the rules for editing scientific works - K_F.U4  U6: Presents research results - K_F.U5</p>
Learning outcomes – social skills	<p>K1: Has a habit of using objective sources of information - K7  K2: Draws and phrases conclusions from their own measurements and observations - K8</p>
Didactic methods	<ul style="list-style-type: none"> <li>• activating didactic methods,</li> </ul>

	<ul style="list-style-type: none"> <li>• discussion</li> </ul>
Preliminary requirements	Not applicable
Brief course description	The purpose of the exercises is a critical approach to the results of measurements carried out during the experimental part of the MA thesis.
Entire course description	During the diploma seminars, students discuss the identification of research problems and the proper application of literature to work that is the subject of the problem. Students have the opportunity to analyze research results, evaluate and draw and present conclusions. Students learn how to create a consistent and logical statement using correct and professional terminology.
References	Primary literature: Literature in the field in which the master's thesis is conducted, specialized articles in reputable medical journals.
Methods and criteria of evaluation	Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

#### F. Course description in the didactic cycle

Space name	Comment												
Didactic cycle	5 <sup>st</sup> year, 9 <sup>st</sup> semester (winter)												
Form of crediting a subject in the cycle	Seminars: credit with grade												
Form(s) and number of course hours as well as the form of crediting	Seminars: 30 hours - credit with grade												
Course coordinator(s)	Heads of Departments in which the master's thesis is carried out												
Subject Teachers	Heads of Departments in which the master's thesis is carried out												
Course form (character)	Obligatory												
Limit of places available in each group	Master's seminars are conditioned by the organization of work of individual Departments												
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń												
Number of hours of classes conducted using e-learning methods	Not applicable												
Subject website	Not applicable												
Learning outcomes determined for the given course form	Specialized exercises: W1-W2, U1-U6, K1-K2												
Methods and criteria of the evaluation for the given course form	<p>Presentations - W1-W2, U3, U5  Activity - W1, W3, U1-U6, K1-K2  In the case of graded credit in writing, the points obtained are converted into grades on the following scale</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Percent of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>84-91%</td> <td>Very good (4.5)</td> </tr> <tr> <td>76-83%</td> <td>Good (4)</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-67%</td> <td>Acceptable (3)</td> </tr> </tbody> </table>	Percent of points	Grade	92-100%	Excellent (5)	84-91%	Very good (4.5)	76-83%	Good (4)	68-75%	Satisfactory (3.5)	60-67%	Acceptable (3)
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60-67%	Acceptable (3)												

	0-59%	Fail (2)
List of topics	1. Presentation of the objectives and hypotheses of the MA thesis, 2. Presentation of the concept of master's thesis using audio-video techniques, 3. Discussion on topics related to the thesis	
Didactic methods	The same as in part A	
References	The same as in part A	

Space name	Comment														
Didactic cycle	5 <sup>st</sup> year, 10 <sup>st</sup> semester (winter)														
Form of crediting a subject in the cycle	Seminars: credit with grade														
Form(s) and number of course hours as well as the form of crediting	Seminars: 30 hours - credit with grade														
Course coordinator(s)	Heads of Departments in which the master's thesis is carried out														
Subject Teachers	Heads of Departments in which the master's thesis is carried out														
Course form (character)	Obligatory														
Limit of places available in each group	Master's seminars are conditioned by the organization of work of individual Departments														
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń														
Number of hours of classes conducted using e-learning methods	Not applicable														
Subject website	Not applicable														
Learning outcomes determined for the given course form	Specialized exercises: W1-W2, U1-U6, K1-K2														
Methods and criteria of the evaluation for the given course form	<p>Presentations - W1-W2, U3, U5 Activity - W1, W3, U1-U6, K1-K2 In the case of graded credit in writing, the points obtained are converted into grades on the following scale</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Percent of points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>92-100%</td> <td>Excellent (5)</td> </tr> <tr> <td>84-91%</td> <td>Very good (4.5)</td> </tr> <tr> <td>76-83%</td> <td>Good (4)</td> </tr> <tr> <td>68-75%</td> <td>Satisfactory (3.5)</td> </tr> <tr> <td>60-67%</td> <td>Acceptable (3)</td> </tr> <tr> <td>0-59%</td> <td>Fail (2)</td> </tr> </tbody> </table>	Percent of points	Grade	92-100%	Excellent (5)	84-91%	Very good (4.5)	76-83%	Good (4)	68-75%	Satisfactory (3.5)	60-67%	Acceptable (3)	0-59%	Fail (2)
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List of topics	1. Presentation of the objectives and hypotheses of the MA thesis, 2. Presentation of the concept of master's thesis using audio-video techniques, 3. Discussion on topics related to the thesis														
Didactic methods	The same as in part A														
References	The same as in part A														



## **Module G**

## Practice in a Community Pharmacy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Practice in a Community Pharmacy Praktyka w aptece ogólnodostępnej</b>
Unit offering the subject	<b>Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun</b>
Unit for which the subject is offered	<b>Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle</b>
Subject code	<b>1720-F3-PRAK-J</b>
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	6
Form of crediting	Completion of the internship on the basis of attendance, implementation of the internship program, evaluation of the internship supervisor
Language of instruction	<b>English</b>
Designation whether a subject may be credited more than once	<b>No</b>
Subject group	<b>Education module: Practice Obligatory course</b>
Total student workload  <i>Elementy wymienione w kolumnie prawej są przykładowe. Proszę dostosować do własnego przedmiotu.</i>	6. Obligatory hours realized with the teacher participation - Lecture participation – 160 hours 7. Time required for the practical training completion – not applicable. <b>Total work amount: 160 hours (6 ECTS point)</b>
Learning outcomes – knowledge	W1: Knows the whole work in a public pharmacy, its organization, professional and administrative activities, rooms and equipment - K_E.W1 W2: Is able to define the basic principles of dispensing medicines based on prescription and over the counter, familiarized with medicinal products and medical devices - K_E.W3
Learning outcomes - abilities	
Learning outcomes – social skills	K1: Draws conclusions from his own measurements and observations - K8 K2: Has a habit of using information technologies to search and select information - K7 K3: Is aware of social conditions and restrictions resulting from the disease and the need to promote health-promoting behaviors - K5
Didactic methods	Observation and checking of practical skills by a supervisor, pharmacy employee, master of pharmacy. Observation, consultation and checking of practical skills by a supervisor on behalf of the university. Test of theoretical knowledge.

