

Course descriptions

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COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/01-Mgr-A/00	Course title: Academic English Language Preparation (1)
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 2.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: intermediate level of English	
Course requirements: - active presence at seminars - final test with evaluation scale – A (100 – 91 %), B (90 – 81 %), C (80 – 73 %), D (72 – 66 %), E (65 – 60 %), FX (59 – 0 %) - To complete the course, the student must achieve at least 60%. Scale of assessment (preliminary/final): 100 %	
Learning outcomes: After completing the seminars a student is able to understand professional texts, reproduce their content orally and in writing, using English professional terminology from the field of human body and the profession of a pharmacist. Thanks to professional texts a student can use English professional terminology in both professional and non-professional environments.	
Class syllabus: The lessons concentrate on the following topics: the human body, the body systems and their functions, pharmaceutical care, the role of a pharmacist, services available in a pharmacy, laboratory equipment.	
Recommended literature: Hollá, O., Kližanová, D., Žufková, V.: English for Pharmacists I. Bratislava: Vydavateľstvo UK, 2023. Grammar Workbook I	
Languages necessary to complete the course: English language	
Notes: Academic English Language Preparation (1 - 5) within Master Study Programme is carried out in English study programme in five semesters. The contents of these specialised professional courses closely follow the contents of other professional courses taught in the relevant semesters.	

It is therefore highly recommended to take the courses gradually from the 2nd to the 6th semester (including) of the study, i.e., Academic English Language Preparation (1) in the 2nd (summer) semester of study.

Past grade distribution

Total number of evaluated students: 753

A	ABS	B	C	D	E	FX
16,6	0,0	11,55	17,53	18,73	27,49	8,1

Lecturers: PaedDr. Viera Žufková, PhD., PhDr. Darina Kližanová, Mgr. Natália Kližanová

Last change: 18.09.2023

Approved by: PaedDr. Viera Žufková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/02-Mgr-A/00	Course title: Academic English Language Preparation (2)
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: intermediate level of English	
Course requirements: - active presence at seminars - final test with evaluation scale – A (100 – 91 %), B (90 – 81 %), C (80 – 73 %), D (72 – 66 %), E (65 – 60 %), FX (59 – 0 %) - To complete the course, the student must achieve at least 60%. Scale of assessment (preliminary/final): 100 %	
Learning outcomes: After completing the seminars a student is able to understand professional texts, reproduce their content orally and in writing, using English professional terminology from the field of factors influencing health condition. Thanks to professional texts a student can use English professional terminology in both professional and non-professional environments.	
Class syllabus: The lessons concentrate on the following topics: factors influencing our health, pollution of environment, drug abuse and drug addiction, health care, disease transmission.	
Recommended literature: Hollá, O., Kližanová, D., Žufková, V.: English for Pharmacists II. Bratislava: Vydavateľstvo UK, 2020. Grammar Workbook II	
Languages necessary to complete the course: English language	
Notes: Academic English Language Preparation (1-5) within Master Study Programme is obligatory elective and is carried out in English study programme in fivesemesters. The contents of these specialised professional courses closely follow the contents of other professional courses taught in the relevant semesters. It is therefore highly recommended to take the courses gradually from	

the 2nd to the 6th semester (including) of the study, i.e., Academic English Language Preparation (2) in the 3rd (winter) semester of study.

Past grade distribution

Total number of evaluated students: 634

A	ABS	B	C	D	E	FX
20,82	0,0	13,56	17,03	20,35	23,34	4,89

Lecturers: PaedDr. Viera Žufková, PhD., PhDr. Darina Kližanová, Mgr. Natália Kližanová

Last change: 15.09.2023

Approved by: PaedDr. Viera Žufková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/03-Mgr-A/20	Course title: Academic English Language Preparation (3)
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 2., 4., 6., 8., 10.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: intermediate level of English	
Course requirements: - active presence at seminars - final test with evaluation scale – A (100 – 91 %), B (90 – 81 %), C (80 – 73 %), D (72 – 66 %), E (65 – 60 %), FX (59 – 0 %) - To complete the course, the student must achieve at least 60%. Scale of assessment (preliminary/final): 100 %	
Learning outcomes: After completing the seminars a student is able to understand professional texts, reproduce their content orally and in writing, using English professional terminology from the field of basic chemical terminology and disease prevention. Thanks to professional texts a student can use English professional terminology in both professional and non-professional environments.	
Class syllabus: The lessons concentrate on the following topics: disease prevention, healthy way of life, balanced diet, vitamins, minerals, cosmetics, first aid, treatment in various situations and emergencies.	
Recommended literature: Hollá, O., Jurišová, E., Kližanová, D., Žufková, V.: English for Pharmacists III. Bratislava: Vydavateľstvo UK, 2019. Grammar Workbook III	
Languages necessary to complete the course: English language	
Notes: Academic English Language Preparation (1-5) within Master Study Programme is carried out in English study programme in five semesters. The contents of these specialised professional courses closely follow the contents of other professional courses taught in the relevant semesters. It is therefore highly recommended to take the courses gradually from the 2nd to the 6th semester	

(including) of the study, i.e., Academic English Language Preparation (3) in the 4th (summer) semester of study.

Past grade distribution

Total number of evaluated students: 39

A	ABS	B	C	D	E	FX
25,64	0,0	28,21	12,82	7,69	12,82	12,82

Lecturers: PaedDr. Viera Žufková, PhD., PhDr. Darina Kližanová, Mgr. Natália Kližanová

Last change: 15.09.2023

Approved by: PaedDr. Viera Žufková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/04-Mgr-A/20	Course title: Academic English Language Preparation (4)
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 1., 3., 5., 7., 9.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: intermediate level of English	
Course requirements: - active presence at seminars - final test with evaluation scale – A (100 – 91 %), B (90 – 81 %), C (80 – 73 %), D (72 – 66 %), E (65 – 60 %), FX (59 – 0 %) - To complete the course, the student must achieve at least 60%. Scale of assessment (preliminary/final): 100 %	
Learning outcomes: After completing the seminars a student is able to understand professional texts, reproduce their content orally and in writing, using English professional terminology from the field of pharmacology. Thanks to professional texts a student can use English professional terminology in both professional and non-professional environments.	
Class syllabus: The lessons concentrate on the following topics: common disorders, home medicine cabinet, drug classification, frequently prescribed drugs, their sources, composition and effects, alternative medicine, healing herbs - their structure and functions.	
Recommended literature: Hollá, O., Kližanová, D., Žufková, V.: English for Pharmacists IV. Bratislava: Vydavateľstvo UK, 2020. Grammar Workbook IV	
Languages necessary to complete the course: English language	
Notes: Academic English Language Preparation (1-5) within Master Study Programme is carried out in English study programme in five semesters. The contents of these specialised professional courses closely follow the contents of other professional courses taught in the relevant semesters.	

It is therefore highly recommended to take the courses gradually from the 2nd to the 6th semester (including) of the study, i.e., Academic English Language Preparation (4) in the 5th (winter) semester of study.

Past grade distribution

Total number of evaluated students: 26

A	ABS	B	C	D	E	FX
19,23	0,0	26,92	15,38	11,54	3,85	23,08

Lecturers: PaedDr. Viera Žufková, PhD., PhDr. Darina Kližanová, Mgr. Natália Kližanová

Last change: 15.09.2023

Approved by: PaedDr. Viera Žufková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/15-Mgr-A/20	Course title: Academic English Language Preparation (5)
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 2., 4., 6., 8., 10.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: intermediate level of English	
Course requirements: - active presence at seminars - final test with evaluation scale – A (100 – 91 %), B (90 – 81 %), C (80 – 73 %), D (72 – 66 %), E (65 – 60 %), FX (59 – 0 %) - To complete the course, the student must achieve at least 60%. Scale of assessment (preliminary/final): 100 %	
Learning outcomes: After completing the seminars, a student can understand professional texts, reproduce their content orally and in writing, using English professional terminology from pharmacy and medicine. Thanks to professional texts a student can use English professional terminology in both professional and non-professional environments.	
Class syllabus: The seminars follow the deepening of communicative skills and professional vocabulary. In addition to selected texts from textbooks, texts from promotional materials, manuals, and magazines are used. The lessons concentrate on the following topics: regular check-ups, prescriptions, drug dosage, over-the-counter drugs, nutrient supplements, pharmaceutical industry, the healthcare system in Slovakia, a career in the pharmaceutical field.	
Recommended literature: Bates, M., Dudley, T.: Nucleus: General Science. London: Longman, 1992 Havlíčková, I., Dostálová, Š., Katerová, Z.: English for Pharmacy and Medical Bioanalytics. Karolinum Press, 2014. James, V. D.: Medicine. London: Prentice Hall, 1989	
Languages necessary to complete the course: English language	
Notes:	

Academic English Language Preparation (1-5) within Master Study Programme is carried out in English study programme in five semesters. The contents of these specialised professional courses closely follow the contents of other professional courses taught in the relevant semesters. It is therefore highly recommended to take the courses gradually from the 2nd to the 6th semester (including) of the study, i.e., Academic English Language Preparation (5) in the 6th (summer) semester of study.

Past grade distribution

Total number of evaluated students: 15

A	ABS	B	C	D	E	FX
53,33	0,0	0,0	26,67	0,0	6,67	13,33

Lecturers: PhDr. Darina Kližanová, PaedDr. Viera Žufková, PhD., Mgr. Natália Kližanová

Last change: 15.09.2023

Approved by: PaedDr. Viera Žufková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KJ/19-Mgr-A/19		Course title: Academic German Language Preparation (1)				
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 2., 4., 6., 8., 10.						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 2						
A	ABS	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: Mgr. Katarína Batková						
Last change:						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/12-Mgr-A/20	Course title: Academic German Language Preparation (2)
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 1., 3., 5., 7., 9.	
Educational level: I.II.	
Prerequisites:	
Course requirements: - active participation of students in classroom - midterm test (15%) - final test (85%) To complete the course successfully a student must achieve at least 60%. Scale of assessment (preliminary/final): 15/85	
Learning outcomes: Students are able to use basic German grammar and practice the basic skills of listening, speaking, reading and writing in the present tense with an emphasis upon correct oral and written expressions and aural comprehension. Students are also introduced to various aspects of German culture in Germany and in German speaking countries focusing on the professional environment of pharmacies.	
Class syllabus: The course is for absolute beginners in German language who would like to obtain basic communication skills and grammar structures needed for everyday life in the academic and professional environment in a German speaking country.	
Recommended literature: Schritte international 2: Deutsch als Fremdsprache / Kursbuch + Arbeitsbuch mit Audio-CD zum Arbeitsbuch und interaktiven Übungen: Niveau A1/2, Hueber, 2009. Schritte international 3: Deutsch als Fremdsprache / Kursbuch + Arbeitsbuch mit Audio-CD zum Arbeitsbuch und interaktiven Übungen: Niveau A2/1, Hueber, 2009.	
Languages necessary to complete the course: English language, only minimal previous knowledge of German language is needed for this course.	
Notes: The course is held only in winter semester. It is highly recommended to take the course in the 3rd semester of the study.	

Past grade distribution						
Total number of evaluated students: 4						
A	ABS	B	C	D	E	FX
75,0	0,0	0,0	25,0	0,0	0,0	0,0
Lecturers: Mgr. Katarína Batková						
Last change: 30.07.2020						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/13-Mgr-A/20	Course title: Academic German Language Preparation (3)
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 2., 4., 6., 8., 10.	
Educational level: I.II.	
Prerequisites:	
Course requirements: - active participation of students in classroom - midterm test (15%) - final test (85%) To complete the course successfully a student must achieve at least 60%. Scale of assessment (preliminary/final): 15/85	
Learning outcomes: Students are able to use basic German grammar and practice the basic skills of listening, speaking, reading and writing in the present tense with an emphasis upon correct oral and written expressions and aural comprehension. Students are also introduced to various aspects of German culture in Germany and in German speaking countries focusing on the professional environment of pharmacies.	
Class syllabus: The course is for absolute beginners in German language who would like to obtain basic communication skills and grammar structures needed for everyday life in the academic and professional environment in a German speaking country.	
Recommended literature: Schritte international 4: Deutsch als Fremdsprache / Kursbuch + Arbeitsbuch mit Audio-CD zum Arbeitsbuch und interaktiven Übungen: Niveau A2/2, Hueber, 2009. Schritte international 5: Deutsch als Fremdsprache / Kursbuch + Arbeitsbuch mit Audio-CD zum Arbeitsbuch und interaktiven Übungen: Niveau B1/1, Hueber, 2009.	
Languages necessary to complete the course: English language, only minimal previous knowledge of German language is needed for this course.	
Notes: The course is held only in summer semester. It is highly recommended to take the course in the 4th semester of the study.	

Past grade distribution						
Total number of evaluated students: 0						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: Mgr. Katarína Batková						
Last change: 30.07.2020						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KJ/16-Mgr-A/20		Course title: Academic German Language Preparation (5)				
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 1., 3., 5., 7., 9.						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 0						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: Mgr. Katarína Batková						
Last change:						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/18-Mgr-A/22	Course title: Advanced Cell-Biology Methods
Educational activities: Type of activities: practicals / lecture Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Mandatory attendance (lectures and laboratories). After successful completion of the laboratory exercises, the subject is finished by an exam taken in written form. Scale of assessment (preliminary/final): Evaluation A: 100-93%, B: 92-85%, C: 84-77%, D:76-69%, E: 68-60%.	
Learning outcomes: The subject is designed for students, who want to take part and work independently on scientific projects based on cell culture experiments, as a part of their diploma thesis research. Students will be informed about the safety and sterility of requirements, which are the key factors for cell culture workflow. Students will be taught how to approach and solve common problems in the cell culture media for a certain cell culture, subculture techniques, cell viability assays, cell morphology (inverted microscopes), cell freezing and thawing, follow-up molecular-biological methods.	
Class syllabus: Cell cultures and their benefits, use in the biomedicine studies, practical skills in the cell-culture laboratory, characteristics of different types of cell cultures, stem cells, biology of cell cultures, conditions of cell cultivation (laboratory equipment, sterility requirements), freezing and unfreezing of cells, basic and follow-up procedures using molecular-biological techniques (transfection, overexpression, knockdown, knockout, quantitative Real-Time PCR). Procedures implemented in the solving of usual problems associated with the cultivation of cell cultures, e.g., different types of infections and contaminations. Practical part of the subject is directed to the determination of changes in inflammatory gene expression in the simulated model of inflammation in cell culture.	
Recommended literature: Animal Cell Culture: Essential Methods, edited by John M. Davis, Wiley, 2011. ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/uniba-ebooks/detail.action?docID=675259	
Languages necessary to complete the course: English language	
Notes:	

Maximum number of students per course: 1 group						
Past grade distribution						
Total number of evaluated students: 4						
A	ABS	B	C	D	E	FX
0,0	0,0	25,0	25,0	25,0	0,0	25,0
Lecturers: Ing. Ludmila Pašková, PhD., Mgr. Veronika Vyletelová, PhD.						
Last change: 28.04.2025						
Approved by: Ing. Ludmila Pašková, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KGF/20-Mgr-A/22	Course title: Advanced Pharmaceutical Compounding
Educational activities: Type of activities: practicals / seminar Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites: FaF.KGF/05-Mgr-A/22 - Pharmaceutical Technology (1)	
Course requirements: Attendance of seminars and practical exercises is obligatory. Methods and options for compensating absences will be defined in the course syllabus. The course is completed when at least 60% is achieved in the final oral exam. Assessment: A: 93.00–100.00%, B: 85.00–92.99%, C: 77.00–84.99%, D: 69.00–76.99%, E: 60.00–68.99%, FX: 59.99 % and less	
Learning outcomes: The course focuses on deeper knowledge of pharmaceutical technology, especially in the field of individually prepared preparations (IPP), which the student acquired in the courses Pharmaceutical Technology 1 and 2. This area is currently getting to the forefront, as individualization of therapy in the form of IPP provides the patient with undeniable benefits and better physician-tailor-made treatment options for the patient. As current practice often requires addressing many of the challenges in the form of formulation and technological problems associated with the nature of drugs or excipients, it is necessary and important to know, how to address them in line with maintaining the efficacy and stability of the formulation. The participation of experts directly from pharmacy practice will keep the topic updated.	
Class syllabus: <ul style="list-style-type: none"> • Solution design for the preparation of individually prepared preparations supplementing outages in the field of mass-produced drugs. • Technological problems in the formulation of rectal and vaginal drugs. • Possibilities of formulation of systemically acting drugs into penetration bases. • Specifics of the preparation of combined dermal semi-solid drugs. • individually prepared preparations for pediatric and geriatric patients, the possibility of influencing the sensory properties of the drug or IPP. • Modern packaging as part of IPP, material properties and their reusability. 	
Recommended literature: Aulton, M. E.: Aulton's Pharmaceutics: the design and manufacture of medicines. Edinburgh: Churchill Livingstone, 2007	

Európsky liekopis, aktuálne vydanie, Strasbourg: EDQM.
Tovey, G.D.: Specialised Pharmaceutical Formulation: The Science and Technology of Dosage Forms, Royal Society Chemistry, 2022
Allen, L.V.; Ansel, H.C.: Pharmaceutical Dosage Forms and Drug Delivery System, Wolters Kluwer Health, 2013
Tekade, R.K.: Dosage Form Design Parameters, Elsevier Science Publishing Co Inc., 2018

Languages necessary to complete the course:

English Language

Notes:

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: Mgr. Jana Selčanová, PharmDr. Mária Čuchorová, PhD., PharmDr. Veronika Šimunková, PhD., PharmDr. Jarmila Prieložná, PharmDr. Miroslava Špaglová, PhD., PharmDr. Veronika Mikušová, PhD., PharmDr. ThLic. Mária Raučinová, PhD., Mgr. Daniel Krchňák, DiS

Last change: 05.09.2024

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFANF/14-Mgr-A/20	Course title: Analysis of Substances in Biological System
Educational activities: Type of activities: practicals / lecture Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Preliminary assessment during the semester - preparation and subsequent defense of the semester work. Successful defense is a prerequisite for the final examination. Final assessment - written examination, minimum 60% is required to pass the examination Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The course builds on the basic and advanced knowledge gained in the courses Analytical Chemistry 2 and New Trends in Analytical Chemistry and is aimed at the practical field of analysis of substances in complex biological systems. The student learns the analytical specifics of biological material, manipulation with biological samples, the process of developing of a new analytical method with respect to the analysis of small molecules and biomolecules (natural, chemical and biological drugs, drug metabolites, biomarkers) in complex biological matrices. Analytical evaluation of the biological system in this regard includes (i) the study of pharmacokinetics, biodistribution, and elimination of the drug, (ii) metabolomics (analysis of selected targeted metabolites and metabolic profiles, non-targeted metabolomics analysis), (iii) proteomics (qualitative and quantitative analysis of short peptides and proteins as potential biomarkers, analysis of large proteins used in pharmaceutical practice in the form of biotherapeutics (monoclonal antibodies)). Such analytical evaluation is essential for studying the mechanisms of drug action in the body, diagnosis of diseases (via known and novel biomarkers), and optimizing a therapy (e.g., by correlating active drug metabolite levels with the patient's condition, i.e., structure-effect relationship). Students also learn the basics of validation of bioanalytical methods according to current guidelines. Laboratory exercises are focused on the use of modern instrumentation techniques (especially selected chromatographic, electromigration, and spectral separation methods) for the analysis of biologically active substances in complex matrices. The knowledge and experience that students will gain after completing the course will be a good basis for successful completion of the thesis, as well as in doctoral studies (PhD.).	
Class syllabus: Bioanalysis <ul style="list-style-type: none"> • Introduction, endogenous and exogenous substances as analytes in complex biological samples 	

- Characteristics of biological materials, sample collection, handling, storage, preparation, and pretreatment
- Validation of bioanalytical method
- Enzymatic and immunochemical analytical methods
- Electrochemical biosensors
- Chromatographic bioanalytical methods
- Electrophoretic bioanalytical methods
- Spectral methods in bioanalysis
- Metabolomics
- Proteomics

Recommended literature:

- Mikuš, Peter, Maráková, Katarína. Hyphenated electrophoretic techniques in advanced analysis. Bratislava: KARTPRINT, 2012
- Watson, David G. Pharmaceutical analysis: A Textbook for Pharmacy Students and Pharmaceutical Chemists, 5th ed. London: Elsevier, 2020
- Ramesh, Vasudevan, ed. Biomolecular and Bioanalytical Techniques: Theory, Methodology and Applications. Hoboken: Wiley, 2019
- Manz, Andreas, Petra S. Dittrich, Nicole Pamme, and Dimitri Iossifidis. Bioanalytical Chemistry. 2nd ed. London: Imperial College Press, 2015
- Mikkelsen, Susan R., and Eduardo Cortón. Bioanalytical Chemistry. 2nd ed. Hoboken: Wiley, 2016.
- Gross, J. H. Mass Spectrometry: A textbook. 3rd ed. Springer, 2017

Languages necessary to complete the course:

english language

Notes:

Past grade distribution

Total number of evaluated students: 66

A	ABS	B	C	D	E	FX
27,27	0,0	19,7	28,79	15,15	6,06	3,03

Lecturers: Mgr. Michal Hanko, PhD., Mgr. Jana Havlíková

Last change: 02.04.2022

Approved by: prof. RNDr. Peter Mikuš, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFANF/01-Mgr-A/25	Course title: Analytical Chemistry (1)
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 4 per level/semester: 28 / 56 Form of the course: on-site learning	
Number of credits: 9	
Recommended semester: 2.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Continuous assessment: The requirement for successful passing the practices is to undertake all tasks in practices and to reach sufficient points: Evaluation of the student's knowledge for the laboratory practical exercise includes written and oral testing at the seminar prior the laboratory practical - max. 4 points, the performance of the individually given practical task – max. 6 points, including a hand-written completed report. Practices are successfully passed only if the total score obtained at the end of the semester is at least 60% of total available points (max. 10 points for each practical). Completion of the practices is a condition of admission to the final exam. Final assessment: After obtaining the required score from the laboratory practices (tests+tasks+reports) student can continue to a final examination. The exam is performed in written form. It is necessary to reach at least 60% of the total score for successful passing of the examination. 50% of the final grade represent the score from the laboratory practices and 50% represent the result from the final examination. Scale of assessment (preliminary/final): 50/50	
Learning outcomes: The student after undertaking the course gets a consistent and sufficiently extensive theoretical, methodical knowledge base and practical experimental skills for the proof and the identification of inorganic and organic elements, based on chemical reactions. The acquired theoretical knowledge and experimental skills will enable the use of gravimetric and titration analytical methods, including the preparation of samples to solve assigned tasks. Chemical analysis of substances, including drugs, pharmaceuticals, nutritional supplements is carried out in accordance with the basic rules and requirements of safety and protection at work. The student will get not only the necessary information about chemical analysis in real conditions of scientific work, but also a demonstration of problem-solving and interrelationships within the analyzed systems, which leads to the development of analytical thinking of the student in general.	
Class syllabus:	

Qualitative chemical analysis

- General analytical chemistry
- Analytical chemistry: Principle, its importance in pharmacy, division (purpose, methods, quantity of analyzed component).
- Analysis procedure: sampling and treatment of the sample before chemical analysis, transfer to solution (mineralization), analysis protocol.
- Analytical reaction requirements: sensitivity and selectivity of the analytical reaction, purity of chemical reagents.
- Inorganic analysis
 - o Group, selective and specific reactions of cations with the emphasis on significant physiological and risk toxic elements.
 - o Group, selective and specific reactions of anions .
 - o Analytical protolytic reactions. Buffers in analytical chemistry. Acids and bases in non-water solvents.
 - o Analytical complex-formation reactions and their equilibria. Masking of interfering components during chemical proofs of cations and anions. Organic complex-forming reagents
 - o Analytical precipitation reactions and their equilibria.
 - o Analytical oxidation-reduction reactions, kinetics. Catalytic and induced reactions.
 - o Selection of analytical method and procedure for the analysis of the unknown sample.
- Organic analysis
 - o Proof and determination of C, H, O, N, S, and halogens in organic compounds.
 - o Classification of organic compounds according to the solubility test results as a part of organic sample characterization.
 - o Functional group analysis – proof of hydrocarbons, halogen derivatives, active hydrogen, sulphonic acids.
 - o Functional group analysis – proof of alcohols (primary, secondary, tertiary).
 - o Functional group analysis – proof of phenols (monovalent, aminophenols).
 - o Functional group analysis – proof of aldehydes and ketones, compounds with active methyl group - methylketons.
 - o Functional group analysis – proof of carboxylic acids, esters, amides, anhydrides.
 - o Functional group analysis – proof of amines, nitro- and nitroso compounds.

Quantitative chemical analysis

- Gravimetry
 - o Introduction to gravimetry – a laboratory technique.
 - o Gravimetric determination of cations and anions.
- Volumetric analysis:
 - o Introduction to volumetry – laboratory technique
 - o Titration curves, equivalence point, indicators, their properties, and classification.
 - o Titration types – direct, indirect, back
 - o Acid-base determination. Acidimetry, alkalimetry, titrations in non-aqueous medium
 - o Complexometric determination. Chelatometry, mercurimetry
 - o Oxidation-reduction determinations: Permanganometry, iodometry, dichromatometry and bromometry
 - o Precipitation titrations: Argentometry

Teaching includes self-study of educational videos, assigned problems and independent student work.

Recommended literature:

Mikuš, P., Mikušová, V.: Chemical Analysis Qualitative and Quantitative. Bratislava : UK, 2011. 133 s.
P. Mikuš, V. Mikušová, Analytical Chemistry: Chemical Analysis, VEDA, 2022
Mikuš, P., Maráková, K.: Hyphenated electrophoretic techniques in advanced analysis. Bratislava : KARTPRINT, 2012. 217 s
D.G. Watson, Pharmaceutical analysis, A textbook for pharmacy students and pharmaceutical chemists, Elsevier, Churchill Livingstone, London 2005.

Languages necessary to complete the course:

english language

Notes:

Past grade distribution

Total number of evaluated students: 680

A	ABS	B	C	D	E	FX
2,79	0,0	5,29	22,65	35,29	23,82	10,15

Lecturers: doc. PharmDr. Katarína Maráková, PhD., RNDr. Svetlana Dokupilová, PhD.

Last change: 31.03.2025

Approved by: doc. PharmDr. Katarína Maráková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFANF/02-Mgr-A/25	Course title: Analytical Chemistry (2)
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 4 per level/semester: 28 / 56 Form of the course: on-site learning	
Number of credits: 8	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Obligatory course. Continuous assessment: The condition for successful passing of the practices is to undertake all practical tasks and to reach sufficient points – minimum 60% out of 10 points (100%): <ul style="list-style-type: none">• Evaluation of knowledge includes written and oral testing at the beginning of each practical - max. 4 points (40%),• the performance of the individually given practical task and a hand-written completed report – max. 6 points (60%). Practices are successfully passed only if a total score obtained at the end of the semester is at least 60% (max. 10 points for each practical). Final assessment: after passing (reached required score) laboratory practices – examination. Examination is performed in written form. It is necessary to reach at least 60% of a total score for successful passing of the examination Scale of assessment (preliminary/final): 50/50	
Learning outcomes: The teaching of analytical chemistry has a significant influence on the formation of logical ideas and workflows in the characterization of the composition of samples, which the pharmacist may encounter in laboratory practice. In the field of instrumental analysis, the student obtains an overview and basic information about the types of analytical methods and their use, with respect to the studied analyte and matrix. Within the theoretical basis for each method, the emphasis is placed on (i) the principle of the method, (ii) the basic instrumental scheme, (iii) the methods of identification and/or quantification of the analyte, and (iv) the analytical / application potential of the method with its advantages and drawbacks. As part of the development of the analytical method, attention is focused on the optimization of working parameters, preparation and analysis of the sample, collection and statistical processing of data using computer technology, and interpretation of the results.	

We base these aspects on the further focus of the pedagogical process so that the graduate gains a sufficient overview of the theoretical basis and possibilities of using instrumental methods in pharmaceutical practice and acquires a creative approach to work - independence and principles of good laboratory practice.

Class syllabus:

Sample collection and its preparation before instrumental analysis

Basic methods of sample preparation

Analyte concentration

Analyte purification

Derivatization of the analyte

Statistical evaluation of the analytical result.

Basic statistical parameters

General approaches in determination (quantification) in instrumental analysis (calibration curve, standard addition method)

Method sensitivity, linear dynamic range, limit of evidence, limit of determination, precision, correctness, selectivity, robustness

Instrumental analytical methods, (determination of basic physicochemical parameters of substances)

Methods for determining:

tt, tv, optical rotation, refractive index, pK, etc.

Instrumental analytical methods (determination of chemical structure, identification and quantification of substances)

Electrochemical methods, basic division, principles and parameters

Instrumental arrangement of electrochemical methods

Potentiometry, potentiometric titrations

Amperometry

Polarography and voltammetry

Titration with polarizable electrodes

Electrogravimetry

Coulometry

Conductometry

Spectral methods, basic distribution, principles and parameters

Optical spectral methods, basic concepts and distribution

Atomic spectral analytical methods: Atomic absorption spectral analysis, atomic emission analysis, flame photometry, X-ray absorption and fluorescence spectrometry

Molecular spectral methods: Molecular absorption spectrometry, fluorescence spectrometry (UV-VIS), infrared spectrometry, Raman spectrometry, nuclear magnetic resonance, mass spectrometry

Non-spectral optical methods, basic distribution, principles and parameters

Refractometry, polarimetry, light scattering photometry, nephelometry, turbidimetry

Diffraction methods, basic distribution, principles and parameters

Crystallography, X-ray diffraction

Nuclear analytical methods, basic division, principles and parameters

Identification of β and γ radiation, types of detectors

Nuclear analytical indicator methods, methods based on natural radioactivity, activation analysis, non-activation interaction analysis, radionuclide X-ray fluorescence analysis

Separation methods, basic division, principles and parameters

Filtration, extraction in analytical chemistry

Chromatography, planar and column chromatography, gas chromatography, high performance liquid chromatography, supercritical fluid chromatography, stationary phases and chromatographic

modes (reversed phase, normal phase, ion exchange, affinity, chiral, mixed modes, gel permeation), mobile phases and elution modes (isocratic and gradient)
 Electromigration methods, electromigration techniques in planar and capillary arrangement, capillary zone electrophoresis, capillary isotachopheresis, isoelectric focusing, capillary gel electrophoresis, electrokinetic chromatography, capillary electrochromatography, (chiral) selectors and (chiral) (pseudo)stationary phases
 Combining separation techniques, chromatographic and electromigration techniques combined with detection techniques (UV, fluorescence, electrochemical, MS, etc.)
 Interpretation of analytical data
 Use analytical methods to identify and determine substances in pharmacy

Recommended literature:

- P. Mikuš, V. Mikušová, Analytical Chemistry: Chemical Analysis, VEDA, 2022
- Mikuš, P., Maráková, K.: Hyphenated electrophoretic techniques in advanced analysis. Bratislava : KARTPRINT, 2012. 217 s.
- D.G. Watson, Pharmaceutical analysis, A textbook for pharmacy students and pharmaceutical chemists, Elsevier, Churchill Livingstone, London 2005.

Languages necessary to complete the course:

english

Notes:

Past grade distribution

Total number of evaluated students: 625

A	ABS	B	C	D	E	FX
2,24	0,0	4,32	16,64	37,6	31,52	7,68

Lecturers: prof. RNDr. Peter Mikuš, PhD., doc. PharmDr. Katarína Maráková, PhD., RNDr. Svetlana Dokupilová, PhD.

Last change: 31.03.2025

Approved by: prof. RNDr. Peter Mikuš, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFANF/16-Mgr-A/22	Course title: Analytical monitoring of drug levels in practice
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Obligatory subject. The condition for recognition of laboratory practice is the completion of all practical tasks with a sufficient number of points - at least 60%. The elaborated protocol from the exercise is evaluated. To successfully complete the exercises from the subject, it is necessary to obtain at least 60% of the sum of points from individual exercises, while an unrecognized exercise is evaluated 0%. The exam will take place in writing - by test. To pass the exam, you must obtain at least 60% of the possible points. The final grade is the arithmetic average of the score from the exercises and exams, the minimum value is 60%. Scale of assessment (preliminary/final): 50/50	
Learning outcomes: Reliable identification and quantification of drugs in biological systems are essential steps to understand the mechanisms of their action in a living organism. Drug concentration levels are an important indicator of the therapeutic process at the molecular level, usable in optimizing the treatment management of individual patients. Therapeutic drug monitoring (TDM) is recommended and performed for (i) drugs with a narrow therapeutic range, (ii) drugs with a well-defined relationship between drug concentration and effect (therapeutic or toxic), (iii) drugs with large inter- or intra-individual differences in drug distribution or clearance. Integral components of TDM are (I) collection and processing of biological material, (II) development, validation and application of analytical methods, and (III) processing and interpretation of analysis results. Interpretation of TDM results requires adequate knowledge of the pharmacokinetics and pharmacodynamics of the monitored drugs and their association with the patient's clinical data. Thus, for the successful implementation of TDM in clinical practice, it is necessary to combine theoretical knowledge and practical aspects of methods of clinical analysis and clinical pharmacology. In a broader context, monitoring of biologically active substance levels is also carried out in the areas of disease diagnosis, toxicology, doping control, forensic analysis and other practical areas. The graduate of the course will gain knowledge related to the development and application of analytical methods and procedures usable in solving the tasks of the above areas of pharmaceutical practice.	

Class syllabus:

Introduction to the issue

- o Clarification of the term “therapeutic drug monitoring”
- o Importance of TDM in clinical practice (current state of the issue)
- o Analytical aspects in TDM
- o Pharmacological aspects in TDM
- o Monitoring the levels of biologically active substances for toxicological, doping and forensic analysis

Groups of therapeutically monitored drugs

- o Drugs with a narrow therapeutic range
- o Drugs with a well-defined relationship between drug concentration and effect (therapeutic or toxic)
- o Drugs with large inter- or intra-individual differences in drug distribution or clearance
- o Distribution of drug groups (by effect)
 - Antibiotics with nephrotoxic and ototoxic effects (aminoglycosides amikacin, gentamicin, netilmicin, tobramycin, polypeptide antibiotic vancomycin)
 - Cardiovascular drugs (cardioglycosides: digoxin, antidysrhythmics: quinidine)
 - Antiepileptics (carbamazepine, ethosuximide, phenobarbital, phenytoin, primidone, valproic acid)
 - Tricyclic antidepressants (amitriptyline, imipramine, clomipramine)
 - Antiasthmatics (theophylline)
 - Immunosuppressants (cyclosporin A, tacrolimus, azathioprine, 6-mercaptopurine, 6-thioguanine)
 - Cytostatics (methotrexate)

Groups of other monitored substances

- o Diagnostic biomarkers - endogenous substances
 - Low molecular weight organic substances (amino acids, carboxylic acids, biogenic amines, lipids, etc.)
 - Inorganic ions (metal cations, anions)
 - Biomolecules (proteins, e.g., enzymes, antibodies)
- o Toxic and prohibited substances (doping, drugs, poisoning) and drugs applied without the consent of a doctor (self-treatment) - exogenous substances
 - Commercial drugs (clenbuterol, ivermectin, etc.)
 - Experimental drugs (SARMS, etc.)
 - Illegal synthetic preparations (heroin, etc.)
 - Natural toxins (amanitin, botulinum toxin, etc.)