Preliminary requirements	To implement the course, it is necessary to have basic knowledge acquired in the following subjects: general and inorganic chemistry, analytical chemistry, physical chemistry, mathematics, drug chemistry, pharmacognosy, pharmaceutical technology.
Brief course description	Practical preparation for work in a public pharmacy. Organization of work in a pharmacy, expedition, recipe.
Entire course description	The summer internship in a community pharmacy is to prepare the student for practicing the profession of pharmacist. During the internship, the student learns the principles of pharmacy operation, the distribution and purpose of individual departments, the principles of storing medicines, the rules of storing and dispensing highly potent and narcotic drugs. The student learns the activities that are the scope of the duties of the master of pharmacy. He learns the principles of prescription delivery and retaxing, ordering and receiving goods, and operating a computer program. Above all, however, the student uses in practice the knowledge acquired during the course of the course: the technology of the form of the drug, i.e. makes medical forms. Getting to know the health and safety rules in force at the pharmacy.
References	<p><b>Primary literature:</b></p> <ol style="list-style-type: none"> <li>1. Loyd V. Allen, Jr.: Pharmaceutical Dosage forms and Drug Delivery Systems, LWW; Eleventh, North American edition, USA 2017</li> <li>2. Yvonne Bouwman- Boer, V'lain fenton-May, Paul Le Brun: Practical Pharmaceutis, Springer 2015</li> <li>3. Kevin Taylor, Michael Aulton: Aulton's Pharmaceutics, Elsevier 2017</li> <li>4. Loyd V. Allen, Jr.: The Art, Science, and Technology of Pharmaceutical Compounding" American Pharmaceutical Association, 2016</li> <li>5. Remington: The Science and Practice of Pharmacy, Pharmaceutical Press, 2012.</li> <li>6. European Pharmacopoeia 10</li> </ol> <p><b>Supplementary literature:</b></p> <ol style="list-style-type: none"> <li>1. Loyd V. Allen, Jr.: Suppositories, Pharmaceutical Press, 2008</li> <li>2. Tapash K. Ghosh, Bhaskara R. Jasti: Theory and practice of contemporary pharmaceutics, CRC Press, 2005</li> <li>3. Current legal acts and regulations regarding medicinal products that can be treated as raw materials for pharmaceutical compounding.</li> </ol>
Methods and criteria of evaluation	Implementation of the internship in accordance with the regulations and internship program. Constant supervision over the student by the internship supervisor on behalf of the pharmacy and control of the internship by the supervisor on behalf of the University. Evaluation of the student's work by the internship supervisor.

	Completion of the internship on the basis of the presence, implementation of the regulations and internship program, colloquium and evaluation of the internship supervisor. Criteria of evaluation are given in part B
Practical training as part of course	Not applicable according to the educational program

### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	<b>3<sup>rd</sup> year, 2<sup>nd</sup> semester (spring)</b>
Form of crediting a subject in the cycle	Summer internship: crediting the internship on the basis of presence, implementation of the practice program, appraisal of the internship tutor, colloquium.
Form(s) and number of course hours as well as the form of crediting	Participation in didactic activities (contact hours and activity): 160 hours. Grade without credit.
Course coordinator(s)	Prof. Jerzy Krysiński
Subject Teachers	Łukasz Pałkowski, PhD Piotr Bilski, PhD Jakub Płaczek, PhD Maciej Karolak, MPharm Andrzej Winnicki, MPharm Marta Czapiewska, MPharm
Course form (character)	<b>Obligatory</b>
Limit of places available in each group	Third-year students in selected pharmacies that meet the requirements of the regulations of practice in a public pharmacy
Scheduled dates and places of course	The dates and places of classes depend on the organization of work of individual pharmacies
Number of hours of classes conducted using e-learning methods	-
Subject website	-
Learning outcomes determined for the given course form	Practice in a community pharmacy: W1-W2, K1-K3
Methods and criteria of the evaluation for the given course form	Implementation of the internship in accordance with the regulations and internship program. Constant supervision of the student by the internship supervisor on behalf of the pharmacy and control of the internship by the supervisor on behalf of the University. Evaluation of the student's work by the internship supervisor. Assessment of the internship on the basis of the presence, implementation and compliance with the regulations and program of the internship, colloquium and evaluation of the internship supervisor.
List of topics	1. Acquaintance with health and safety rules. 2. Acquaintance with the organization of work in a generally accessible pharmacy, professional and administrative activities, rooms and equipment. 3. Acquaintance with the rules of receiving and storing medicinal products, medical devices and dietary supplements, as well as food for special nutritional purposes.

	4. Practical use of skills regarding the principles of drug preparation prescription forms and how to store them. 5. Acquaintance with the use of the computer program 6. Ability to use professional sources, including the Pharmacopoeia.
Didactic methods	The same as in part A
References	The same as in part A

## Practice in a Hospital Pharmacy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Practice in a Hospital Pharmacy</b> (praktyka w aptece szpitalnej) alternatywnie Praktyka w aptece szpitalnej i w przemyśle farmaceutycznym ( <b>Practice in a Hospital Pharmacy and in a Pharmaceutical Industry</b> )
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1720-F4-PRAK-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	6
Form of crediting	Completion of the internship on the basis of attendance, implementation of the internship program, evaluation of the internship supervisor
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Education module: Practice Obligatory course
Total student workload <i>Elementy wymienione w kolumnie prawej są przykładowe. Proszę dostosować do własnego przedmiotu.</i>	1. Obligatory hours realized with the teacher participation - Lecture participation – 160 hours 2. Time required for the practical training completion – not applicable. Total work amount: 160 hours (6 ECTS point)
Learning outcomes – knowledge	W1: Knows the principles of Good Manufacturing Practice specified in the regulations issued on the basis of art. 39 section 5 point 1 of the Act of 6 September 2001 - Pharmaceutical Law (Journal of Laws of 2019, item 499, as amended), including the principles of documenting technological processes - K_C.W33 W2: Knows the legal basis and principles of organization of the pharmaceutical market in the field of retail trade in the Republic of Poland and the operation of hospital pharmacies - K_E.W1