Collection and processing of biological material

- o Sampling (method, time intervals), steady state, number of samples, residual and peak concentration vs. toxicity and therapeutic effect
- o Sample processing (sample type, sample preparation before analysis, sample preparation techniques / methods - protein precipitation, extraction, derivatization, protein cleavage, etc.)
- o Sample storage

Methods of biological material analysis

- o Development (optimization), validation and application of analytical methods, advantages and limitations of analytical methods
- o Spectral methods
- o Electrochemical methods
- o Separation methods (chromatographic, electromigration)
- o Hyphenated separation and spectral or electrochemical methods
- o Separation methods with on-line sample preparation

- o Immunochemical methods: radioimmunoassay (RIA), immunoenzyme methods (EIA, EMIT, ELISA, FPIA, MEIA, CMIA)
- # Interpretation of analytical results
- o TDM: Interpretation of serum drug concentrations in the context of all clinical data (related areas: pharmacokinetics and pharmacodynamics of drugs)
- o Diagnosis of diseases: correlations of levels of individual biomarkers or biomarker profiles in comparison groups (monitoring of changes in datasets of health vs patients)
- o Toxicological, anti-doping, forensic analysis: monitoring of levels of monitored substances, limit concentrations
- # Statistical evaluation of the analytical results
- # Validation parameters according to the used validation protocol
- # Validation protocols: FDA, EMA, ICH
- # Hypothesis testing (Student's t-test, ANOVA)
- o Use of therapeutic drug level monitoring data:
 - Objective: to ensure maximum efficacy of drugs, to reduce the risk of drug toxicity, to maintain the concentration of drugs in the so-called "Therapeutic range"
 - Monitoring of treatment of chronically and critically ill patients with altered drug clearance with a narrow therapeutic range, patients with different drug pharmacokinetics (elderly, children)
 - Adjust batch modes (regimes)
 - Optimization of therapy using pharmacokinetic programs (population-kinetic data)
 - Determining patients' compliance with treatment
 - Identification of drug toxicity risks (reduction of toxic drug reactions)
 - Reduction of treatment costs
 - Reducing the need for emergency procedures and hospitalizations
 - Shortening the length of hospitalization
- o Application areas - solved examples:
 - TDM of thiopurines in the optimization of therapy of patients with non-specific inflammatory bowel diseases
 - Monitoring of carboxylate levels in connection with the diagnosis and therapy of cancer patients
 - Monitoring of Prohibited Substance Levels in connection with doping control

Recommended literature:

- Mikuš, P., Maráková, K.: HYPHENATED ELECTROPHORETIC TECHNIQUES IN ADVANCED ANALYSIS, Bratislava, KARTPRINT, 2012. 217 s.
- Mikuš, P., Hanko, M., Piešťanský, J., Maráková, K., Dokupilová, S., Mikulová, M.: Analytical chemistry: Instrumental analysis. Bratislava : VEDA, is being prepared.
- Dasgupta A. Therapeutic Drug Monitoring Newer Drugs and Biomarkers, 1st Edition. Academic Press 2012.
- Stove, C. New Sampling Strategies in Toxicology and Therapeutic Drug Monitoring, Future Science Ltd, 2015.
- Samanidou, V, Karageorgou, E. Drug Monitoring by Hplc : Recent Developments Nova Science Publishers, Incorporated 2010.
- Scientific publications registered in the Web of Science database: keywords: Mikus (author), Comenius (Address), amino acids, biogenic amines, thiopurines (Topic)

Languages necessary to complete the course:

english language

Notes:

Past grade distribution						
Total number of evaluated students: 49						
A	ABS	B	C	D	E	FX
4,08	0,0	2,04	30,61	28,57	22,45	12,24
Lecturers: PharmDr. Kristián Slíž, PhD., PharmDr. Mária Göböová, PhD., PharmDr. Zuzana Kiliánová, PhD., PharmDr. Andrej Kováč, PhD., PharmDr. Gabriel Dóka, PhD., Mgr. Michal Hanko, PhD., Ing. Peter Bystrický, PhD., Mgr. Jana Havlíková						
Last change: 05.08.2025						
Approved by: prof. RNDr. Peter Mikuš, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/01-Mgr-A/24	Course title: Anatomy and Physiology
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 3 per level/semester: 28 / 42 Form of the course: on-site learning	
Number of credits: 7	
Recommended semester: 2.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Mandatory 100% participation in laboratory exercises and lectures and sufficiently demonstrated readiness for practical exercises. Students' readiness for the exercises is continuously verified by tests (written, oral). Excused absence from exercises (max. 2x) is replaced by: a) substitution; b) by preparing a written work; c) written or oral examination. During the semester, students take 2 interim assessment tests (pre-tests), whose writing on at least 60% of each test conditions the possibility to participate in the final exam. The final exam test is completed by students in computer by written form (distant) of examination. To pass the final exam test by students in minimally 60% rate. Evaluation (mark and score): A 92-100%, B 84-91%, C 76-83%, D 68-75%, E 60-67%, FX < 60%. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: By completing the course, the student will gain a comprehensive idea of the organization and activities of the human body. He will learn essential knowledge of the anatomy of the human body, its spatial organization, composition and structure of individual systems and organs, they will get acquainted with the structure of tissues and their components. The student will be able to characterize the basic anatomical and functional units, learn the functions of tissues, organs, individual systems. The focus of teaching is neurohumoral regulation and signaling at the level of the cell and subcellular structures, regulatory, coordination and integration relationships between individual functional systems and the function of the organism as a whole. A necessary condition of the study is the verification of theoretical knowledge gained in lectures at practical exercises. The course is essential for the study of pharmacy and biologically-medically oriented subjects.	
Class syllabus: Introduction to Anatomy and Physiology. Body systems. Structural characteristics of the organs and tissue. Epithelial, connective tissues. Bones, skelet. Muscular system. Types of muscle tissue. Excitation-Contraction Coupling (ECC). Mechanism of contraction. Nervous system - organization, structure, function. Physiology of Nerve. Central nervous system. Peripheral nervous system-/ somatic, autonomic. Somatic, visceral reflex arc.	

Special Senses. Physiology of vision, hearing, equilibrium and orientation. Endocrine System. Organization and feedback system. Hormones. Glands and their hormones. Organization of cardiovascular system. Structure, function and factors affecting heart, vessels, circulation. ECG. Autonomic regulation of vascular lumen diameter. Blood pressure. Blood composition, plasma, elements and their role in the body. Blood clotting. Lymphatic system. Respiratory System. Respiratory Tract, Mechanics of Breathing, Gas Transport, Neurochemical Control of Breathing. Digestive System. Anatomy and Function of the Organs. Basic functional units. Enterohepatic circulation. Secretory function of stomach, liver, pancreas, intestine. Physiology of digestion. Nutrition. Regulation of Body Temperature. Urinary System. Anatomy and Functions of the Kidneys, Accessory Excretory Structures, Urine. Countercurrent multiplier. Mechanism of micturition. Acid-Base Balance. Body Fluids. Anatomy and Physiology of Reproductive System. Male and Female Reproductive Organs, hormones, menstrual cycle, pregnancy

Exercise topics are focused on the anatomical structure of the body, musculoskeletal system, tissue histology and practical tasks determining selected physiological functions of individual systems: nerve cell physiology, reflexes, muscle physiology, blood examination, ECG recording, blood pressure measurement, urine examination, blood examination, determination blood glucose, cholesterol, functional lung examination, determination of body weight and composition, food composition, sensory examination.

Teaching includes self-study of educational videos, assigned problems and independent student work.

Recommended literature:

Ganong's Review of Medical Physiology 25th ed, McGraw-Hill, NY, by KE Barrett, SM Barman, S Boitano, HL Brooks, 2016, ISBN 9780071848978, 750pp

Essentials of Medical Physiology 6th ed, Jaypee Brothers Medical Publishers Ltd, 2012, ISBN 9789350259368

Anatomy and Physiology, OpenStax, Texas, by JG Betts and al., 2013 9781938168307, 1410 pp.

Vander's Human Physiology 15th ed, McGraw/Hill, Ed., NY, by EP Widmaier, H Raff, KT Strang, 2018, ISBN 9781259903885

Introduction to Human Anatomy and Physiology, 4th ed, Saunders Elsevier, St. Louis, by EP Solomon, 2015, ISBN 9780323401760

Human Anatomy and Physiology, Pearson Benjamin Cummings, San Francisco, by EN Marieb, K Hoehn, 11th ed., 2018, ISBN 9780134580999

Human Anatomy and Physiology, McGraw-Hill, NY, by R Carola, JP Harley, CR Noback, 2nd ed., 1992, ISBN 9780070109643

Human Anatomy, Physiology, and Pathophysiology. by Thewes G., Mutschler E., Vaupel P., Ed. Elsevier, Amsterdam, 1985. 812pp.

Kosirova S. et al. Selected questions for the Anatomy and Physiology exam for pharmacy students. 1.st ed, Comenius University Bratislava, 2023

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 14

A	ABS	B	C	D	E	FX
0,0	0,0	14,29	42,86	7,14	14,29	21,43

Lecturers: doc. MUDr. Tatiana Stankovičová, CSc., doc. PharmDr. Stanislava Kosírová, PhD., PharmDr. Eva Kráľová, PhD., doc. PharmDr. Anna Paul Hrabovská, PhD., PharmDr. Csaba Horváth, PhD., PharmDr. Katarína Hadová, PhD., Mgr. Ondrej Sprušanský, PhD., doc. PharmDr. Tomáš Rajtík, PhD.

Last change: 12.09.2024

Approved by: doc. PharmDr. Stanislava Kosírová, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/13-Mgr-A/22	Course title: Applied Biochemistry
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 4	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Termination of course: Written examination. Preliminary conditions: The requirement for completing a practical course is to fulfil all prescribed experimental assignments and successfully pass the preliminary semestral pre-tests. Students have to obtain at least 60% from the sum of maximal points of pre-tests. After the successful completion of practical exercises, the course is completed by a written exam. Scale of assessment (preliminary/final): The scale of assessment (preliminary/final): Pre-tests: achievement of at least 60 % from the sum of maximal points of pre-tests. Written exam. Evaluation A corresponds to obtaining min. 92% of the maximum number of points, B – 84%, C – 76%, D – 68%, E – 60%, and Fx less than 60%.	
Learning outcomes: Students obtain information about the aetiology of diseases and mechanisms of biochemical processes associated with their pathology. Specific emphasis is put on the current possibilities of therapeutic approaches based on the application of biologics (biological treatment). Except understanding changes in biochemical processes in case of various diseases, the subject is also focused on providing knowledge related to their laboratory and clinical diagnostics, such as processing of biological material, methods used for the determination of selected clinical parameters, usage of in vitro diagnostic tools, as well as an overall evaluation of patient status based on laboratory results. The mentioned areas of Applied Biochemistry are implemented into practical courses realized within the subject.	
Class syllabus: <ul style="list-style-type: none"> - Fundamentals of clinical biochemistry. Procedures for preparation and adjustment of analyzed samples. Principles of selected clinical-biochemical methods. - Clinical enzymology, laboratory diagnostics. Importance of enzyme preparations in the diagnosis and therapy of diseases. - Disorders of glucose and glycogen metabolism, biochemical presentation of diabetes mellitus. - Lipid metabolism disorders. Lipoproteins: lipid transport forms, regulation of cholesterol metabolism, dyslipoproteinemias, and disorders of sphingolipid metabolism. 	

- Disorders connected to specific metabolic processes of carbohydrates, lipids, and proteins in the liver. Formation of ketone bodies and their relationship to various pathological conditions.
- Proteins and amino acid absorption disorders, proteolytic enzymes, innate amino acid metabolism disorders.
- Disorders of synthesis and degradation of purine and pyrimidine nucleotides.
- Disorders of heme and bilirubin metabolism, porphyria and hemoglobinopathy.
- Disorders of hormonal regulation.
- Acidobasic balance, mineral metabolism.
- Biochemical fundamentals of tumour process, specific markers of cancer diseases.
- Biochemical principles of the inflammatory response of the organism, enzymes, and mediators of the inflammatory process.

Recommended literature:

Lieberman M., Marks A.D.: Basic Medical Biochemistry: A Clinical Approach. Wolters Kluwer/ Lippincott Williams & Wilkins, 2013, 4th edition.
 Baynes J.W., Dominiczak M.H.: Medical Biochemistry. Elsevier Science, 2018, 5th Edition.

Languages necessary to complete the course:

English language.

Notes:

Past grade distribution

Total number of evaluated students: 108

A	ABS	B	C	D	E	FX
11,11	0,0	19,44	17,59	19,44	28,7	3,7

Lecturers: PharmDr. Andrea Balažová, PhD., doc. PharmDr. Marek Obložinský, PhD., RNDr. František Bilka, PhD., Mgr. Ivana Holková, PhD., PharmDr. Renáta Kubíková, PhD., Ing. Ludmila Pašková, PhD.

Last change: 28.04.2025

Approved by: doc. PharmDr. Marek Obložinský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/22-Mgr-A/14	Course title: Basics of Regulatory Pharmacy
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Phartmacology (1), Social Pharmacy and Pharmacoeconomics	
Course requirements: Mandatory 80% attendance at lectures and seminar work, in particular cases a written test. Scale of assessment (preliminary/final): Ongoing 0 / final 100	
Learning outcomes: By passing this course, student is acquiring basic knowledge from field of regulation of medicinal products, mainly of evaluation of non-clinical and clinical documentation in the process of registration of medicinal products, regulation of safety of medicinal product, evaluation of efficacy of medicinal products and basic knowledge concerning regulatory aspects and procedures in medicines agencies (SIDC, EMA) and regulatory principles in non-clinical testing and clinical trials. During classes, one solves case studies with experts from practice.	
Class syllabus: <ul style="list-style-type: none"> - history of regulation of medicinal products in context of increased need for safety and efficacy demonstration - principles of regulation of medicinal products, basic characteristics of medicinal products – quality, efficacy, safety - need for good manufacturing practice, good clinical practice, good laboratory practice from regulatory point of view – effects on non-clinical and clinical testing -integration of regulatory pharmacy into pre- and post-marketing, planning and overview of product strategy, transfer of information to interested parties - regulatory and practical aspects of non-clinical and clinical testing - re-evaluation, referrals in the EU, issues concerning confidentiality and transparency in regulatory processes – consistence of decisions and application of state of the art knowledge - orphan medicinal products, paediatric data, advanced therapies, biosimilars, generics – non-clinical and clinical aspects - over-the-counter vs. prescription-only medicines, legal status of medicinal products, evaluation of legal status 	

- regulation and evaluation of medical devices
- regulatory aspects of medicinal product's documentation
- off-label use and misuse from the regulatory point of view
- regulatory aspects of pharmacovigilance, evaluation of adverse events and safety of medicinal products
- evaluation of risk-benefit ratio in medicinal product's regulation

Recommended literature:

Klimas J a kol: Basics of Regulatory Pharmacy, Univerzita Komenského v Bratislave, 2014
 Guidelines of European medicines agency, see <http://www.ema.europa.eu/ema/>

Languages necessary to complete the course:

Slovak, English

Notes:

maximum number of students: 20, in case of higher interest - selection will be made based on: grade average (years 1-3), average from subjects Pharmacology and Social pharmacy and pharmacoconomics, motivation letter, certificate (exam) proving knowledge of english language

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: prof. PharmDr. Ján Klimas, PhD., MPH

Last change: 01.12.2021

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/03-Mgr-A/25	Course title: Biochemistry
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 3 / 4 per level/semester: 42 / 56 Form of the course: on-site learning	
Number of credits: 8	
Recommended semester: 4.	
Educational level: I.II.	
Prerequisites:	
Course requirements: "The conditions for the recognition of practical exercises is: 1) a 100% attendance at the laboratory practices, 2) written protocols from each exercise, 3) obtaining at least 60% of the mathematical sum of the points of all semestral tests. If a student fails to reach the requirement (point 3), student is entitled to one reparative test (with a minimum yeald of at least 60%). If the student fails to fulfil the minimum 60% score requirement, the teacher will give the student a grade of Fx, which will not allow the student to participate in the exam. The examination will be conducted by attendance and will consist of a written and an oral part. The student must score at least 60% on each part of the exam. If the student does not obtain 60% on the written part of the exam, student cannot take the oral part. In the case of a grade of Fx, the student will retake both the written and oral parts of the examination. Scale of assessment (preliminary/final): Both parts of the exam participate to the same extent on the exam evaluation: Final grade A corresponds to obtaining min. 92% of the maximum number of points; B - 84%, C - 76%, D - 68%, E - 60%, FX less than 60%.	
Learning outcomes: After completing biochemistry courses, the students should manage the basic biochemical analysis including enzyme kinetic on cell and molecular level. Moreover, should have good knowledge about basic metabolic pathways, their enzyme equipment and subcellular location. The student should know the basics of the mechanism of metabolic regulation as well as about some important signalling molecules and enzymes that can be involved in the mechanism of drug effect.	
Class syllabus: 1) The dynamic idea of the properties and functions of a biological system. 2) Protein structures and functions - translation, posttranscriptional and posttranslational modifications, higher structures of proteins and their biological properties. 3) Enzymology - kinetics, inhibition, regulation. Coenzymes. 4) Energy - biological membranes, respiratory chain, proton gradient and energy generation, biological oxidations, Krebs cycle.	