	W3: Knows the rules for issuing, recording and implementing prescriptions and the rules for dispensing medicines from a hospital pharmacy - K_E.W3
Learning outcomes - abilities	U1: Is able to determine the storage conditions of medicinal products, medical devices and dietary supplements, indicate products that require special storage conditions, and control storage conditions in a hospital pharmacy - K_E.U4
Learning outcomes – social skills	K1: Draws conclusions from his own measurements and observations - K8 K2: Has a habit of using information technologies to search and select information - K7 K3: Is aware of social conditions and restrictions resulting from the disease and the need to promote health-oriented behaviors - K5
Didactic methods	Observation and checking of practical skills by a supervisor, pharmacy employee, master of pharmacy. Observation, consultation and checking of practical skills by a supervisor on behalf of the university.
Preliminary requirements	To implement the course, it is necessary to have basic knowledge acquired in the following subjects: general and inorganic chemistry, analytical chemistry, physical chemistry, mathematics, drug chemistry, pharmacognosy, pharmaceutical technology.
Brief course description	Practical preparation for work in a hospital pharmacy. Rules and requirements for work organization, professional activities.
Entire course description	The summer internship in a hospital pharmacy is to prepare the student for practical practicing the profession of pharmacist in a hospital pharmacy. During the internship, the student learns the principles of pharmacy operation, the distribution and purpose of individual departments, the rules for supplying the hospital with medicinal products and medical devices, rules for the implementation of department orders and supervision of departmental first aid kits. The student learns the specifics of making prescription drugs for wards, with particular emphasis on cytostatics and parenteral nutrition. The summer internship in pharmaceutical industry to improve the student's knowledge of the functioning of the producing medicinal products or medical devices.
References	<b>Primary literature:</b> 1. Loyd V. Allen, Jr.: Pharmaceutical Dosage forms and Drug Delivery Systems, LWW; Eleventh, North American edition, USA 2017 2. Yvonne Bouwman- Boer, V'lain fenton-May, Paul Le Brun: Practical Pharmaceutis, Springer 2015 3. Kevin Taylor, Michael Aulton: Aulton's Pharmaceutics, Elsevier 2017 4. Loyd V. Allen, Jr.: The Art, Science, and Technology of Pharmaceutical Compounding” American Pharmaceutical Association, 2016

	<p>5. Remington: The Science and Practice of Pharmacy, Pharmaceutical Press, 2012.</p> <p>6. European Pharmacopoeia 10</p> <p><b>Supplementary literature:</b></p> <p>1. Loyd V. Allen, Jr.: Suppositories, Pharmaceutical Press, 2008</p> <p>2. Tapash K. Ghosh, Bhaskara R. Jasti: Theory and practice of contemporary pharmaceuticals, CRC Press, 2005</p> <p>3. Current legal acts and regulations regarding medicinal products that can be treated as raw materials for pharmaceutical compounding.</p>
Methods and criteria of evaluation	<p>Implementation of the internship in accordance with the regulations and internship program. Constant supervision over the student by the internship supervisor on behalf of the pharmacy and control of the internship by the supervisor on behalf of the University. Evaluation of the student's work by the internship supervisor.</p> <p>Completion of the internship on the basis of the presence, implementation of the regulations and internship program, colloquium and evaluation of the internship supervisor.</p> <p>Criteria of evaluation are given in part B</p>
Practical training as part of course	Not applicable according to the educational program

### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	<b>4<sup>th</sup> year, 2<sup>nd</sup> semester (spring)</b>
Form of crediting a subject in the cycle	Summer internship: crediting the internship on the basis of presence, implementation of the practice program, appraisal of the internship tutor.
Form(s) and number of course hours as well as the form of crediting	Participation in didactic activities (contact hours and activity): 160 hours. Grade without credit.
Course coordinator(s)	Prof. Jerzy Krysiński
Subject Teachers	Łukasz Pałkowski, PhD Piotr Bilski, PhD Jakub Płaczek, PhD Maciej Karolak, MPharm Andrzej Winnicki, MPharm Marta Czapiewska, MPharm
Course form (character)	<b>Obligatory</b>
Limit of places available in each group	Four-year students in selected pharmacies that meet the requirements of the regulations of practice in a hospital pharmacy or eventually in pharmaceutical industry
Scheduled dates and places of course	The dates and places of classes depend on the organization of work of individual pharmacies and pharmaceutical industry
Number of hours of classes conducted using e-learning methods	-

Subject website	-
Learning outcomes determined for the given course form	Practice in a pharmacy: W1-W3, U1, K1-K3
Methods and criteria of the evaluation for the given course form	Implementation of the internship in accordance with the regulations and internship program. Constant supervision of the student by the internship supervisor on behalf of the pharmacy and control of the internship by the supervisor on behalf of the University. Evaluation of the student's work by the internship supervisor. Assessment of the internship on the basis of the presence, implementation and compliance with the regulations and program of the internship, colloquium and evaluation of the internship supervisor.
List of topics	<ol style="list-style-type: none"> <li>1. Acquaintance with health and safety rules.</li> <li>2. Acquaintance with the organization of work in a hospital pharmacy, professional and administrative activities, rooms and equipment.</li> <li>3. Acquaintance with the principles of taking and storing medicinal products, medical devices and dietary supplements, as well as food for special nutritional purposes.</li> <li>4. Acquaintance with the rules of functioning of the hospital acceptor.</li> <li>5. Acquaintance with the rules of dispensing medicinal products and medical materials to hospital departments</li> <li>6. Practical use of skills related to the principles of preparing medicines prepared in a hospital pharmacy, including sterile medicines and how to store them.</li> <li>7. Familiarizing with using the computer program.</li> <li>8. The ability to use professional sources, including the Pharmacopoeia.</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A



## Six-month internship in a pharmacy

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Six-month internship in a pharmacy</b> Praktyka sześciomiesięczna w aptece
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	1720-F6-PRAK-J
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	60
Form of crediting	Completion of the internship on the basis of attendance, implementation of the internship program, evaluation of the internship supervisor
Language of instruction	<b>English</b>
Designation whether a subject may be credited more than once	<b>No</b>
Subject group	<b>Education module: Practice</b> <b>Obligatory course</b>
Total student workload <i>Elementy wymienione w kolumnie prawej są przykładowe. Proszę dostosować do własnego przedmiotu.</i>	<p>1. The workload related to activities requiring direct contact is:</p> <ul style="list-style-type: none"> <li>– participation in practical classes at the pharmacy - <b>960 hours</b>, which corresponds to <b>38.4 ECTS points</b>.</li> </ul> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in practical classes at the pharmacy (contact hours and activity): 960 hours</li> <li>– own work of the student (preparation for classes, studying literature): 540 hours.</li> </ul> <p>The total student workload is <b>1500 hours</b>, which corresponds to <b>60 ECTS points</b>.</p>
Learning outcomes – knowledge	<p>W1: Knows the legal basis and principles of organization of the pharmaceutical market in the field of retail trade in the Republic of Poland and the functioning of public and hospital pharmacies - K_E.W1</p> <p>W2: Knows the rules for issuing, recording and implementing prescriptions and the rules for dispensing medicines from a public and hospital pharmacy - K_E.W3</p>
Learning outcomes - abilities	<p>U1: Is able to conduct a critical analysis of publications on the effectiveness and safety of preparations issued to patients from the pharmacy - K_E.U28</p> <p>U2: Is able to comply with the principles of occupational deontology, including the Code of Ethics for the Pharmacist of the Republic of Poland - K_E.U30</p> <p>U3: Is able to respect the rights of the patient - K_E.U31</p>
Learning outcomes – social skills	K1: Draws conclusions from his own measurements and observations - K8

	<p>K2: Has a habit of using information technologies to search and select information - K7</p> <p>K3: Is aware of social conditions and restrictions resulting from the disease and the need to promote health-oriented behaviors - K5</p>
Didactic methods	<p>Observation and checking of practical skills by a supervisor, pharmacy employee, master of pharmacy.</p> <p>Observation, consultation and checking of practical skills by a supervisor on behalf of the university.</p>
Preliminary requirements	<p>To implement the course, it is necessary to have basic knowledge acquired in the following subjects: general and inorganic chemistry, analytical chemistry, physical chemistry, mathematics, drug chemistry, pharmacognosy, pharmacology, pharmaceutical care, practical pharmacy, pharmaceutical technology.</p>
Brief course description	<p>Practical preparation for work in a public and hospital pharmacy. Organization of work in a pharmacy, expedition, pharmaceutical compounding.</p>
Entire course description	<p>Six-month internship in a pharmacy aims to deepen theoretical knowledge and improve practical skills in the field of pharmacy, acquired during the course of pharmacy, with particular emphasis on: preparation of medical forms, storage and dispensing of drugs and medical devices, mastering in practice the principles of pharmaceutical care as well as ethical, legal and organizational basis of pharmacist's work in a pharmacy.</p> <p>During the six-month internship at the pharmacy, the student learns the activities that are the scope of the Master's degree in pharmacy, including mainly the rules for the implementation and retaxing of prescriptions, ordering and receiving goods, maintaining pharmacy documentation and operating a computer program.</p>
References	<p><b>Primary literature:</b></p> <ol style="list-style-type: none"> <li>1. Loyd V. Allen, Jr.: Pharmaceutical Dosage forms and Drug Delivery Systems, LWW; Eleventh, North American edition, USA 2017</li> <li>2. Yvonne Bouwman- Boer, V'lain fenton-May, Paul Le Brun: Practical Pharmaceutis, Springer 2015</li> <li>3. Kevin Taylor, Michael Aulton: Aulton's Pharmaceutics, Elsevier 2017</li> <li>4. Loyd V. Allen, Jr.: The Art, Science, and Technology of Pharmaceutical Compounding" American Pharmaceutical Association, 2016</li> <li>5. Remington: The Science and Practice of Pharmacy, Pharmaceutical Press, 2012.</li> <li>6. European Pharmacopoeia 10</li> </ol> <p><b>Supplementary literature:</b></p> <ol style="list-style-type: none"> <li>1. Loyd V. Allen, Jr.: Suppositories, Pharmaceutical Press, 2008</li> </ol>

	<p>2. Tapash K. Ghosh, Bhaskara R. Jasti: Theory and practice of contemporary pharmaceuticals, CRC Press, 2005</p> <p>3. Current legal acts and regulations regarding medicinal products that can be treated as raw materials for pharmaceutical compounding.</p>
Methods and criteria of evaluation	<p>Double control of the internship by the internship supervisor on behalf of the University, during which the implementation of the internship program in accordance with the internship program is verified.</p> <p>Passing skills, confirmed by the signature of the internship supervisor, such as:</p> <ul style="list-style-type: none"> <li>• Dispensing of drugs and medical devices and providing information on medicines,</li> <li>• Applying special rules for dispensing highly potent drugs, psychotropics and narcotics,</li> <li>• Applying the principles of good pharmacy practice,</li> <li>• Consulting and providing information on medicines,</li> <li>• Proper preparation of prescription and pharmacy medicines,</li> <li>• Proper preparation of medical forms under aseptic conditions,</li> <li>• Evaluating the quality of the medicine form.</li> <li>• Interpersonal communication necessary for the implementation of pharmaceutical care,</li> <li>• Practical implementation of pharmaceutical care in a pharmacy,</li> <li>• Application of the principles of the code of professional ethics, provisions regarding the profession of pharmacist, running a pharmacy and labor law,</li> <li>• Application of the principles of distribution and storage of medicinal products and medical devices,</li> <li>• Applying the principles of work organization in a pharmacy, taking into account health and safety rules and regulations,</li> <li>• Keeping pharmacy documentation as well as handling and administration of pharmacy IT systems.</li> <li>• Positive opinion of the internship supervisor from the pharmacy. Documenting in the placement diary that the placement lasted no less than 960 teaching hours (6 months).</li> </ul>
Practical training as part of course	Not applicable according to the educational program

### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	6 <sup>th</sup> year, 2 <sup>nd</sup> semester (spring)

Form of crediting a subject in the cycle	Six-month practice: crediting the practice on the basis of presence, implementation of the practice program, appraisal of the internship tutor.
Form(s) and number of course hours as well as the form of crediting	Participation in didactic activities (contact hours and activity): 960 hours. Grade without credit.
Course coordinator(s)	Prof. Jerzy Krysiński
Subject Teachers	Łukasz Pałkowski, PhD Piotr Bilski, PhD Jakub Płaczek, PhD Maciej Karolak, MPharm Andrzej Winnicki, MPharm Marta Czapiewska, MPharm
Course form (character)	<b>Obligatory</b>
Limit of places available in each group	Sixth-year students in selected pharmacies that meet the statutory requirements of an internship pharmacy, which received a positive opinion of the Provincial Pharmaceutical Inspector and the Regional Pharmacy Council. In the event that the internship takes place in a hospital pharmacy, at least 3 months of internship should take place in a generally available pharmacy.
Scheduled dates and places of course	The dates and places of classes depend on the organization of work of individual pharmacies and pharmaceutical industry
Number of hours of classes conducted using e-learning methods	-
Subject website	-
Learning outcomes determined for the given course form	Practice in a pharmacy: W1-W2, U1-U3, K1-K3
Methods and criteria of the evaluation for the given course form	<p>Double control of the internship by the internship supervisor on behalf of the University, during which the implementation of the internship program in accordance with the internship program is verified.</p> <p>Passing skills, confirmed by the signature of the internship supervisor, such as:</p> <ul style="list-style-type: none"> <li>– Dispensing of drugs and medical devices and providing information on medicines.</li> <li>– Applying special rules for dispensing highly potent drugs, psychotropics and narcotics.</li> <li>– Applying the principles of good pharmacy practice. Consulting and providing information on medicines.</li> <li>– Proper preparation of prescription and pharmacy medicines.</li> <li>– Proper preparation of medical forms under aseptic conditions.</li> <li>– Evaluating the quality of the medical forms.</li> <li>– Interpersonal communication necessary for the implementation of pharmaceutical care.</li> <li>– Practical implementation of pharmaceutical care in a pharmacy.</li> <li>– Application of the principles of the code of professional ethics, provisions regarding the profession of pharmacist, running a pharmacy and labor law.</li> </ul>