- 5) Nutrient metabolism - catabolism and anabolism - carbohydrates (glycolysis, gluconeogenesis, phosphopentose cycle, glycogen metabolism), lipids (beta-oxidation, fatty acid synthesis, mobilization and formation of storage lipids), amino acids (formation, degradation, ureogenic cycle), proteins.
- 6) Hormone biochemistry - relation to regulation of metabolic pathways.
- 7) Metabolism of nucleotides and nucleic acids.
- 8) Basic issues of xenobiochemistry and its' attributes.
- 9) Integration of metabolism - regulatory modes in nutrient metabolism.
- 10) Plant biochemistry - photosynthesis, glyoxylate cycle, nitrogen metabolism, enzymology of secondary metabolites.
- 11) Use of biochemical knowledge in pharmaceutical practice.

Recommended literature:

Lieberman M. A., Ricer R.: Biochemistry, Molecular Biology, and Genetics, Wolters Kluwer, 2020, 7th ed.
 Litwack G.: Human Biochemistry, Elsevier, 2017, 1st ed.

Languages necessary to complete the course:

English language.

Notes:

The biochemistry course in its practical part is focused on two thematic units:

1. Definition, function, properties and meaning of biochemical substrates mainly of saccharides, lipids and proteins.
2. Enzymes: enzyme structures and functions, the principle of catalysis, inhibition, enzyme kinetics

Because of difficulties with biological material it is not possible to replace practical exercises.

Past grade distribution

Total number of evaluated students: 1

A	ABS	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: RNDr. František Bilka, PhD., PharmDr. Renáta Kubíková, PhD., PharmDr. Andrea Balažová, PhD., doc. PharmDr. Marek Obložinský, PhD., Ing. Ľudmila Pašková, PhD., Mgr. Ivana Holková, PhD., PharmDr. Ema Balažová, Mgr. Veronika Vyletelová, PhD., PharmDr. Barbora Hans, PhD.

Last change: 31.03.2025

Approved by: RNDr. František Bilka, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KChTL/01-Mgr-A/00	Course title: Bioorganic Chemistry
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Recommendation: Organic Chemistry 1	
Course requirements: a) To prepare a seminar paper b) Pass the written test. For passing the exam it is required to achieve more than 60 % of the points. A: 90,01 % – 100,00 %; B: 82,01 % – 90,00 %; C: 74,01 % – 82,00 %; D: 66,01 % – 74,00 %; E: 60,01 % – 66,00 %; Fx: ≤ 60,00 %. Scale of assessment (preliminary/final): 20/80	
Learning outcomes: The basic aim of the course Bioorganic Chemistry lies in the understanding of biological processes at the level of organic reaction mechanisms and identifying the basic parameters that govern these processes. Bioorganic Chemistry then is to deal with the problems of living nature in which chemical factors play an important role.	
Class syllabus: Bioorganic Chemistry follows the course of Organic Chemistry. Due to the fact that biological objects represent complex systems, their study requires an interdisciplinary approach. The course in the form of lectures focuses on those areas of bioorganic chemistry which are related to the structure of biomolecules, their spatial arrangement and relationships to biological functions. The emphasis is not only on the compounds with dominant position in living objects, such as aminoacids, peptides, proteins, heterocyclic bases, mono- and polysaccharides, nucleotides and nucleic acids, lipids but also the knowledge of known mechanisms of chemical reactions taking place in a biological system. Watching the rules of creating of macromolecular structure of organisms and their mutual interactions also with other molecules belong to other areas to be studied by bioorganic chemistry. The detailed knowledge of the structure and chemical processes occurring in a biological system allows to create bio-analogical chemical systems operating on a similar principle as in living nature (biomembranes, enzymatic catalysis, etc...) for practical use.	

Recommended literature:

1. Devínsky F. et al. Organic Chemistry for Pharmacy Students. Comenius University Press, Bratislava, 2010
2. Van Vranken, D., Weiss, G.: Introduction to Bioorganic Chemistry and Chemical Biology, Garland Science 2013
3. McMurry, J.W., Begley, T.P.: The Organic Chemistry of biological Pathways, W. H. Freeman, 2nd ed., 2015
4. Voet D., Voet J.: Biochemistry, John Wiley & Sons, 3rd ed., 2004

Languages necessary to complete the course:

English language

Notes:

Subject is thought and examined only during the winter semester.

Past grade distribution

Total number of evaluated students: 37

A	ABS	B	C	D	E	FX
67,57	0,0	10,81	5,41	8,11	2,7	5,41

Lecturers: doc. PharmDr. Jindra Valentová, PhD., Mgr. Lucia Lintnerová, PhD.

Last change: 22.03.2024

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KGF/27-Mgr-A/25	Course title: Biopharmaceutical technology
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Type, volume, methods and workload of the student - additional information Lectures: 2 h / week Seminars: 3 blocks (à 4 h) / semester On-site learning	
Number of credits: 3	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Course requirements: A student may be excused for a maximum of 1 seminar, the content of which will be examined. The student must complete all lectures and seminars, and must submit a properly prepared protocol for each seminar. During the semester, 1 test is written, in which a minimum of 60% must be achieved. Only students who meet the given conditions are admitted to the exam. The subject is concluded with a combined written and oral exam, and to be admitted to the oral exam, a minimum of 60% points must be achieved in the written part. The minimum passing score is 60%. Evaluation: A = 100 – 95% B = 94 – 89 C = 80 – 88 D = 71 – 79 E = 60 – 70 Fx < 60	
Learning outcomes: During the lectures, students will become familiar with the current principles of production, formulation and quality control of biopharmaceuticals. Seminars will allow students to gain a comprehensive view on incorporation of biopharmaceuticals into a suitable dosage form for i.v. administration. Students will also gain an insight into new possibilities for formulating biopharmaceuticals for atypical methods of their application. The subject ultimately follows current modern trends in the field of drug development, which has changed rapidly due to the rapid development of innovative technological approaches. The subject comprehensively covers the requirements of the current pharmaceutical industry, but also of current science and research. It focuses in detail on the "down-stream" processes in the technology of biopharmaceuticals, follows the processes of incorporation of biologics into a suitable dosage form, provides an insight into the possibilities of delivering biologics into the body. Students will become familiar with the factors	

affecting the stability and immunogenicity of biologics, and the processes of ensuring their quality control.

Class syllabus:

Introduction to biopharmaceutical technology. Biologics – general definitions, position of biologics in the hierarchy of drugs. Dosage forms of biologics. Protein engineering. Modeling, design and simulation of biomolecules. Methods of protein characterization. Crystallography and NMR spectroscopy of proteins. Monoclonal antibodies – production, formulation and characterization of monoclonal antibodies. Comprehensive characterization of monoclonal antibodies – methods applied in the characterization process (identification and quantification methods), critical quality attributes. Glycan characterization – identification and determination of structure, distribution and localization of glycoprotein glycans. Post-translational modifications as critical quality control attributes. Biosimilars, biobetters, ADC conjugates – technology of formulation, application and administration. “Fill & finish” processes in the preparation of biologics. Blood products and drugs prepared from blood plasma. Transfusion drugs. Plasma processing. Quality control of transfusion drugs. Therapeutic aspects. Formulation processes and characterization of blood products and drugs prepared from blood plasma. Interleukins, interferons, antibody fragments, growth factors – formulation processes and characterization. Oligonucleotides – formulation processes and characterization. Vaccines – formulation processes and characterization. Vaccines based on immunogenic peptides. Legislative aspects of biologics – approval processes of biologics, development and production of biologics from the perspective of the pharmaceutical industry.

Recommended literature:

Lill, J.R., Sandoval, W. (eds.): Analytical characterization of biotherapeutics. Hoboken: John Wiley & Sons. 2017. 343 p.

Chen G. (ed.): Characterization of protein therapeutics using mass spectrometry. New York: Springer. 2013. 404 p.

Elkordy A.A.: Formulation of monoclonal antibody therapies. From lab to market. London: Academic Press. 2023. 338 p.

Piešťanský, J., Kováč, A. Scriptum in preparation

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: PharmDr. Andrej Kováč, PhD., PharmDr. Veronika Šimunková, PhD., PharmDr. Miroslava Špaglová, PhD., doc. RNDr. Miroslava Šupolíková, PhD., PharmDr. Desana Matušová, PhD., doc. PharmDr. Juraj Piešťanský, PhD.

Last change: 31.03.2025

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFChL/02-Mgr-A/20	Course title: Biophysics
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites: FaF.KFChL/21-Mgr-A/21 - Pharmaceutical Physics and FaF.KFChL/22-Mgr-A/22 - Physical Chemistry	
Recommended prerequisites: General biology, Organic chemistry, Mathematics	
Course requirements: Written essay on the selected theme from literature, seminar presentation of the theme and its defense (max. 40 points). Active discussion at seminars, oral examination from lecture topics (max. 20 points). A total of at least 55 points must be obtained to obtain an A rating, at least 51 points to obtain a B rating, a minimum of 47 points for a C rating, a minimum of 42 points for a D rating and a minimum of 37 points for an E rating. Scale of assessment (preliminary/final): Seminar work and exam interview: a maximum of 60 points Scale of assessment (preliminary/final): 40/60	
Learning outcomes: The aim of the subject is to provide pharmacists with knowledge of physical processes that take place on the level of tissues, cells and molecules at physiological and pathological conditions. The importance of pharmaceutical view is emphasized in each of the studied problems. Students will be able to understand basic topics of molecular biophysics, to study selected themes from literature, to elaborate a written work about it and to present a lecture.	
Class syllabus: Selected lectures from molecular biophysics will be delivered either by experts from the Faculty or invited from other institutes: Introduction to Biophysics. Membrane biophysics, lipid bilayers, lipid rafts. Polymorphic behavior of lipids. Lipids as drug delivery systems in various applications. Biological membrane and anesthesia, solitons. Membrane channels – general introduction, specification, methods of study. Methods of isolation and detection of voltage dependent ion channels. Biophysics and pharmacology of voltage dependent channels. Hereditary diseases caused by mutation of membrane's channels. Dendrimers in drug delivery. Computational drug design. The lectured topics are discussed in seminars. The students discuss their own selected scientific problem and related literature for the essay and its presentation.	

Recommended literature:

Basics of medical physics and biophysics. http://www.fmed.uniba.sk/uploads/media/Basics_of_Biophysics.pdf
<http://www.freebookcentre.net/physics-books-download/Biological-and-Environmental-Physics.html>
<http://www.freebookcentre.net/Physics/Medical-Physics-Books.html>
Gurtu J.N., Gurtu A.: Pragati's biophysical chemistry (electronic resource). Meerut, Pragati Prakashan, 2010, <http://site.ebrary.com/lib/uniba/Doc?id=10355534>
Lacinová Ľ., Uhríková D.: Voltage dependent channels in excitable membranes. Bratislava, Comenius University, 2011
Vítek F.: Lectures on biophysics with medical orientation. Prague, Karolinum, 2011
Dillon P. F.: Biophysics : A physiological approach. Cambridge, Cambridge University Press, 2012
Comprehensive biophysics, volumes 1-6. Amsterdam, Elsevier, 2012
Glaser R.: Biophysics : An introduction. Heidelberg, Springer, 2012
Amler E. et al.: Chapters from biophysics. Prague, Karolinum, 2012
Hrazdira I., Mornstein V., Bourek A.: Fundamentals of biophysics and medical technology. Brno, Masaryk University, 2013
Lacinova, Gen Physiol Biophys 24:Suppl 1:1-78, 2005

Languages necessary to complete the course:

English

Notes:

The number of enrolled students for the subject is ranged between 5 – 30 (min – max).

Past grade distribution

Total number of evaluated students: 4

A	ABS	B	C	D	E	FX
25,0	0,0	0,0	0,0	25,0	50,0	0,0

Lecturers: prof. RNDr. Daniela Uhríková, CSc., Mgr. Mária Klacsová, PhD., Mgr. Norbert Kučerka, DrSc.

Last change: 01.04.2022

Approved by: prof. RNDr. Daniela Uhríková, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFChL/01-Mgr-A/20	Course title: Biostatistics for Pharmacists
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 4.	
Educational level: I.II.	
Prerequisites:	
Course requirements: The overall evaluation consists of continuous evaluation in seminars (0-10 points), evaluation of the final written project (0-24 points) and evaluation of the presentation (0-16 points) as a simple sum of points: A 45-50 points, B 40-44 points, C 36-39 points, D 33-35 points, E 30-32 points.	
Learning outcomes: After completing the course, the student is familiar with applied statistical methods in drug development and research, drug control and analysis, manufacturing processes and outputs, methods applied in epidemiology and drug policy, and finally in applied statistical procedures of economic management of pharmacies and drug distribution.	
Class syllabus: 1. Methodology of the statistical survey: research question, research hypothesis, population, sample, methods of selection, quantitative and qualitative research, types of studies, observation, experiment, meta-analysis, research set design, sample size, randomization procedures, factors, intervention, intervention effect, cross effect, effect size, background, suppressor, confounder, noise, main research result, support information, research protocol, statistical survey phases (schedule, data collection, quality assurance procedures, statistical analysis, interpretation) 2. Data preparation for statistical analysis: object and subject of research, random variables, types and distributions of random variables, parameter, external and internal sources of variability, uncertainty and error, probability and its models, transformation of variable, standardization of random variable, blinding methods, Latin square, data quality control and assurance (gross errors, incomplete, missing and outlying data, transformation, encryption, coding), replicas, parallel measurements, sorting, filtering, stratification 3. Procedures for the selection of data processing methods: target population, research sample, sample design, prospective and retrospective studies, intervention, exposed and control, randomization, cross schedule, longitudinal study, blindness, instrumental and questionnaire research, reliability, validity, sensitivity and robustness of the questionnaire, the Likert scale, scoring, signal, noise, distortion, standardized questionnaire, methods of questionnaire validation, reliability measurement, transformation of data-information-knowledge, character, character value, variable independence, descriptor, predictor, regressor	

4. Descriptive statistics: cardinal, ordinal and nominal variables, scale, interval and categorical variables, measures of extent, arithmetic, geometric and hypergeometric mean, statistical weight, mode, median, variability rates, variation range, mean deviation, variance and standard deviation variation coefficient, shape measures, symmetry of distribution, distribution concentration, frequency analysis, information content and its reduction

5. Univariate sample analysis: selection types, point and interval estimation, parametric tests, null hypothesis, significance level, effect size, first and second type errors, false positivity and negativity, statistical significance, clinical and biological significance, mean value hypothesis tests and variance, two mean and variance matching tests, component variation analysis, variance analysis, balanced experiment, solid, random and mixed effects and models, single-factor variance analysis

6. Measures of association: countable random variable, transformable measurable variables to countable, exposure and effect as quality, frequency characteristic analysis, chance and risk, absolute and relative risk, risk ratio and chance ratio, count interval estimation, interval estimation of or and rr , pivot table, independence, 2x2 tables, Fisher-Freeman exact test, Pearson test of goodness of fit, survival curves, Kaplan-Meier survival curve

7. Relative numbers and indices - aggregation, temporal and spatial development, time series, cyclic phenomena, seasonality, trend, chaos, noise, effects of cyclic and random phenomena on processes, predictability

8. Multivariate analysis: correlation and covariance, trends, correlation dependency, simple linear regression, linear modeling, transformation to linear problem, statistical dependence rates, sign tests, serial tests, Kruskal-Wallis test, Friedman test for dependent samples, regression diagnostics (linearity, homoskedasticity, autocorrelation, residue analysis), multi-factor analysis of variance, general linear model, nonlinear regression models with two or more parameters

9. Process evaluation: types of measurement errors, simple and compound uncertainty, uncertainty propagation and composition, Ishikawa diagram, accuracy, accuracy, robustness, detection limit (LOD), quantification limit (LOQ), outliers tests, validation, control standard, certified reference material, accredited tests, ROC curve, sensitivity and selectivity, AUC, inter-rater agreement, pharmacopoeial statistics, evaluation process validation

10. Statistical software: data import and export, format compatibility, data processing, scripts, data mining, statistical software for UK users.

Recommended literature:

Jones D.: Pharmaceutical Statistics, London, Pharmaceutiacal Press, 2002.

Languages necessary to complete the course:

Notes:

Past grade distribution

Total number of evaluated students: 7

A	ABS	B	C	D	E	FX
14,29	0,0	14,29	14,29	0,0	28,57	28,57

Lecturers: RNDr. Tomáš Fazekaš, PhD., RNDr. Alexander Búcsi, PhD.