	<ul style="list-style-type: none"> <li>– Application of the principles of distribution and storage of medicinal products and medical devices.</li> <li>– Applying the principles of work organization in a pharmacy, taking into account health and safety rules and regulations.</li> <li>– Keeping pharmacy documentation as well as handling and administration of pharmacy IT systems.</li> <li>– Positive opinion of the internship supervisor from the pharmacy. Documenting in the placement diary that the placement lasted no less than 960 teaching hours (6 months).</li> </ul> <p>Completing the internship in the form of a colloquium at the tutor's internship.</p>
List of topics	<ol style="list-style-type: none"> <li>1. Acquaintance with health and safety rules.</li> <li>2. Acquaintance with the organization of work in a public or hospital pharmacy, professional and administrative activities, rooms and equipment.</li> <li>3. Acquaintance with the rules of accepting and storing drugs, medical devices and dietary supplements as well as nutritional supplements.</li> <li>4. Acquaintance with the rules of functioning of a prescription.</li> <li>5. Acquaintance with the principles of dispensing medicines, including the principles of dispensing highly potent drugs, psychotropic and narcotic drugs, medicinal products and medical materials, as well as providing information on dispensed products including sterile drugs and their storage and shelf life.</li> <li>6. Qualitative assessment of medical forms.</li> <li>7. Acquaintance with the use of the computer program and pharmacy documentation.</li> <li>8. Consolidation of skills related to the practical implementation of pharmaceutical care in the pharmacy.</li> <li>9. Ability to use professional sources, including Pharmacopoeia.</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

**Others**

## Library orientation

Space name	Comment
Subject name (in English and in Polish)	<b>Library orientation</b> (Przysposobienie biblioteczne)
Unit offering the subject	Medical Library Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	9001-eBHP
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	0
Form of crediting	Credit
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Education module: Others Obligatory course
Total student workload	<p>The workload related to the classes carried out on the NCU Moodle e-learning platform is:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 2 hours,</li> <li>– participation in exercises: 2 hours,</li> </ul> <p>The workload related to the classes carried out on the NCU Moodle e-learning platform is 4 hours.</p> <p>2. Student workload balance:</p> <ul style="list-style-type: none"> <li>– participation in lectures: 2 hours,</li> <li>– participation in classes: 2 hours,</li> <li>– preparation for the test: 1 hour.</li> </ul> <p>The total student workload related to the subject is 5 hours.</p> <p>3. The workload related to the scientific research carried out: - not applicable.</p> <p>4. Time required to prepare and participate in the assessment process: - preparation for the test: 1 hour.</p> <p>The total student workload related to preparation for participation in the assessment process is 1 hour.</p> <p>5. Balance of practical workload: - not applicable</p>
Learning outcomes – knowledge	W1: knows medical databases and the library and information system of the Medical Library Collegium Medicum

	W2: tracks the process of shaping new medical achievements based on available literature
Learning outcomes - abilities	U1: is able to use IT tools supporting the UMK library and information system U2: can self-assess knowledge and development needs, and plan educational activity using medical literature U3: can analyze medical literature, including in a foreign language, and draw conclusions based on available literature in the Bibliographic and Information System of the Medical Library U4: can use bibliographic and full-text databases and search for necessary information using available tools U5: can use specialist domestic and foreign scientific literature available in the Medical Library
Learning outcomes – social skills	K1: has the skill and habit of continuing education and professional development using objective sources of scientific information
Didactic methods	Lecture with multimedia presentation.
Preliminary requirements	To implement the described subject, it is necessary to know the general principles of using the library and to be able to search documents in a computer catalog.
Brief course description	Classes aim to familiarize the student with the principles of the Medical Library, its collections, databases and to present practical ways of using sources
Entire course description	Lectures on the subject of library adoption are designed to familiarize students with the organization and functioning of the Medical Library and the entire library and information system of the Nicolaus Copernicus University UMK, as well as to understand how to use computer catalogs in the HORIZON integrated library system, which allows searching, ordering and, as a result, borrowing books, magazines or other document in the Library's collections. To acquaint the student with the method of booking books, currently unavailable. Presentation of the most important scientific and medical computer databases and how to use them. The exercises are related to the issues discussed in the lectures and are designed to consolidate the ability to independently search for documents in a computer catalog, order or reserve them, become familiar with the search capabilities of computer databases and use their content in the didactic process.
References	Primary literature: 1. Reader guide: <a href="http://biblio.cm.umk.pl/index.php?id=83">http://biblio.cm.umk.pl/index.php?id=83</a>
Methods and criteria of evaluation	The basis for passing the subject Library preparation is compliance with the rules set out in the Medical Library Didactic Regulations. The online test consists of 7 questions randomly selected from 74 (single choice answer). The student receives 1 point for each correct answer. To get credit it is necessary to get 5 (70%) points. The student has the right to 5 approaches. Completion $\geq$ 70% (W1, W2, U1, U4, U5)



Practical training as part of course	Not applicable according to the educational program
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### B. Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 1 <sup>st</sup> semester (winter)
Form of crediting a subject in the cycle	e-learning lecture: credit
Form(s) and number of course hours as well as the form of crediting	e-learning lecture: 4 hours, credit
Course coordinator(s)	Dr Krzysztof Nierzwicki
Subject Teachers	mgr Anna Markowska
Course form (character)	Obligatory
Limit of places available in each group	Student's individual work
Scheduled dates and places of course	Computer station with Internet access. e-learning platform - UMK moodle. Completion date: the end of the semester I exam session.
Number of hours of classes conducted using e-learning methods	4
Subject website	<a href="https://moodle.umk.pl/BM/">https://moodle.umk.pl/BM/</a>
Learning outcomes determined for the given course form	E-learning <b>Lectures:</b> W1, W2, U1, U4, U5 <b>Tutorials:</b> W1, W2, U1, U4, U5
Methods and criteria of the evaluation for the given course form	Lecture: assessment based on the test - closed questions (single choice) - assessment without assessment $\geq 70\%$ (W1,, U1, U4, U5) Tutorials: assessment based on the test - closed questions (single choice) - assessment without assessment $\geq 70\%$ (W1,, U1, U4, U5)
List of topics	Lectures: 1. History of the Medical Library. 2. General information and order regulations. exercises: 1. Agenda of the Medical Library. 2. Computer catalog. 3. Digital resources.
Didactic methods	The same as in part A
References	The same as in part A

## Occupational Safety, Health and Ergonomics

### A. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Occupational Safety, Health and Ergonomics</b>

	(Elementy bezpieczeństwa i higieny pracy oraz ergonomii)
Unit offering the subject	Faculty of Pharmacy Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle
Subject code	9001-eBHP
ERASMUS code	
ISCED code	(0916) Pharmacy
Number of ECTS points	0
Form of crediting	Credit
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Education module: Others Obligatory course
Total student workload	<p>1. The workload related to activities requiring the direct participation of academic teachers is:0</p> <p>The workload associated with activities requiring the direct participation of academic teachers is 0hours, corresponding to 0 ECTS points.</p> <p>2. Student workload balance: participation in e-learning lecture: 8 hours,</p> <p>The total student workload is 8 hours, which corresponds to 0 ECTS point.</p> <p>3. The workload related to the scientific research carried out: not applicable</p> <p>4. The time required to prepare and to participate in the assessment process: not applicable</p> <p>2. Time required to complete the compulsory apprenticeship (s): not applicable</p>
Learning outcomes – knowledge	<p>W1: knows and understands the basic principles of ergonomics and the necessary provisions in the field of health and safety at work</p> <p>W2: knows his rights and obligations in this respect</p> <p>W3: Defines and recognizes common threats potentially occurring in the Nicolaus Copernicus University</p>
Learning outcomes - abilities	<p>U1: recognizes situations that threaten human health or life, applies qualified first aid principles and provides qualified first aid in situations of threat to health and life</p> <p>U2: can describe the procedure in the event of an accident and evacuation</p>
Learning outcomes – social skills	K1: is aware of social conditions and restrictions resulting from the disease and the need to promote healthy behaviors
Didactic methods	Problem-based lecture with multimedia presentation.

Preliminary requirements	No preliminary requirements.
Brief course description	As part of the education, topics are discussed in the field of popularizing the issues of labor protection in accordance with the psychophysical capabilities of man and with the objectives of the University's activities in this field.
Entire course description	<p>As part of the education conducted, topics are raised in the field of popularizing the issues of labor protection in accordance with the psychophysical capabilities of man and with the objectives of the University's activities in this field.</p> <p>The subject Elements of occupational health and safety and ergonomics contains the following content:</p> <ul style="list-style-type: none"> <li>- potential hazards at the place of study and stay,</li> <li>- factors harmful to health, arduous and dangerous - prevention,</li> <li>- an introduction to ergonomics,</li> <li>- fire protection,</li> <li>- first aid rules.</li> </ul> <p>The overall goal is to limit exposure in the living environment, reduce the likelihood or frequency of adverse health changes.</p>
References	<p>Primary literature:</p> <p>Supplementary literature:</p>
Methods and criteria of evaluation	Final written exam: e-learning test on the Moodle platform
Practical training as part of course	Not applicable according to the educational program

#### B.Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 1 <sup>st</sup> semester (winter)
Form of crediting a subject in the cycle	e-learning lecture: credit
Form(s) and number of course hours as well as the form of crediting	e-learning lecture: 8 hours, credit
Course coordinator(s)	mgr Bożena Bukowska mgr Elżbieta Dobkiewicz
Subject Teachers	mgr Bożena Bukowska
Course form (character)	Obligatory
Limit of places available in each group	Lectures: 5th year students, 9th (winter) semester
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	8
Subject website	<a href="https://moodle.umk.pl/BHPCM/">https://moodle.umk.pl/BHPCM/</a>
Learning outcomes determined for the given course form	E-learning: On completion, the student has demonstrated knowledge of basic knowledge and skills in a given topic. The student has demonstrated the given competences sufficiently to pass.

Methods and criteria of the evaluation for the given course form	Final written exam: e-learning test on the Moodle platform
List of topics	<p>The course contains the following content:</p> <ol style="list-style-type: none"> <li>1. Human threats in the modern world <ul style="list-style-type: none"> <li>• The most common threats</li> <li>• Threats in work and living environment</li> <li>• Factors harmful to health, arduous and dangerous</li> </ul> </li> <li>2. Selected hazards at work and in the workplace <ul style="list-style-type: none"> <li>• Physical factors: electromagnetic fields, ultraviolet, atmospheric discharges, gale, slippery and uneven surfaces, noise, infrasound</li> <li>• Chemical agents: chemical exposure and poisoning, poison absorption pathways, selected chemical hazards (food, cosmetics, medicines, drinking water, SBS syndrome, ototoxic substances, household poisons, nanoproducts)</li> </ul> </li> <li>3. Biological factors (definition, classification, occurrence and spread, effects on the human body, threats from insects)</li> <li>4. Psychosocial factors (UMK student stress relief guide, or how to like stress, mobbing, bullying, addiction)</li> <li>5. Ergonomics <ul style="list-style-type: none"> <li>• Introduction to ergonomics</li> <li>• Contemporary directions of ergonomic activities</li> <li>• Nanoergonomics, Nanoneuroergonomics</li> <li>• Ergonomic organization of computer stations</li> </ul> </li> <li>6. Fire and explosion hazards <ul style="list-style-type: none"> <li>• Fire phenomenon</li> <li>• Rules of conduct during fires</li> <li>• Firefighting, test alerts - photos from evacuation exercises at the Nicolaus Copernicus University buildings</li> <li>• Fire protection</li> </ul> </li> <li>7. First aid <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Legal aspects</li> <li>• Organization of activities at the place of the incident</li> <li>• Resuscitation</li> <li>• Hemorrhage, injury</li> <li>• Other injuries</li> <li>• Burns</li> <li>• Electric shock</li> <li>• Insect stings</li> <li>• poisoning</li> <li>• Sudden states</li> <li>• Road accidents</li> </ul> </li> </ol>
Didactic methods	The same as in part A
References	The same as in part A