Last change: 23.03.2022

Approved by: RNDr. Tomáš Fazekaš, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/12-Mgr-A/25	Course title: Biotechnology
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 4	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Course requirements: During the semester there will be 2 written tests, from each of which it is necessary to obtain at least 60%. The student can have justified max. 1 practical class, the content of which will be tested. The student must submit correctly prepared and evaluated protocols from all completed practical classes. The course is completed by examination made up of two equal parts - written and oral. Grade A corresponds to obtaining min. 92% of the maximum number of points; B – 84%, C – 76%, D – 68%, E – 60%, Fx less than 60%.	
Learning outcomes: On completion of the lectures, the student will have acquired knowledge of the possibilities of producing drugs using biotechnological processes based on the manipulation of nucleic acids. He/she will be familiar with recombinant DNA technology and the molecular aspects of bioprocessing. The student will be familiar with different types of cloning and expression vectors and their use in the production of specific biopharmaceuticals (e.g., r-hormones, r-cytokines, r-vaccines, r-enzymes, and r-monoclonal antibodies). The student will be introduced to the latest therapeutic trends and the molecular nature of gene therapy, therapeutic cloning, and the use of stem cells. The student will master the basics of working in a molecular biology/biotechnology laboratory, e.g., bioinformatic analysis of nucleic and amino acid sequences, learn to assess the viability of cell lines in vitro and become familiar with the use of in vitro plant cultures in pharmaceutical biotechnology.	
Class syllabus: Biotechnology. Definition of terms. Classical vs. molecular biotechnology, principles, their importance, and use. Stages in the development of biotechnology. Pharmaceutical biotechnology and biotechnology in medicine (biologics, biosimilars and biobetters). Recombinant DNA methods. OMICS technologies. Work with nucleic acids - isolation, restriction analysis, cloning, hybridization, molecular probes, sequencing, genomic and cDNA libraries, Next Generation Sequencing, work with gene and protein databases in silico, computer genome analysis, gene editing using CRISPR-Cas9 technology. Use of recombinant DNA for the production of biologics. Cloning and expression vectors for various cell types (bacteria, yeast, animal, and plant cells), methods for transferring recombinant DNA into target cells. Molecular biology background of production cells (microorganisms,	

mammalian cell lines, insect cells, transgenic plants, and animals). Selection of a suitable expression system for the production of a specific biological drug. Post-translational modifications. Immunogenicity of biologics. Fusion proteins. Ways of increasing the efficacy and stability of biologics - chemical and genetic modifications, ribosomal engineering, prolonging biological half-life, influencing therapeutic effect, chaperones (HSP). Protein labelling. Targeted structural modifications.

Molecular aspects of bioprocessing: GMP. Upstream processes in the manufacture of biologics. Cultivation equipment, media, and processes. Bioreactors and their modes of operation in the biologics manufacturing process. Use of molecular biological aspects in downstream processes in the manufacture of biologics.

Plants in pharmaceutical biotechnology: cell, callus, organ, organelle cultures in vitro. Transgenic plants. Edible vaccines, "plantibodies" and functional foods.

Biotechnological background of production of the most important recombinant biologicals: recombinant enzymes, hormones, growth factors, cytokines and interferons, recombinant vaccines (subunit, edible, vector, DNA and RNA vaccines). Monoclonal antibodies, structure and nomenclature, methods of preparation and modification, examples of use.

Molecular biological principles, mechanisms and approved techniques of gene therapy, types of vectors, gene therapy in vitro and in vivo. Biological drugs based on nucleic acids (CPG oligonucleotides, miRNA, siRNA, aptamers, CRISPR-Cas method, DNA microarray).

Reproductive and therapeutic cloning. Methods, ethical aspects and legislative requirements, practical applications. Stem cells - types, characterisation, isolation and use in therapy.

Recommended literature:

Feng X., Xie H.G., Malhotra A., Yang C.F.: Biologics and Biosimilars. Drug discovery and clinical applications, CRC Press 2022.

Pessoa Jr. A., Vitolo M., Long P.F.: Pharmaceutical Biotechnology. A Focus on Industrial Application. CRC Press 2022.

Crommelin D. J. A., Sindelar R. D., Meibohm B.: Pharmaceutical Biotechnology, Cahm: Springer 2019.

Clark D.P. a Pazdernik N.J.: Biotechnology. Oxford: Academic Cell 2016.

Languages necessary to complete the course:

English language.

Notes:

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: doc. Mgr. Andrea Bilková, PhD., doc. Mgr. Martina Hřčka Dubníčková, PhD., PharmDr. Hana Kiňová Sepová, PhD., Mgr. Eva Drobná, PhD., PharmDr. Gabriela Greifová, PhD., Mgr. Jana Hricovíniová, PhD.

Last change: 31.03.2025

Approved by: doc. Mgr. Andrea Bilková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFANF/11-Mgr-A/19	Course title: Calculations in chemical analysis
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 2., 4., 6., 8., 10.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Elective course. Continuous assessment: To successfully complete the seminar from calculations, it is necessary to obtain at least 60% of the sum of the maximum number of points from individual seminars - (max. 10 points per seminar). The exam will be performed in writing - by a test. To successfully pass the exam, it is necessary to obtain at least 60% of possible points. The assessment A: 100.0 - 92.1% B: 92.0 - 84.1% C: 84.0 - 76.1% D: 76.0 - 68.1% E: 68.0 - 60.0% FX: <60.0%. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: Calculations from various chemical equations are an integral part of chemical analysis. Elective course "Calculations in chemical analysis" which takes place in parallel with the course "Analytical Chemistry 1", helps students to overcome problematic areas of chemical analysis and at the same it extends this scope to other relevant calculations.	
Class syllabus: <ul style="list-style-type: none"> • Determination of stoichiometry of chemical equations, calculations of equilibrium constants, pH • Calculation of concentration for the prepared solution (mass and molar concentration, dilution of solutions, mass and volume percentage) • Calculation of the content of the test substance in gravimetric determinations • Calculation of the content of the test substance in acid - base titrations (alkalimetry, acidimetry, acid-base determinations in non-aqueous solvents) • Calculation of the content of the analyte in complexation titrations (chelometry, argentometric determination of cyanides, mercurimetry) • Calculation of the content of the analyte in redox titrations (iodometry, bromatometry, manganometry, dichromatometry) • Calculation of the content of the test substance in precipitation titration determinations (argentometry) • Evaluation of measured data of direct, backward and indirect titrations 	
Recommended literature:	

- Mikuš, P., Mikušová, V.: Chemical Analysis Qualitative and Quantitative. Bratislava : UK, 2011. 133 s.
- P. Mikuš, V. Mikušová, Analytical Chemistry: Chemical Analysis, VEDA, 2022
- D.G. Watson, Pharmaceutical analysis, A textbook for pharmacy students and pharmaceutical chemists, Elsevier, Churchill Livingstone, London 2005.
- web pages with appropriate keywords and their combinations

Languages necessary to complete the course:

english language

Notes:

Past grade distribution

Total number of evaluated students: 13

A	ABS	B	C	D	E	FX
84,62	0,0	7,69	0,0	0,0	7,69	0,0

Lecturers: doc. Ing. Dáša Kružlicová, PhD.

Last change: 16.02.2023

Approved by: doc. Ing. Dáša Kružlicová, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/11-Mgr-A/22	Course title: Clinical Pharmacology and Pharmacotherapy
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 2 per level/semester: 28 / 28 Form of the course: on-site learning	
Number of credits: 4	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Anatomy and Physiology, Pathology, Pharmacology (1), Pharmacology (2)	
Course requirements: Preliminary assessment: 1 seminar work Final exam: written examination, minimum threshold of success: 60% Scale of assessment: A: 100 % - 92 %; B: 91,9 % - 84 %; C: 83,9 % - 76 %; D: 75,9 % – 68 %; E: 67,8 % - 60 %; Fx: 59,9 % and less	
Learning outcomes: Students shall acquire basic information not only on the efficacy of medicinal products, but also on their safe administration to patients, in particular to risk groups. Students become familiar with the methods of preclinical and clinical trials of medicinal products, explanation of mechanism of interactions, adverse effects of drugs and their monitoring. As part of the case-solving process, he acquires communication skills and experience as a means of social interaction, and acquires the basic skills of managing the patient as well as the professional team. Pharmacy students will be able to contribute to the rational use of medicines in clinical practice.	
Class syllabus: <ul style="list-style-type: none"> - Introduction to the study of Clinical Pharmacology and Pharmacotherapy - The importance of rational pharmacotherapy for the efficacy and safety of treatment - Preclinical evaluation of drugs - Clinical evaluation of drugs - Rational pharmacotherapy - Harmful effects of drugs, adverse drug reaction. Pharmacovigilance. - Pharmacovigilance - Summary of Product Characteristic and Patient Information Leaflet - Over the counter drugs - European drug policy - Drug interactions - Importance of pharmacogenetics for the rational pharmacotherapy. Gene therapy 	

- Chronopharmacology and its importance for therapy Humans rights and medicine
- Ethical problems and non-proved therapeutical approaches
- Basic pharmacokinetic parameters in clinical practice
- Prescription of medicines from the aspect of irrational pharmacotherapy
- Individual variability in pharmacotherapy of neonates and children, pregnant women, elderly
- Pathophysiological status influencing drug response
- Obesity, dyslipidemia, diabetes and cardiovascular disease, nutritional supplements for proper diet
- Abdominal pain - basic evaluation and first aid
- Chest pain and back pain - diagnosis and first aid

Recommended literature:

- Walker R, Whittlesea C: Clinical Pharmacy and Therapeutics. Fifth edition. Churchill Livingstone. Elsevier. 2012.
- Brown M.J., Sharma P., Mir F.A., Bennet P.N.: Clinical Pharmacology. 12th Edition. Elsevier. 2018 (available as e-book from Central Library)
- McKay G.A., Walters M.R.: Clinical Pharmacology and Therapeutics. 9th Edition. John Wiley & Sons, Incorporated. 2013. (available as e-book from Central Library)
- Francis S-A, Smith F.J., Malkinson J., Constanti A., Taylor K. Integrated Pharmacy Case Studies. Pharmaceutical Press. 2015 (available as e-book from Central Library)
- Gray A.H., Wright J., Bruce L., Oakley J. Clinical Pharmacy. Second Edition. Pharmaceutical Press. 2016 (available in Central Library for present studying)
- Nathan A: Managing symptoms in the pharmacy. Second Edition. Pharmaceutical Press. 2012 (available as e-book from Central Library)

Online databeses:

- LEXICOMP Online. Wolters Kluwer Clinical Drug Information, Inc. <online: <http://online.lexi.com/lco/action/home>>

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 110

A	ABS	B	C	D	E	FX
0,91	0,0	3,64	14,55	20,91	44,55	15,45

Lecturers: prof. PharmDr. Ján Klimas, PhD., MPH, PharmDr. Gabriel Dóka, PhD., PharmDr. Zuzana Kiliánová, PhD., doc. PharmDr. Stanislava Kosírová, PhD., doc. Mgr. Diana Vavrinová, PhD., doc. Mgr. Peter Vavrínek, PhD., PharmDr. Natália Stollárová, PhD., PharmDr. Boris Dudík, PhD., PharmDr. Eva Kráľová, PhD.

Last change: 12.09.2024

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/12-Mgr-A/25	Course title: Clinical Pharmacy and Pharmacotherapy
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 4 / 2 per level/semester: 56 / 28 Form of the course: on-site learning	
Number of credits: 6	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Pharmacology (1), Pharmacology (2), Clinical pharmacology and pharmacotherapy	
Course requirements: Preliminary assessment: 1 seminar work Final assessment of students takes place in two parts: written examination (50% of the final mark) and an oral exam (50% of the final mark). Minimum pass for each part of exam: 60% Overall evaluation of the exam: A: 100 % - 92 %; B: 91,9 % - 84 %; C: 83,9 % - 76 %; D: 75,9 % - 68 %; E: 67,8 % - 60 %; Fx: 59,9 % and less	
Learning outcomes: Completing the course the student acquires basic information about treatment options and first aid for pain, insomnia, dizziness and vomiting, fever, cough, diarrhea, bleeding events, infections, gastrointestinal diseases and ear, nose, throat diseases. The student will become familiar with the ATC groups and therapeutic use of the most current symptoms of disease and potential manifestations of adverse effects in selected pharmacotherapeutic groups. This course will contribute to the participation of pharmacists for solving pharmacotherapeutic problems in clinical practice in cooperation with the physician.	
Class syllabus: Anatomical-therapeutical-chemical classification of drugs. ATC groups A-V: - Drugs decreasing motility of smooth muscles - The most frequent diseases of GIT - dyspepsia, oesophageal reflux, pyrosis, diarrhea, constipation- first aid and treatment - Dizziness, nausea and vomiting - first aid and treatment - Bleeding disorders - first aid and therapy - Antithrombotic drugs in therapy - Chest pain and back ache as suspicious of ischemic heart disease and myocardial infarction - Unconsciousness and shock states - Drugs used for topical application in dermatology - Allergic reactions and their skin manifestations	

- Glucocorticoids and their pharmacological importance
- Hormonal contraception and hormonal replacement therapy
- Strategy of antibiotic therapy
- Pharmacotherapy of reumatoid diseases
- Fever - its clinical importance and therapy
- Headache and migraine - first aid and therapeutical approaches
- Insomnia - first aid and therapeutical approaches
- Asthma and chronic obstructive lung disease
- Cough and drugs used for cough- first aid and therapy
- Life style drugs, falsified medicines
- Pharmacotherapeutic problems of the most commonly used drugs in therapy (CVS, CNS, anti-infective drugs) and their analysis
- Inappropriate drugs in therapy. Criteria for evaluation in pharmacotherapy

Recommended literature:

Online databases:

- Lexidrug. UpToDate Lexidrug Standard. Wolters Kluwer. 2025. Link: <https://online.lexi.com/>
- European Medicines Agency (EMA). Link: <https://www.ema.europa.eu/>
- State Institute for Drug Control Slovak Republic. (SIDC; Štátny ústav pre kontrolu liečiv). Link: <https://www.sukl.sk/>

- Cochrane library. Cochrane. Link: <https://www.cochranelibrary.com/>

e-books and printed books:

- Access Pharmacy. McGraw Hill. (<https://accesspharmacy.mhmedical.com/>):
 - o DiPiro J.T., Yee G.C., Haines S.T., Nolin T.D., Ellingrod V.L., Posey L.M. DiPiro's Pharmacotherapy: A Pathophysiologic Approach, 12th Edition. McGraw Hill. 2023 (e-book)
 - o Whalen K., Hardin H.C. Medication Therapy Management: A Comprehensive Approach, 2nd Edition. McGraw Hill. 2018 (e-book)
- ProQuest EBook Central. Proquest – Part of Clarivate. (<https://ebookcentral.proquest.com/lib/uniba-ebooks/home.action>)
 - o Brown M.J., Sharma P., Mir F.A., Bennet P.N.: Clinical Pharmacology. 12th Edition. Elsevier. 2018 (e-book)
 - o McKay G.A., Walters M.R.: Clinical Pharmacology and Therapeutics. 9th Edition. John Wiley & Sons, Incorporated. 2013 (e-book)
 - o Francis S-A, Smith F.J., Malkinson J., Constanti A., Taylor K. Integrated Pharmacy Case Studies. Pharmaceutical Press. 2015 (e-book)
 - o Nathan A: Managing symptoms in the pharmacy. Second Edition. Pharmaceutical Press. 2012 (e-book)
 - o Blenkinsopp A., Paxton P., Blenkinsopp J.: Symptoms in the Pharmacy: A Guide to the Management of Common Illness. John Wiley & Sons, Inc. 2008

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: prof. PharmDr. Ján Klimas, PhD., MPH, PharmDr. Gabriel Dóka, PhD., PharmDr. Zuzana Kiliánová, PhD., doc. PharmDr. Stanislava Kosírová, PhD., PharmDr. Eva Kráľová, PhD., doc. Mgr. Diana Vavrincová, PhD., doc. Mgr. Peter Vavrinec, PhD.