## Physical Education

### B. General course description

Space name	Comment
Subject name (in English and in Polish)	<b>Physical Education</b> (Wychowanie Fizyczne)
Unit offering the subject	Department of Physical Education and Sport Ludwig Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun
Unit for which the subject is offered	Faculty of Pharmacy Field of study: Pharmacy, full-time studies, long cycle part-time studies
Subject code	4600 – WF (GZES, FIT., SIŁ.,)
ERASMUS code	
ISCED code	(0916)
Number of ECTS points	0
Form of crediting	Credit
Language of instruction	English
Designation whether a subject may be credited more than once	No
Subject group	Obligatory course Education module: Others
Total student workload	<ol style="list-style-type: none"> <li>Obligatory hours realized with the teacher participation: <ul style="list-style-type: none"> <li>practicals participation – 60 hours (2 x 30 ours)</li> </ul> <p>The workload related to activities requiring the direct participation of academic teachers is 60 hours</p> </li> <li>Student workload balance is 60 hours <ul style="list-style-type: none"> <li>practicals participation – 60 hours (2 x 30 ours)</li> </ul> <p>The total student workload is 60 hours</p> </li> <li>The workload related to the scientific research: not applicable</li> <li>Time required for the preparation and participation in evaluating process: not applicable</li> <li>Time required for the practical training completion – not applicable</li> </ol>
Learning outcomes – knowledge	W1: Knows the principles of health promotion W2: Knows the human physical development, health and principles of his hardening
Learning outcomes - abilities	U1: is able to work in a team U2: can use various forms of activities that promote a healthy lifestyle
Learning outcomes – social skills	K1: has the awareness of continuous training in its various aspects, including the care of its own efficiency K2: is able to support communities in the field of health promotion and their physical activity

Didactic methods	Viewing methods (demonstration with explanation, film, cinograms), Verbal methods (description, explanation, explanation), Methods of teaching movement: analytical, synthetic and global, Methods of teaching technique in sports games: repetitive, Methods used to shape motor skills: - repetitive, low and medium loads, circuit, circuit - station, Forms of exercise: - team - frontal - individual Forms of teaching sport games: - strict - parts of the game, - school game, - proper game.
Preliminary requirements	To achieve the objectives and tasks of the subject described, the following are needed: eral good health, medical contraindications, prerequisites for special preparation, rest and activity desirable
Brief course description	Physical Education - a form of physical activity - includes a set of measures, methods and forms that aim to enable the participants to master basic motor skills and through these exercises to improve their physical and motor skills.
Entire course description	Lectures – not applicable Physical activity classes - The curriculum of the subject of physical education covers all forms of physical activity proposed to students. Each of them, as a common and basic goal, assumes the dissemination of physical activity among students through the implementation of tasks in the field of functional and motor skills training, the ability to use selected basic and simplest exercises for health-promoting activities, using the knowledge and practical skills acquired during classes. Shaping skills is based on the principles of proper communication in the team, self-discipline, friendliness and responsibility for health and safety of yourself and others. The goals pursued are to help shape the right personality of students able to take on difficult challenges in the future. The differences in the proposed forms of classes relate to the selection of resources and forms for the implementation of individual tasks, while using similar methods and accents on the implemented goals and tasks as well as the selection of equipment and devices. In team sports games, elements of technique and tactics of selected sports games such as volleyball, basketball and floorball are used as the basic means to achieve the objectives and tasks of shaping general physical and motor fitness. In gym classes, the basic means used to raise to a higher level basic motor skills, such as strength, speed or endurance, are exercises with external load. During classes in the form of fitness, all tasks and goals are implemented based on music and dance forms, individual and group exercises. During these classes, tools and small equipment for external load are also used. Seminars – not applicable
References	Primary literature:

	<p>3. 1. Piłka ręczna, Piłka siatkowa, Koszykówka - A. Matyszkiewicz, I. Worobjew, M. Chromajew, wyd. COS Warszawa, 1999.</p> <p>Supplementary literature:</p> <p>4. 1. "Vademcum koszykówki" -T.Huciński, wyd. RCMSKFiS, Warszawa, 1992,</p> <p>5. „Piłka siatkowa” - Technika, taktyka i elementy mini siatkówki, Grzegorz Grządziel, Dorota Szade, wyd. AWF Katowice, 2009,</p> <p>6. „Unihokej”, Podstawy techniki i taktyki w ćwiczeniach, grach i zabawach, Stanisława Starzyńska, wyd. Polska Federacja Unihokeja, 1998,</p> <p>7. Atlas ćwiczeń ogólnorozwojowych – wyd. AWF W-wa, 1999</p>
Methods and criteria of evaluation	<p>The condition of passing the course is: attendance at all classes (in the case of excused absence the classes must be completed at another time by the end of the semester), a positive assessment of the motor skills test, a positive assessment of the teacher.</p> <p>Criteria for passing physical education: The attitude and activity of the student during classes is manifested in:</p> <ol style="list-style-type: none"> <li>willingness and commitment to performed exercises during classes</li> </ol> <p>ude towards students - help, kindness, no aggression in organizing accessories, places for exercise, uraging others to physical activity, rest in developing own fitness, ying the rules of personal hygiene, ntory during classes, icipation in the organization of sporting events - eational, icipation in selected sport sections KU AZS CM UMK, 10. representing universities in the inter-university sports competition system (MP UM, AMP)</p>
Practical training as part of course	Not applicable according to the educational program

### C. Course description in the didactic cycle

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 1 <sup>st</sup> semester (winter)
Form of crediting a subject in the cycle	Practicals: credit
Form(s) and number of course hours as well as the form of crediting	Practicals: 30 hours - credit
Course coordinator(s)	Dr. Tomasz Zegarski, PhD
Subject Teachers	Practicals: Marcin Kwiatkowski, PhD
Course form (character)	Obligatory
Limit of places available in each group	Practicals: groups of 15 people

Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	not applicable
Subject website	not applicable
Learning outcomes determined for the given course form	Practicals: W1,W2, U1, U2, K1, K2
Methods and criteria of the evaluation for the given course form	The condition of passing the course is: attendance at all classes (in the case of excused absence the classes must be completed at another time by the end of the semester), a positive assessment of the motor skills test, a positive assessment of the teacher. Criteria for passing physical education: The attitude and activity of the student during classes is manifested in: 1. willingness and commitment to performed exercises during classes 2. attitude towards students - help, kindness, no aggression 3. participation in organizing accessories, places for exercise, 4. encouraging others to physical activity, 5. interest in developing own fitness, 6. obeying the rules of personal hygiene, 7. punctuality during classes, 8. participation in the organization of sporting events - educational, 9. participation in selected sport sections KU AZS CM UMK, 10. representing universities in the inter-university sports competition system (MP UM, AMP)
List of topics	Topics for each form of Physical Education classes chosen by students before the beginning of each semester: 1. Fitness test based on the International Physical Fitness Test (MTSF). 2. Exercises for general physical and motor fitness with an emphasis on coordination motor skills using a variety of equipments. 3. General development exercises in the field of motion stabilization using elements of functional training. 4. Teaching the technique of bouncing volleyball with the upper and lower two-hand method. 5. Teaching service with the tennis method and its bouncing by the bottom method. 6. Preparatory exercises for learning how to attack in volleyball. 7. Practicing attacking in close form and parts of the game. 8. Learning and improving elements of volleyball technique in small games 2 X 2 and 3 X 3, learning the rules of organizing competitions. 9. School game as improving selected elements of game technique and tactics, learning the rules and regulations of the game and competition organization. 10. Improving the basic elements of the basketball technique: dribbling the ball, catching and passing the ball, moving around on the pitch.



11. Learning to throw into the basket from the spot and from a distance after dribbling. 3 x 3 small games.
12. Learning and improving selected elements of basketball in the game 3 X 3.
13. Improving the game technique in the form of game fragments and in a 5x5 game. Learning the rules for setting up the pitch in defense and attack.
14. Improving the techniques of playing (leading the ball in twos to attack) in the form of fragments of the game and the game 3 X 3.
15. Learning the rules and regulations of the game during the school game. 3 x 3 small games tournament.

Form of classes: Gym:

In classes conducted in the form of gym exercises, each lesson unit has the same task - to improve the overall strength of all muscle groups of individual body parts. Part of the exercising group, which has experience in the use of the gym and has its own sets of exercises, can continue their implementation but after consultation and supervision of the teacher. This situation may be due to the fact that the trainees take part in such classes outside the university or in the university gym but outside the program hours and during program classes they continue to work on the fitness and appearance of their own body. In turn, another part of the group that wants to use this form of classes for the first time, first undergoes adaptation to exercises, learns the principles of their selection, the technique of working on machines - trainers under the supervision of the teacher conducting the classes. Such organization of classes is in no way conducive to formulating topics (topics on PE are tasks) for individual units of classes, because these tasks are different for individual people in the group. The whole group participating in the classes in the introductory part participates in the so-called warm-up aimed at preparing their body for physical effort, followed by the implementation of tasks according to the above principles and conditions. Each participant or group exercises using different loads, intensities or the number of repetitions resulting from their own capabilities, degree of preparation and experience to work in the gym. These classes are subject to the principle of full individualization. There is full repetition of the same tasks (themes) and goals throughout the course, using variations in the intensity range and size of loads, using the same methods and forms.

Form of classes: Fitness:

1. Assessment of students' fitness level in the International General Physical Fitness Test (MTSF).
2. Developing general physical and motor fitness using various accessories.
3. Movement stabilization exercises using elements of functional training. Teaching safety rules during fitness classes.
4. Teaching the correct body posture and familiarizing with basic corrective and compensatory exercises.

	<p>5. Teaching basic steps with their names, the correct technique of their implementation.</p> <p>6. Teaching and improving the skills of responding to specific commands in aerobics and fitness in a strictly defined way.</p> <p>7. Teaching and perfecting simple step modifications (type: basic&gt; mambo&gt; pivot).</p> <p>8. Teaching how to remember the order of individual elements.</p> <p>9. Teaching how to combine elements into a repeatable whole, i.e. remembering the entire choreography.</p> <p>10. Improving work on music and keeping the right pace and intensity.</p> <p>11. Teaching how to use various types of equipment, such as: gym balls, skipping ropes and others.</p> <p>12. Teaching choreography on different arrangements of foam pads.</p> <p>13. Teaching the basic 'Zumba' steps.</p> <p>14. Improving zumba steps for individual dance songs.</p> <p>Improving coordination motor skills using systems of known choreographic systems.</p>
Didactic methods	The same as in part A
References	The same as in part A

Space name	Comment
Didactic cycle	1 <sup>st</sup> year, 2 <sup>nd</sup> semester (spring)
Form of crediting a subject in the cycle	Practicals: credit
Form(s) and number of course hours as well as the form of crediting	Practicals: 30 hours - credit
Course coordinator(s)	Dr. Tomasz Zegarski, PhD
Subject Teachers	Practicals: Marcin Kwiatkowski, PhD
Course form (character)	Obligatory
Limit of places available in each group	Practicals: groups of 15 people
Scheduled dates and places of course	Dates and locations are provided by the Department of Recruitment and Student Affairs Collegium Medicum in Bydgoszcz NCU in Toruń
Number of hours of classes conducted using e-learning methods	not applicable
Subject website	not applicable
Learning outcomes determined for the given course form	Practicals: W1,W2, U1, U2, K1, K2
Methods and criteria of the evaluation for the given course form	<p>The condition of passing the course is: attendance at all classes (in the case of excused absence the classes must be completed at another time by the end of the semester), a positive assessment of the motor skills test, a positive assessment of the teacher.</p> <p>Criteria for passing physical education: The attitude and activity of the student during classes is manifested in:</p> <ol style="list-style-type: none"> <li>1. willingness and commitment to performed exercises during classes</li> </ol> <p>ude towards students - help, kindness, no aggression in organizing accessories, places for exercise,</p>

	<p>uraging others to physical activity, rest in developing own fitness, ying the rules of personal hygiene, ntory during classes, icipation in the organization of sporting events - eational, icipation in selected sport sections KU AZS CM UMK, 10. representing universities in the inter-university sports competition system (MP UM, AMP)</p>
List of topics	<ol style="list-style-type: none"> <li>1. Fitness test based on the International Physical Fitness Test (MTSF).</li> <li>2. Exercises for general physical and motor fitness with an emphasis on coordination motor skills using a variety of equipments.</li> <li>3. Exercises of mobility stabilization through elements of functional training.</li> <li>4. Improving the technique of bouncing volleyball upper and lower both hands.</li> <li>5. Learning and improving service with the tennis method.</li> <li>6. Preparatory exercises for learning how to attack a ball.</li> <li>7. Learning and improving the elements of volleyball technique in small games 2 X 2 and 3 X 3, learning the rules of organization competition.</li> <li>8. School game as improvement of selected elements techniques and tactics of the game, learning the rules and regulations of the game and competition organization.</li> <li>9. Learning the basic elements of the game technique in basketball, dribbling the ball, grasping and passing the ball, moving on the pitch, shaping directed fitness.</li> <li>10. Learning and improving selected elements of the game basketball in the game 3 X 3.</li> <li>11. Understanding the rules of organization of recreational competition sports games for promotion physical activity, promotion of a healthy lifestyle through intra-group organization competition.</li> <li>12. Developing motor skills using the equipment of selected sports games in the form of a task.</li> <li>13. Improving the techniques of playing (playing the ball to the net and exposing it to attack) in the form of game fragments and 3 X 3 games.</li> <li>14. Learning to throw from a deed into a basket from dribbling and from passing.</li> <li>15. Improving the techniques of playing (driving the ball in twos to attack) in the form of game fragments and games 3 X 3.</li> </ol>
Didactic methods	The same as in part A
References	The same as in part A