Last change: 10.04.2025

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/14-Mgr/A/22	Course title: Computer Data Processing
Educational activities: Type of activities: practicals Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: There are two tests during the semester. At least 60% must be obtained for their successful completion. The exam is a written test. 100 – 95 %: A, 94 – 85 %: B, 84 – 75 %: C, 74 – 65 %: D, 64 – 60 %: E, < 59 %: Fx. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: After completing the course the student is able to work independently and creatively in the field of collection, processing, presentation and evaluation of data in electronic form. A self-versed in this area and can use the methods and techniques of data, data organization understands and is able to use the current version of the standard application software for their professional activities.	
Class syllabus: The content of the course is an update of the student's abilities and skills to communicate with the means of computer technology at the level of the so-called standard application equipment as a result of intensive development in the technical and program area, which is an organic part of professional pharmaceutical activities in all branches of pharmaceutical sciences and practice. Course syllabus: <ul style="list-style-type: none"> · Qualified communication of the user with the computer, knowledge of working with devices, peripherals and media of computer technology, · Data organization and its means, work with archive files (zip, rar, etc.) and their current tools, · Word processing, creation and operations with text files, creation of tables and calculations in them, conversion to rtf, pdf formats, · Spreadsheet and its user functions, including mathematical and statistical, graphing, · Creation of presentations as specific document formats. 	
Recommended literature: The literature is constantly updated at the exercises in the form of protocols. Due to the need for constant updating, students are provided with study texts on individual issues.	
Languages necessary to complete the course: English language	

Notes:						
Past grade distribution						
Total number of evaluated students: 30						
A	ABS	B	C	D	E	FX
26,67	0,0	3,33	10,0	20,0	26,67	13,33
Lecturers: prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Zuzana Koblišková, PhD.						
Last change: 31.03.2022						
Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KGF/19-Mgr-A/22	Course title: Cosmetics in Pharmacy
Educational activities: Type of activities: practicals / lecture Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites: FaF.KGF/05-Mgr-A/22 - Pharmaceutical Technology (1)	
Course requirements: Attendance of the lectures and practical exercises is obligatory. Absence tolerance for lectures is a maximum of three lectures. Absences are not tolerated at exercises. In case of violation of this rule, the student will lose the opportunity to pass the exam. Methods and options for compensating absences will be defined in the course syllabus. The course is completed when at least 60% is achieved in the final written exam. Assessment: A: 93.00–100.00%, B: 85.00–92.99%, C: 77.00–84.99%, D: 69.00–76.99%, E: 60.00–68.99%, FX: less than 60.00%.	
Learning outcomes: By completing the course, the student acquires basic knowledge about the functioning of the skin, how to care for it, and an overview of the basic skin diseases and defects that students will meet in their pharmaceutical practice. As erudite experts, they will be able to evaluate the patient's condition and then recommend a suitable product or a visit to the doctor. Attention is also paid to hair, skin aging, cosmetics with a special focus, and phototherapy. The course includes compulsory practical exercises in the laboratory, students get acquainted with the basic principles of cosmetics preparation, and learn to select appropriate excipients and specific excipients that meet the requirements of individualized therapy and provide a sufficient therapeutic or cosmetic effect.	
Class syllabus: thematic focus: Human skin, skin types, specifics of their treatment. The most used biologically active substances and their use. Types of cosmetics for skin and body skin care. Healthy skin care. The most common skin diseases and their treatment. Skin aging, mechanisms of aging, prevention and anti-aging preparations, and alternative substances. Solar radiation, benefits, and risks, types of UV filters, phototypes, and types of cosmetics for protection against sunlight. Biologically active substances and auxiliary substances in cosmetics. Cosmetics testing, the most common allergens, prohibited substances, interpretation of information on cosmetics packaging, and legislation on the production of cosmetics. Hair physiology. Hair cosmetics, therapy of the most common hair diseases. Phototherapy in the management of skin and autoimmune diseases. Cosmetics with a special focus. Care for specific parts of the body: nails, eyes, lips, and feet. Intimate hygiene cosmetics.	

Recommended literature: A. Shai, H. I. Maibach, R. Baran: Handbook of Cosmetic Skin Care. CRC Press, 2009. F. Gardiner: Handbook of Skin Diseases, Legare Street Press, 2021. D. Janeš, N. Kočevar Glavač: Modern cosmetics. Širimo dobro besedo, d. o. o. Velenje, 2018.Z. D. Draelos, L. A. Thaman: Cosmetic Formulation of Skin Care Products. CRC Press, 2006.						
Languages necessary to complete the course: English language						
Notes:						
Past grade distribution Total number of evaluated students: 36						
A	ABS	B	C	D	E	FX
22,22	0,0	47,22	22,22	5,56	2,78	0,0
Lecturers: Mgr. Jana Selčanová, PharmDr. Veronika Šimunková, PhD., PharmDr. Miroslava Špaglová, PhD., PharmDr. Jarmila Prieložná, PharmDr. Veronika Mikušová, PhD., PharmDr. ThLic. Mária Raučinová, PhD., PharmDr. Miroslava Potůčková, PhD., Mgr. Daniel Krchňák, DiS						
Last change: 12.09.2024						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFB/13-Mgr-A/22	Course title: Current Trends in Preparations of Natural Origin
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Course requirements: A 100% attendance in practical training in person or online is required**. The final exams will have the form of a test***. Grading rules: 100-92/A, 91-84/B, 83-76/C, 75-68/D, 67-60/E, 59-0/FX Scale of assessment (preliminary/final): 1/1	
Learning outcomes: Upon successfully completing the educational process, the student should have extensive knowledge from Pharmacognosy about medicinal plants and natural products in the current pharmaceutical market, food, beverages, or cosmetics. Furthermore, get information about the pitfalls of natural remedies in self-medication to learn exciting facts about recent research of natural products and their path to the herbal drug. The acquired knowledge should give the pharmacist courage and confidence to dispatch herbal drugs, medical devices, cosmetic products and food supplements of natural origin.	
Class syllabus: Lectures are devoted to current topics on natural substances and medicinal plants, which are available as OTC products (over-the-counter) in pharmacies or used in everyday life, and which are not fully covered in Pharmacognosy 1 and 2. The student will meet with important information about current research of natural products, about psychoactive plants and their constituents, about the Influence of the intestinal microbiome on the activity of natural substances, about plant antioxidants in the prevention of various diseases (e.g. Alzheimer's, Parkinson's), about vegetables, fruits, and spices with therapeutic potential, about known beverages, and natural substances from non-vascular land plants or sea plants. Attention will also be paid to important natural substances with antimicrobial effects, natural dyes, and plant metabolites currently used in pharmacotherapy.	
Recommended literature: European Medicines Agency (https://www.ema.europa.eu/en/medicines) Databases: ScienceDirect, Scopus, PubMed, SciFinder, GoogleScholar	
Languages necessary to complete the course: English	

Notes:						
Past grade distribution Total number of evaluated students: 0						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: doc. PharmDr. Silvia Bittner Fialová, PhD., prof. PharmDr. Pavel Mučaji, PhD.						
Last change: 10.04.2025						
Approved by: prof. PharmDr. Pavel Mučaji, PhD.						

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/300-Mgr-A/25	Course title: Defense of Diploma Thesis
Number of credits: 4	
Recommended semester: 9., 10..	
Educational level: I.II.	
Course requirements: The state exam can be taken by a student who has successfully completed the subjects: Diploma Thesis Preparation I, Diploma Thesis Preparation II Diploma Thesis Preparation III, and has also prepared and submitted the final version of the diploma thesis.	
Learning outcomes: The student can work with scientific and professional literary sources and summarize basic scientific knowledge into a logically organized unit that meets the formal aspect of a diploma thesis. He can clearly define the goal and methodology of scientific work, he can process the results together with their practical interpretation (according to the focus of the work), he can cite literature in accordance with applicable regulations. He can present and defend the results of his diploma thesis.	
Class syllabus: The state exam consists of presenting the thesis, the results of the diploma thesis and defending them before the state exam committee.	
State exam syllabus:	
Last change: 04.04.2025	
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH	

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/29-Mgr-A/22	Course title: Diet and Nutrition Basics
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Course requirements: 1. Obligatory participation in seminars. Absence on the seminar must be proved by the reason for absence and the seminar must be replaced in agreement with the teacher. 2. Continuous test without a set minimum pass. 3. Completion of the course is done by a written exam with a minimum success rate of 60%. Rating: A = 100-95%, B = 94-85%, C = 84-75%, D = 74-65%, E = 64-60%, FX = 59% and less.	
Learning outcomes: By completing the course, the student will gain basic knowledge and skills in the medical field of dietetics and the origin and development of nutrition-related diseases. The student will gain theoretical knowledge and practical foundations of dietary, nutritional, and supplementary counselling provided preventively and medically.	
Class syllabus: Lectures: Dietetics in the treatment and prevention of diseases. The relationship of nutrition to health and disease. Physiology of nutrition. Nutritional components - nutrients (carbohydrates, fats, proteins), macro elements and microelements, micronutrients, vitamins. Water. Alcohol. Nutritional status of the individual. Population nutritional monitoring. Energy balance - energy intake and expenditure. Energy substrates. Energy density of food. Influence of energy expenditure. Therapeutic and preventive dietary recommendations for selected diseases - obesity, type 1 and type 2 diabetes mellitus, dyslipoproteinemia, hypertension and atherosclerosis, cancer. Diet therapy for specific population groups (children, pregnant and lactating women, the elderly). Eating disorders (malnutrition, malnutrition, anorexia, bulimia). Food allergies and intolerances. Food and nutritional literacy. Food safety. Basics of nutrition hygiene. Nutrition recommendations. Nutritional habits and their monitoring (analysis of dietary records, databases of energy and nutritional composition of food). Nutrigenetics and nutrigenomics. Artificial nutrition - enteral and parenteral nutrition. The current nutritional situation in our country and in the world. Nutrition as part of the National Health Promotion Program. Principles of rational healthy nutrition. Alternative forms of nutrition. Organic food, genetically modified food, functional food. Foods for specific nutritional purposes - dietetic foods and nutritional supplements. Legislation, marketing,	

reimbursement, rational use, and advice. Nutrition and supplementation advice in a pharmacy. Nutrition software, mobile applications for nutritional and supplementation counselling. Seminars: Anthropometric examinations in adults and children. Measurement of skin algae. Bioimpedance analysis of body composition. Biochemical markers of nutrition in the evaluation of nutritional status. Rational physiological nutrition - work with graphic aids (food pyramid, properly divided plate). Caloric tables, practice of calculating caloric values. Working with nutritional databases and software. Training in dietetic and nutritional procedures for selected diseases and specific population group.

Recommended literature:

1. Temple N.J., Wilson T., Bray G.A. (Eds). Nutrition Guide for Physicians and Related Healthcare Professionals (Nutrition and Health) 2nd ed. 2017 Edition ISBN-13: 978-3319499284.
2. U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2020-2025 Dietary Guidelines for Americans. Available at https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf
3. Australian Dietary Guidelines, 2013. Available at <https://www.eatforhealth.gov.au/guidelines>.
4. The Food Safety Authority of Ireland , 2019. A guide supporting the Healthy Ireland Food Pyramid. Available at https://www.fsai.ie/news_centre/press_releases/healthy_eating_guidelines_28012019.html
5. Food-Based Dietary Guidelines. Joint Research Centre, European Commission’s science and knowledge service, Last update Feb 2020. Available at <https://ec.europa.eu/jrc/en/health-knowledge-gateway/about>.
6. WCRF/AICR 2018. Diet, Nutrition, Physical Activity, and Cancer: a Global Perspective. Continous Update Project expert Report. Available at <https://www.wcrf.org/sites/default/files/Summary-of-Third-Expert-Report-2018.pdf>.
7. Handboob for counselors reducing risk factors for noncommunicable diseases, 2017.
8. 2021 Dietary Guidance to Improve Cardiovascular Health: A Scientific Statement From the American Heart Association. Circulation. 2021;144:e472–e487
9. Nutritional Recommendations for Individuals with Diabetes, 2019. Available at <https://www.ncbi.nlm.nih.gov/books/NBK279012/>.

Languages necessary to complete the course:

English language

Notes:

Maximum capacity 25 students.

Past grade distribution

Total number of evaluated students: 82

A	ABS	B	C	D	E	FX
34,15	0,0	28,05	23,17	6,1	7,32	1,22

Lecturers: doc. PharmDr. Daniela Mináriková, PhD., PharmDr. Ľubica Lehocká, PhD.

Last change: 17.09.2024

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF/01-Mgr-A/22			Course title: Diploma Thesis Preparation I			
Educational activities: Type of activities: practicals Number of hours: per week: 4 per level/semester: 56 Form of the course: on-site learning						
Number of credits: 3						
Recommended semester: 7.						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 34						
A	ABS	B	C	D	E	FX
79,41	0,0	0,0	8,82	2,94	5,88	2,94
Lecturers: Mgr. Mária Klacsová, PhD., doc. Mgr. Fils Andriamainty, PhD., doc. PharmDr. Ivan Malík, PhD., doc. PharmDr. Miroslava Sýkorová, PhD., Mgr. Róbert Šandrik, PhD., Ing. Stanislava Šoralová, PhD., Ing. Jaroslav Galba, PhD., PharmDr. Vladimír Garaj, PhD., PharmDr. Iva Kapustíková, PhD., PharmDr. Matej Maruniak, PhD., PharmDr. Eva Salanci, PhD., PharmDr. Lenka Stopková, PhD., Ing. Ladislav Habala, Dr.rer.nat, doc. PharmDr. Jindra Valentová, PhD., Mgr. Lucia Lintnerová, PhD., RNDr. Roman Mikláš, PhD., PharmDr. Andrea Balažová, PhD., PharmDr. Renáta Kubíková, PhD., RNDr. František Bilka, PhD., doc. Mgr. Andrea Bilková, PhD., Mgr. Eva Drobná, PhD., doc. PharmDr. Marek Obložinský, PhD., PharmDr. Gabriela Greifová, PhD., Ing. Ludmila Pašková, PhD., Mgr. Ivana Holková, PhD., doc. Mgr. Martina Hrčka Dubničková, PhD., Mgr. Jana Hricoviniová, PhD., PharmDr. Hana Kiňová Sepová, PhD., Ing. Michael Kenneth Lawson, PhD., PharmDr. Veronika Šimunková, PhD., PharmDr. Eva Malíková, PhD., doc. PharmDr. Marek Mátuš, PhD., doc. PharmDr. Anna Paul Hrabovská, PhD., PharmDr. Gabriel Dóka, PhD., prof. PharmDr. Adriana Duriš Adameová, DrSc., doc. PharmDr. Tomáš Rajtík, PhD., doc. PharmDr. Tatiana Foltánová, PhD., PharmDr. Katarína Hadová, PhD., PharmDr. Csaba Horváth, PhD., doc. Mgr. Diana Vavrincová, PhD., doc. Mgr. Peter Vavrinec, PhD., PharmDr. Zuzana Kiliánová, PhD., prof. PharmDr. Ján Klimas, PhD., MPH, doc. PharmDr.						

Stanislava Kosírová, PhD., PharmDr. Eva Kráľová, PhD., doc. PharmDr. Peter Křenek, PhD., prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Zuzana Koblišková, PhD., PharmDr. Ľubica Lehocká, PhD., PharmDr. Lucia Masaryková, PhD., doc. PharmDr. Daniela Mináriková, PhD., PharmDr. Miroslava Snopková, PhD., doc. PharmDr. Silvia Bittner Fialová, PhD., RNDr. Veronika Brindza Lachová, PhD., doc. PharmDr. Szilvia Czigle, PhD., Mgr. Ondrej Ďuriška, PhD., PharmDr. Vladimír Forman, PhD., RNDr. Peter Gál, PhD., MBA, prof. Ing. Miroslav Habán, PhD., PharmDr. Mgr. Elena Kurin, PhD., PharmDr. Michaela Mergová, PhD., RNDr. Ingrid Mistríková, CSc., Mgr. Petra Mitrengová, PhD., prof. PharmDr. Pavel Mučaji, PhD., prof. Ing. Milan Nagy, CSc., PharmDr. Zuzana Scheerová Kontšeková, PhD., PharmDr. Ivana Šušaníková, PhD., RNDr. Daniela Tekel'ová, CSc., Mgr. Jaroslav Tóth, PhD.

Last change:

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF/02-Mgr-A/22		Course title: Diploma Thesis Preparation II				
Educational activities: Type of activities: practicals Number of hours: per week: 10 per level/semester: 140 Form of the course: on-site learning						
Number of credits: 4						
Recommended semester: 8.						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 49						
A	ABS	B	C	D	E	FX
53,06	0,0	14,29	14,29	10,2	2,04	6,12
<p>Lecturers: Mgr. Mária Klacsová, PhD., doc. Mgr. Fils Andriamainty, PhD., doc. PharmDr. Ivan Malík, PhD., doc. PharmDr. Miroslava Sýkorová, PhD., Mgr. Róbert Šandrik, PhD., Ing. Stanislava Šoralová, PhD., Ing. Jaroslav Galba, PhD., PharmDr. Vladimír Garaj, PhD., PharmDr. Iva Kapustíková, PhD., PharmDr. Matej Maruniak, PhD., PharmDr. Eva Salanci, PhD., PharmDr. Lenka Stopková, PhD., Ing. Ladislav Habala, Dr.rer.nat, doc. PharmDr. Jindra Valentová, PhD., Mgr. Lucia Lintnerová, PhD., RNDr. Roman Mikláš, PhD., PharmDr. Andrea Balažová, PhD., PharmDr. Renáta Kubíková, PhD., RNDr. František Bilka, PhD., doc. Mgr. Andrea Bilková, PhD., Mgr. Eva Drobná, PhD., doc. PharmDr. Marek Obložinský, PhD., PharmDr. Gabriela Greifová, PhD., Ing. Ľudmila Pašková, PhD., Mgr. Ivana Holková, PhD., doc. Mgr. Martina Hrčka Dubničková, PhD., Mgr. Jana Hricoviniová, PhD., PharmDr. Hana Kiňová Sepová, PhD., Ing. Michael Kenneth Lawson, PhD., PharmDr. Eva Malíková, PhD., Mgr. Lenka Bies Piváčková, PhD., doc. PharmDr. Anna Paul Hrabovská, PhD., PharmDr. Gabriel Dóka, PhD., prof. PharmDr. Adriana Duriš Adameová, DrSc., doc. PharmDr. Tomáš Rajtík, PhD., doc. PharmDr. Tatiana Foltánová, PhD., PharmDr. Katarína Hadová, PhD., Mgr. Ondrej Sprušanský, PhD., PharmDr. Csaba Horváth, PhD., doc. Mgr. Peter Vavrínek, PhD., PharmDr. Zuzana Kiliánová, PhD., PharmDr. Eva Veľasová, PhD., prof. PharmDr. Ján Klimas, PhD., MPH, doc. PharmDr.</p>						

Stanislava Kosírová, PhD., PharmDr. Eva Kráľová, PhD., doc. PharmDr. Peter Křenek, PhD., doc. PharmDr. Katarína Maráková, PhD., prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Zuzana Koblišková, PhD., PharmDr. Ľubica Lehocká, PhD., PharmDr. Lucia Masaryková, PhD., doc. PharmDr. Daniela Mináriková, PhD., PharmDr. Miroslava Snopková, PhD., prof. RNDr. Daniela Uhríková, CSc., RNDr. Alexander Búcsi, PhD., RNDr. Tomáš Fazekaš, PhD., prof. Ing. Vladimír Frecer, DrSc., doc. RNDr. Jana Gallová, CSc., Mgr. Lukáš Hubčík, PhD., doc. Mgr. Marcela Chovancová, PhD., Ing. Jarmila Oremusová, CSc., doc. PharmDr. Silvia Bittner Fialová, PhD., RNDr. Veronika Brindza Lachová, PhD., doc. PharmDr. Szilvia Czigle, PhD., Mgr. Ondrej Ďuriška, PhD., PharmDr. Vladimír Forman, PhD., RNDr. Peter Gál, PhD., MBA, prof. Ing. Miroslav Habán, PhD., PharmDr. Mgr. Elena Kurin, PhD., PharmDr. Michaela Mergová, PhD., RNDr. Ingrid Mistríková, CSc., Mgr. Petra Mitrengová, PhD., prof. PharmDr. Pavel Mučaji, PhD., prof. Ing. Milan Nagy, CSc., PharmDr. Zuzana Scheerová Kontšeková, PhD., PharmDr. Ivana Šušaniková, PhD., RNDr. Daniela Tekeľová, CSc., Mgr. Jaroslav Tóth, PhD., doc. PharmDr. Marek Máťuš, PhD.

Last change:

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF/03-Mgr-A/22			Course title: Diploma Thesis Preparation III			
Educational activities: Type of activities: seminar Number of hours: per week: 22 per level/semester: 308 Form of the course: on-site learning						
Number of credits: 10						
Recommended semester: 9., 10..						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 38						
A	ABS	B	C	D	E	FX
55,26	0,0	18,42	13,16	10,53	2,63	0,0
<p>Lecturers: doc. Mgr. Fils Andriamainty, PhD., doc. PharmDr. Ivan Malík, PhD., doc. PharmDr. Miroslava Sýkorová, PhD., Mgr. Róbert Šandrik, PhD., Ing. Stanislava Šoralová, PhD., Ing. Jaroslav Galba, PhD., PharmDr. Vladimír Garaj, PhD., PharmDr. Iva Kapustíková, PhD., PharmDr. Matej Maruniak, PhD., PharmDr. Eva Salanci, PhD., PharmDr. Lenka Stopková, PhD., Ing. Ladislav Habala, Dr.rer.nat, doc. PharmDr. Jindra Valentová, PhD., Mgr. Lucia Lintnerová, PhD., RNDr. Roman Mikláš, PhD., PharmDr. Andrea Balažová, PhD., PharmDr. Renáta Kubíková, PhD., RNDr. František Bilka, PhD., doc. Mgr. Andrea Bilková, PhD., Mgr. Eva Drobná, PhD., doc. PharmDr. Marek Obložinský, PhD., PharmDr. Gabriela Greifová, PhD., Ing. Ľudmila Pašková, PhD., Mgr. Ivana Holková, PhD., doc. Mgr. Martina Hrčka Dubničková, PhD., Mgr. Jana Hricovíniová, PhD., PharmDr. Hana Kiňová Sepová, PhD., Ing. Michael Kenneth Lawson, PhD., PharmDr. Eva Malíková, PhD., Mgr. Lenka Bies Piváčková, PhD., doc. PharmDr. Marek Máťuš, PhD., PharmDr. Elena Ondriašová, CSc., PharmDr. Dominika Dingová, PhD., doc. PharmDr. Anna Paul Hrabovská, PhD., prof. PharmDr. Adriana Duriš Adameová, DrSc., doc. PharmDr. Tomáš Rajtík, PhD., doc. PharmDr. Tatiana Foltánová, PhD., PharmDr. Katarína Hadová, PhD., Mgr. Ondrej Sprušanský, PhD., doc. MUDr. Tatiana Stankovičová, CSc., PharmDr. Csaba Horváth, PhD., doc. RNDr. Ingrid Tumová, CSc., doc. Mgr. Diana Vavrincová, PhD., doc. Mgr. Peter</p>						

Vavrinec, PhD., PharmDr. Zuzana Kiliánová, PhD., prof. PharmDr. Ján Klimas, PhD., MPH, doc. PharmDr. Stanislava Kosírová, PhD., PharmDr. Eva Kráľová, PhD., doc. PharmDr. Peter Křenek, PhD., PharmDr. Gabriel Dóka, PhD., doc. PharmDr. Katarína Maráková, PhD., prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Zuzana Koblišková, PhD., PharmDr. Ľubica Lehocká, PhD., PharmDr. Lucia Masaryková, PhD., doc. PharmDr. Daniela Mináriková, PhD., PharmDr. Miroslava Snopková, PhD., prof. RNDr. Daniela Uhríková, CSc., RNDr. Alexander Búcsi, PhD., RNDr. Tomáš Fazekaš, PhD., prof. Ing. Vladimír Frecer, DrSc., doc. RNDr. Jana Gallová, CSc., Mgr. Lukáš Hubčík, PhD., doc. Mgr. Marcela Chovancová, PhD., Mgr. Mária Klacsová, PhD., Ing. Jarmila Oremusová, CSc., doc. PharmDr. Silvia Bittner Fialová, PhD., RNDr. Veronika Brindza Lachová, PhD., doc. PharmDr. Szilvia Czigle, PhD., Mgr. Ondrej Ďuriška, PhD., PharmDr. Vladimír Forman, PhD., RNDr. Peter Gál, PhD., MBA, prof. Ing. Miroslav Habán, PhD., PharmDr. Mgr. Elena Kurin, PhD., PharmDr. Michaela Mergová, PhD., RNDr. Ingrid Mistríková, CSc., Mgr. Petra Mitrengová, PhD., prof. PharmDr. Pavel Mučaji, PhD., prof. Ing. Milan Nagy, CSc., PharmDr. Zuzana Scheerová Kontšeková, PhD., PharmDr. Ivana Šušaníková, PhD., RNDr. Daniela Tekel'ová, CSc., Mgr. Jaroslav Tóth, PhD.

Last change:

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFCh/01-Mgr-A/24	Course title: Drug Analysis
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 4 / 3 per level/semester: 56 / 42 Form of the course: on-site learning	
Number of credits: 8	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: KFCH/05-Mgr-A/00 Pharmaceutical Chemistry (1); KFCH/06-Mgr-A/20 Pharmaceutical Chemistry (2); KFANF/01-Mgr-A/19 Analytical Chemistry (1); KFANF/02-Mgr-A/20 Analytical Chemistry (2).	
Course requirements: Participation in all compulsory forms of teaching, elaboration of protocols from laboratory practicals and completion of two written preliminary tests, each with a minimum success rate of 60 %. Completion of the written final examination test with a minimum success rate of 60 %. The content of all lectures and laboratory practicals will be included in the final examination test. Classification grades: (A) 100 – 92 %, (B) 91 – 84 %, (C) 83 – 76 %, (D) 75 – 68 %, (E) 67 – 60 %, (FX) less than 60 %. Scale of assessment (preliminary/final): 20/80.	
Learning outcomes: The aim of the course Drug Analysis is to teach students the basic principles of methods and tests used in the complex quality control of drugs, excipients and medicines in order to ensure their quality, safety and efficacy. The content of the course is based on the requirements of currently valid European Pharmacopoeia for the identification of drugs, evaluation of drug purity and determination of drug content. Students will get acquainted with the pharmacopoeial analysis of drugs using chemical, volumetric, gravimetric, chromatographic, spectral and electroanalytical methods. Theoretical knowledge is applied in laboratory practicals, where students experimentally perform drug quality control. When working with the European Pharmacopoeia, students learn to orientate quickly and with understanding in a wide range of pharmacopoeial procedures and statements. The knowledges and skills acquired in course Drug Analysis can be then applied in practice in public and hospital pharmacies, in control laboratories, in state regulatory authorities for drug control, in pharmaceutical production and research, and in further postgraduate education of pharmacists.	
Class syllabus:	

- Content, mission and importance of Drug Analysis; The European Pharmacopoeia; The European Directorate for the Quality of Medicines & HealthCare.
- Qualitative analysis: Identification reactions of ions and functional groups; Specific identification reactions of drugs; Physical and physicochemical methods.
- Purity of drugs and its control: Limit tests for inorganic impurities; Physical and physicochemical methods.
- Quantitative analysis: Gravimetry; Titrimetric methods; Physical and physicochemical methods.
- Quality control of the final pharmaceutical products.
- Quality control of containers and materials used for the manufacture of containers.
- Stability of drugs and medicines.
- Validation in pharmaceutical analysis. Good manufacturing practice. Pharmaceutical analysis in registration of medicinal products. Safety data sheet.

List of concerned general chapters in the European Pharmacopoeia:

1. General notices

2. Methods of analysis

2.2. Physical and physico-chemical methods: 2.2.1. Clarity and degree of opalescence of liquids; 2.2.2. Degree of coloration of liquids; 2.2.3. Potentiometric determination of pH; 2.2.4. Approximate pH of solutions; 2.2.5. Relative density; 2.2.6. Refractive index; 2.2.7. Optical rotation; 2.2.8. Viscosity; 2.2.9. Capillary viscometer method; 2.2.10. Viscosity – rotating viscometer method; 2.2.11. Distillation range; 2.2.12. Boiling point; 2.2.13. Determination of water by distillation; 2.2.14. Melting point – capillary method; 2.2.15. Melting point – open capillary method; 2.2.16. Melting point – instantaneous method; 2.2.17. Drop point; 2.2.18. Freezing point; 2.2.19. Amperometric titration; 2.2.20. Potentiometric titration; 2.2.21. Fluorimetry; 2.2.22. Atomic emission spectrometry; 2.2.23. Atomic absorption spectrometry; 2.2.24. Absorption spectrophotometry, infrared; 2.2.25. Absorption spectrophotometry, ultraviolet and visible; 2.2.26. Paper chromatography; 2.2.27. Thin-layer chromatography; 2.2.28. Gas chromatography; 2.2.29. Liquid chromatography; 2.2.30. Size-exclusion chromatography; 2.2.31. Electrophoresis; 2.2.32. Loss on drying; 2.2.38. Conductivity; 2.2.46. Chromatographic separation techniques; 2.2.47. Capillary electrophoresis; 2.2.49. Falling ball and automatic rolling ball viscometer methods; 2.2.54. Isoelectric focusing

2.3. Identification: 2.3.1. Identification reactions of ions and functional groups

2.4. Limit tests: 2.4.1. Ammonium; 2.4.2. Arsenic; 2.4.3. Calcium; 2.4.4. Chlorides; 2.4.5. Fluorides; 2.4.6. Magnesium; 2.4.7. Magnesium and alkaline-earth metals; 2.4.8. Heavy metals; 2.4.9. Iron; 2.4.10. Lead in sugars; 2.4.11. Phosphates; 2.4.12. Potassium; 2.4.13. Sulfates; 2.4.14. Sulfated ash; 2.4.17. Aluminium; 2.4.19. Alkaline impurities in fatty oils

2.5. Assays: 2.5.1. Acid value; 2.5.2. Ester value; 2.5.3. Hydroxyl value; 2.5.4. Iodine value; 2.5.5. Peroxide value; 2.5.6. Saponification value; 2.5.8. Determination of primary aromatic amino-nitrogen; 2.5.11. Complexometric titrations; 2.5.12. Water: semi-micro determination

3. Materials for containers and containers

4. Reagents

4.1. Reagents, standard solutions, buffer solutions: 4.1.1. Reagents; 4.1.2. Standard solutions for limit tests; 4.1.3. Buffer solutions

4.2. Volumetric analysis: 4.2.1. Primary standards for volumetric solutions; 4.2.2. Volumetric solutions

5. General texts

5.5. Alcoholimetric tables

Recommended literature:

- The European Pharmacopoeia. Current Edition and Supplements. Strasbourg: Council of Europe.
- Hansen, S., Pedersen-Bjergaard, S., Rasmussen, K.: Introduction to Pharmaceutical Chemical Analysis. Chichester: John Wiley & Sons, 2012.
- Kapustíková, I.: Drug Analysis, Laboratory Practicals. Bratislava: Comenius University in Bratislava, 2020.
- Kar, A.: Pharmaceutical Drug Analysis. New Delhi: New Age International, 2005.
- Pedersen, O.: Pharmaceutical Chemical Analysis. Methods for Identification and Limit Tests. New York: CRC Press, Taylor & Francis Group, 2006.
- Rouessac, F., Rouessac, A.: Chemical Analysis. Modern Instrumentation Methods and Techniques. 2nd Ed. Chichester: John Wiley & Sons, 2007.
- Watson, D. G.: Pharmaceutical Analysis. A Textbook for Pharmacy Students and Pharmaceutical Chemists. 4th Ed. Edinburgh: Elsevier, 2017.

Languages necessary to complete the course:

English language.

Notes:

Past grade distribution

Total number of evaluated students: 22

A	ABS	B	C	D	E	FX
36,36	0,0	22,73	9,09	13,64	13,64	4,55

Lecturers: PharmDr. Iva Kapustíková, PhD.

Last change: 09.05.2024

Approved by: PharmDr. Iva Kapustíková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF/VP-A/20		Course title: Extracurricular study activities				
Educational activities: Type of activities: Number of hours: per week: per level/semester: Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 1., 2., 3., 4., 5., 6., 7., 8., 9., 10..						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 0						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: doc. PharmDr. Jindra Valentová, PhD.						
Last change:						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KFT/15-Mgr-A/24			Course title: First Aid			
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning						
Number of credits: 2						
Recommended semester: 2.						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 2						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	100,0	0,0	0,0
Lecturers: doc. PharmDr. Tomáš Rajtík, PhD.						
Last change: 10.05.2024						
Approved by: doc. PharmDr. Tomáš Rajtík, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/19-Mgr-A/25	Course title: General Biology
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 6	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Student assessment consists of three written parts. Control test - exercises - the result is 20% of the total evaluation of the subject. Exam - written test - the result is 50% of the total evaluation of the course. Exam - solving selected problems from the areas covered in lectures - the result is 30% of the total evaluation of the course. In each written part, the student must achieve at least 60% success rate Grade Rating (%) A 100.00 - 92.00 B 91.99 - 84.00 C 83.99 - 76.00 D 75.99 - 68.00 E 67.99 - 60.00 FX <60.00	
Learning outcomes: By completing the course the student acquires basic information about the position of molecular and cell biology in the pharmaceutical study and the scientific field of Pharmacy. The acquired knowledge is the basis for related medical disciplines: physiology, pathology, biochemistry, immunology, microbiology, molecular and general pharmacology, clinical disciplines and forms the basis for understanding the effects of biologically active molecules - drugs.	
Class syllabus: - Chemical composition of living matter, biologically active macromolecules - carbohydrates, lipids, proteins, nucleic acids - Basic cell structure, cell theory, phylogeny, origin of cells and multicellular organisms. prokaryotic and eukaryotic cell. Non-membrane cell structures - cytology in terms of cell morphology and structure, - Cell membrane, membrane organelles, their structure and function - Membrane transport, cell connections. - Biocommunication, cellular receptors	

- DNA replication and DNA repair mechanisms
- Gene expression - basic principles and regulation of transcription and translation.
- Cell division and cell cycle, cell death
- Germ cells, sexosomes, insemination. Ontogenesis. Stem cells
- Chromatin, chromosomes, HUGO project. Introduction to genetics, Mendel's laws, investigative methods in genetics, human genetics, mutations, genetic engineering
- Cellular and molecular biology of cancer, oncogenes, tumor suppressor genes, metastases

Teaching includes self-study of educational videos, assigned problems and independent student work.

Recommended literature:

- Alberts, Bruce, et al. Essential cell biology. Garland Science, 2015..
- Alberts, Bruce, et al. Molecular biology of the cell. WW Norton & Company, 2017.
- Lodish, Harvey, et al.: Molecular Cell Biology, eight edition, W.H.Freeman and Company, 2016

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 12

A	ABS	B	C	D	E	FX
8,33	0,0	16,67	41,67	16,67	16,67	0,0

Lecturers: Mgr. Ondrej Sprušanský, PhD., PharmDr. Katarína Hadová, PhD., PharmDr. Csaba Horváth, PhD., PharmDr. Nikola Chomaničová, PhD.

Last change: 31.03.2025

Approved by: Mgr. Ondrej Sprušanský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KChTL/06-Mgr-A/24	Course title: General and Inorganic Chemistry
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 2 per level/semester: 28 / 28 Form of the course: on-site learning	
Number of credits: 9	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Seminars: The student is required to complete all seminars during semester. During the course each student must write 3 interim tests (max 20 points each). The exam admission requires to reach more than 60% of the total maximum point score from all tests. Laboratory exercises: During the semester, the student is required to complete all laboratory exercises. According to the study programme he/she must write one test from the laboratory techniques (0-40 points) and independently perform one synthetic work (0-10 points). The exam admission requires to reach more than 60% of the total maximum point score from the laboratory exercises. The points reached within the seminars and laboratory work are multiplied by the factor of 0,3 and their value is 30% of the exam grade in case of a successful completion of the exam. The coefficient obtained from the seminars applies solely to the academic year in which it was obtained. Exam: The participation in the exam is conditioned by the full completion of the seminars and laboratory exercises programme and by the acquisition of more than 60% of the total maximum point score from the seminars and more than 60% of the total maximum point score from the laboratory exercises. In case of an in-person exam, the whole exam is taken in writing. In case of an on-line exam, the exam consists of the written part and of the oral part. To pass the in-person exam successfully, the student must reach more than 60 % of the maximum point score in the General Chemistry part and more than 60 % of the maximum point score in the Inorganic Chemistry part. To pass the on-line exam successfully, the student must reach more than 60 % of the maximum point score in the written exam part and more than 60 % of the maximum point the General Chemistry oral exam part and more than 60 % of the maximum point score in the Inorganic Chemistry oral exam part. The mean final percentage obtained from all exam parts is then multiplied by the factor of 0,7. The final exam grade is composed from the part obtained for seminars (30%) and from the part obtained for laboratory exercises and the examination test (70%). Grading scale of the overall result of the exam (after considering the outcome of the interim control): A: 90,01 % – 100,00 %; B: 82,01 % – 90,00 %; C: 74,01 % – 82,00 %; D: 66,01 % – 74,00 %; E: 60,01 % – 66,00 %; Fx: ≤ 60,00 %.	

Scale of assessment (preliminary/final): 30/70

Learning outcomes:

The aim of the course is to acquire the basic knowledge of general and inorganic chemistry. In the context of teaching the course will give students basic laboratory skills and carry out the synthesis of selected types of inorganic compounds. The gained knowledge and skills are necessary for the completion of the other chemical courses, such as Organic Chemistry 1, 2 and are also needed for the pharmaceutically oriented courses, e.g. Pharmaceutical Chemistry.

Class syllabus:

The course of General and Inorganic Chemistry is the first principal subject in the complex chemical preparation of students of pharmacy. The first part – general chemistry – includes topics such needed as the theoretical base of the follow up courses of chemical, pharmaceutical, biological and medical orientation. Great attention is paid to the issue of the chemical bond and the structure of substances, in particular to their relevance in explaining the characteristics of pharmaceutical compounds, including their pharmacotherapeutic effects. In the second part of the course – systematic inorganic chemistry – the chemistry of elements and their compounds is presented according to their rational division into the groups of the periodic system of elements. Alongside with the interpretation of the nature of the chemical reactivity of elements and their compounds, emphasis is laid on their use in pharmacy and medicine on the basis of their function, place and importance in biological systems. Needed attention shall be paid to the environmental education. The course is comprehensively designed, focusing on Master Degree accredited study programme of Pharmacy. Further pharmaceutically significant knowledge from the systematic inorganic chemistry is supplemented in the course of Selected Chapters in Inorganic Chemistry. Teaching includes self-study of educational videos, assigned problems and independent student work.

Recommended literature:

1. C. E. Housecroft, A. G. Sharpe: Inorganic Chemistry, 4th Edition, Pearson Publ. 2012.
2. J. C. Kotz, P. M. Treichel, J. R. Townsend: Chemistry & Chemical Reactivity, 7th Edition, Brooks/Cole 2010.
3. K. A. Strohfeldt: Essentials of Inorganic Chemistry for Students of Pharmacy, Pharmaceutical Sciences and Medicinal Chemistry, Wiley 2015
4. L. Habala, L. Lintnerová, N. Miklášová, M, Kohútová: Chemical calculations and introduction to laboratory work in general and inorganic chemistry, Univerzita Komenského v Bratislave, 2024

Languages necessary to complete the course:

English language

Notes:

The course is held only in winter semester.

Past grade distribution

Total number of evaluated students: 25

A	ABS	B	C	D	E	FX
12,0	0,0	24,0	32,0	20,0	0,0	12,0

Lecturers: doc. Ing. Martin Pisárčik, CSc., Ing. Ladislav Habala, Dr.rer.nat, Mgr. Lucia Lintnerová, PhD.

Last change: 10.04.2025

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/31-Mgr-A/25	Course title: Genetics and pharmacogenomics
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 4	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Preliminary assessment: students will submit a pharmacogenetic testing protocol with an interpretation of the result at the last exercise, which will be assessed as "pass" / "fail". The assessment "pass" is a mandatory requirement for participation in the final exam. The final assessment has 2 parts: a written exam assesses the acquired knowledge (makes up 50% of the total assessment) and an oral exam assesses the acquired skills in interpreting pharmacogenetic testing on patient case reports (makes up 50% of the total assessment). The minimum passing score for each part of the exam individually is at least 60%. The overall assessment is the average of both parts of the exam with the final grade according to the scale: A: 100% - 92%; B: 91.9% - 84%; C: 83.9% - 76%; D: 75.9% - 68%; E: 67.8% - 60%; Fx: 59.9% and less.	
Learning outcomes: The main objective of the course is to provide students with comprehensive knowledge of genetic factors influencing pharmacotherapy and their use in personalized medicine. The course covers the basic principles of molecular and population genetics, heredity and genetic variability, as well as their impact on pharmacokinetics, pharmacodynamics and adverse effects of drugs. Students will become familiar with pharmacogenetic testing methods, interpretation of results and their implementation in clinical practice. Emphasis is placed on the role of pharmacists in optimizing pharmacotherapy, ethical and legal aspects of pharmacogenetics and communication of genetic information with patients and healthcare professionals. The course also addresses advanced gene and nucleotide therapies, including CRISPR, siRNA and antisense oligonucleotide drugs (ASO) and mRNA drugs/vaccines, and future perspectives of pharmacogenetics.	
Class syllabus: By completing the course, students will gain knowledge in the following areas: <ul style="list-style-type: none"> - Fundamentals of genetics and population genetics – Gene, genome, alleles, mutations, polymorphisms. Heredity and genetic variability in populations. - Principles of pharmacogenetics (PGx) – Genotype-phenotype relationship, pharmacogenetic polymorphisms, impact on drug efficacy and safety. - Pharmacogenetic testing/Genotyping – Types of genetic tests – targeted genotyping and gene sequencing, DNA isolation, sample quality, bioinformatic analysis. 	

- Phenotyping – Genotype versus phenotype, metabolic phenotypes, phenotyping methods, factors influencing phenotype.
 - Pharmacogenetics of biotransformation/metabolic enzymes (CYP450, TPMT, NUDT15, DPYD, UGT1A1, NAT2), transporters (SLCO1B1, ABCB1, ABCG2) and other pharmacogenes (VKORC1)
 - Pharmacogenetics and adverse drug reactions – Risk genes (HLA), prediction and prevention of adverse reactions.
 - „Actionable“ drugs with pharmacogenetic recommendations – PGx in cardiology, psychiatry, neurology, oncology, immunology and other fields
 - Implementation of pharmacogenetics – Clinical guidelines (PharmGKB, CPIC, DPWG, FDA, EMA), personalized pharmacotherapy.
 - Ethics and communication – GDPR, informed consent, how to interpret and communicate sensitive PGx results.
 - Pharmacogenetics in personalized medicine – The role of pharmacists, pre-emptive vs. reactive testing, PGx panels, genetic scores.
 - Advanced therapies & the future of PGx – Gene therapy, CRISPR, siRNA/ASO drugs, PGx in e-health, use of artificial intelligence and multi-omics.
- Students will acquire the following skills during practical exercises:
- Sample collection and DNA isolation
 - DNA quantification by microspectrophotometry and quality assessment by electrophoresis
 - Targeted genotyping by qPCR
 - Interpretation of PGx testing results on patient case reports, including training in communicating sensitive information

Recommended literature:

Books:

- Pharmacogenomics in Precision Medicine : From a Perspective of Ethnic Differences, edited by Weimin Cai, et al., Springer, 2020. ProQuest Ebook Central, <https://ebookcentral.proquest.com/lib/uniba-ebooks/detail.action?docID=6227123>.
- Pharmacogenomics: A Primer for Clinicians, edited by Jerika T. Lam, et al., The McGraw-Hill, 2021. <https://accesspharmacy.mhmedical.com/content.aspx?bookid=3020§ionid=254122611>.
- Pharmacogenomics: An Introduction and Clinical Perspective, edited by Joseph S. Bertino, Jr, et al., The McGraw-Hill, 2013. <https://accesspharmacy.mhmedical.com/content.aspx?bookid=511§ionid=40849364>.

Websites and databases:

- Pharmacogenomics Knowledge Base (PharmGKB), Stanford USA, 2025, <https://www.pharmgkb.org/>
- Pharmacogene Variation Consortium (PharmVar), Kansas City, USA, 2025, <https://www.pharmvar.org/>
- Clinical Pharmacogenetics Implementation Consortium (CPIC), Stanford, USA, 2025, <https://cpicpgx.org/>
- Dutch Pharmacogenetics Working Group (DPWG), The Royal Dutch Pharmacists Association (Koninklijke Nederlandse Maatschappij ter bevordering der Pharmacie (KNMP)), Hague, Netherlands, 2023, <https://www.knmp.nl/dossiers/farmacogenetica/pharmacogenetics>

Languages necessary to complete the course:

English

Notes:

Past grade distribution						
Total number of evaluated students: 0						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: Mgr. Ondrej Sprušanský, PhD., Mgr. Lenka Bies Piváčková, PhD., PharmDr. Natália Stollárová, PhD., PharmDr. Gabriel Dóka, PhD., PharmDr. Zuzana Kiliánová, PhD., Mgr. Natália Krajčírová						
Last change: 31.03.2025						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KGF/17-Mgr-A/22	Course title: Good Manufacturing Drugs Practice
Educational activities: Type of activities: practicals Number of hours: per week: 1 per level/semester: 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Attendance of lectures and practical exercises is obligatory. Methods and options for compensating absences will be defined in the course syllabus. The course is completed when at least 60% is achieved in the final written exam. Assessment: A: 93.00 –100.00%, B: 85.00–92.99%, C: 77.00–84.99%, D: 69.00–76.99%, E: 60.00–68.99%, FX: less than 60.00 %	
Learning outcomes: Študent získava absolvovaním predmetu základný prehľad o výrobných procesoch vo farmaceutickom priemysle a ich optimalizácii, o manažmente kvality – od formulácie liekových foriem až po finálne farmaceutické produkty určené pre terapeutickú prax. Získané poznatky obohacuje exkurzia do farmaceutickej výroby, eventuálne aj tematicky zameraná seminárna práca študenta. Nadobudnuté znalosti v tejto oblasti umožnia študentom pochopiť dôležitosť správnych praxí v oblasti farmácie pre prípravu a výrobu účinných, bezpečných a kvalitných liekov.	
Class syllabus: <ul style="list-style-type: none"> • Drug manufacturing, its development, future, and place in the medical care system. • Research and development of drugs and medicines, transfer to production, and key aspects of pharmaceutical technology. Principles of Quality by Design, pre-formulation, formulation, optimization of the production process, and quality assurance during the product's life cycle. • Pharmaceutical legislation, registration processes, and structure of registration documentation. • Pharmaceutical quality assurance, principles of ensuring Good Manufacturing Practice (GMP) and other practices, redundancy systems, the role of QA and QC, and the status of qualified persons. • Pharmaceutical production - principles, organization, primary and secondary pharmaceutical production, regulation of production processes, documentation, production equipment and technical backup, sanitation and disinfection, and validation. • Pharmaceutical quality control, PAT, and RTRT systems. Risk management. Importance of inspection. 	
Recommended literature:	

Aulton, M. E.: Aulton's Pharmaceutics: the design and manufacture of medicines. Edinburgh: Churchill Livingstone, 2007
 European Pharmacopoeia, current edition, Strasbourg: EDQM.
 Eudralex – Volume 4, European Commission. Available online: https://ec.europa.eu/health/documents/eudralex/vol-4_en
 European Medicines Agency. Good manufacturing practice (GMP). Available online: <https://www.ema.europa.eu/en/human-regulatory/research-development/compliance/good-manufacturing-practice>.

Languages necessary to complete the course:

English

Notes:

The course is only available: if at least 4 students are registered. Due to the participation of students on the excursion in a manufacturing company, the capacity of the course is limited to 8 students.

Past grade distribution

Total number of evaluated students: 14

A	ABS	B	C	D	E	FX
42,86	0,0	0,0	35,71	0,0	0,0	21,43

Lecturers: PharmDr. Milica Molitorisová, PhD., PharmDr. Desana Matušová, PhD., PharmDr. Jarmila Prieložná, PharmDr. Miroslava Potůčková, PhD., Ing. Silvia Molnárová, Mgr. Daniel Krchňák, DiS

Last change: 05.09.2024

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/22-Mgr-A/22	Course title: Health Psychology
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Completion of lectures and seminars. The exam performed by the written test with a minimum success rate of 60%. The assessment: A = 100-93%, B = 92-85%, C = 84-77%, D = 76 -69%, E = 68-60%, FX = less than 60%. Scale of assessment (preliminary/final): 0 / 100	
Learning outcomes: After finishing the course student will gain basic overview in the following topics: social psychology, psychology of patients, psychology of diseases and psychology of healthcare professional, information on basic types of personalities, assertive behaviour, abilities to handle conflict situations, stress, how to communicate correctly and use the verbal and nonverbal communication, how to get ready for public presentation, how to communicate with patients, colleagues, other healthcare professionals, representatives of pharmaceutical industry, insurance companies and/or media. Students through various tests can find out information on themselves (what kind of personalities they are, what should they focus on while solving of stress and conflict situations, and how they can improve their communication abilities).	
Class syllabus: <ul style="list-style-type: none"> - Introduction to Health Psychology. - Psychology in disease. Relationship patient – healthcare professional in psychology. - Personality, forming of personality and its position in social group. - Social interaction and communication. - Verbal communication in the work of pharmacists. - Non-verbal communication in the work of pharmacists. - Optimal communication in the work of pharmacists. - Conflict in community pharmacy and its resolution in team of co-workers. - Stress situations in community pharmacy. - Cooperation within a team of co-workers in healthcare, leadership. - Public presentation, job interview and presentation of self 	

Recommended literature:

1. Hungman, B.: Healthcare Communication, London, Pharmaceutical Press, 2009, 304 p.
2. Veatch, R.M., Haddad, A.: Case studies in pharmacy ethics, Oxford, Univesity Press, 2008, 331 p.
3. Bissel, P., Traulsen, J.M.: Sociology and pharmacy practice, London, Pharmaceutical Press, 2005, 226 p.
4. Wingfield, J., Badcott, D.: Pharmacy ethics and decision making, London, Pharmaceutical Press, 2007, 313 p.
5. Appelbe, G.E., Wingfield, J.: Dale and Appelbe s Pharmacy Law and Ethics, London, Pharmaceutical Press, 2005, 593 p.
6. Harman, R.J.: Patient Care in Community Practice, London, Pharmaceutical Press, 2002, 203 p.
7. Harman, R.J.: Handbook of Pharmacy Health Education, second edition, London, Pharmaceutical Press, 2001, 299 p.

Languages necessary to complete the course:

English language.

Notes:

Maximum capacity 20 students.

Past grade distribution

Total number of evaluated students: 74

A	ABS	B	C	D	E	FX
56,76	0,0	18,92	16,22	2,7	5,41	0,0

Lecturers: PharmDr. Ľubica Lehocká, PhD., doc. PharmDr. Daniela Mináriková, PhD.

Last change: 20.09.2024

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/28-Mgr-A/22	Course title: Health Technology Assessment
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Student #s assessment includes a written test. The minimum success limit is 65 %. The final assessment of the exam is: A = 100 – 85 %, B = 84 – 79 %, C = 78 – 73 %, D = 72 – 66 %, E = 65 – 60 %, FX = less than 59 %.	
Learning outcomes: By completing the study course, the student acquires basic knowledge in the field of the health technology assessment with an emphasis on the evaluation of drugs for the categorization process within the public health insurance system. Health technology assessment is an interdisciplinary process, that summarizes information on health, social, economic and ethical issues related to the use of health technology. For the purposes of Directive 2011/24 /EU, the term „Health technology“ means a medicinal product, medical device or medical and surgical procedures, as well as disease prevention, diagnosis or treatment measures used in healthcare. As part of the course, students will participate in solving case studies from real practice.	
Class syllabus: <ul style="list-style-type: none"> - History of health technology assessment. - The importance of health technology assessment. - Health technology assessment as a strategic tool for decision-making in the health care system. - Directive 2011/24/EU and health technology assessment. - EUnetHTA Project - Procedure of health technology assessment. The HTA Core Model is a methodological framework for production and sharing of HTA information. (The first part characterizes the health problem and the currently used technology, so it contains epidemiological and basic information about the currently available medical intervention to address this medical problem. The second area concerns the description and technical characteristics of the evaluated medical intervention. The third part deals with its clinical effectiveness. The fourth part focuses on the safety of the evaluated medical intervention. The fifth part focuses on financial costs and economic evaluation. Part six contains the ethical aspects of the evaluated medical intervention. Organizational aspects depending on the individual health care systems are part of part seven. Part eight analyzes the social aspects related to putting new	

technology into practice. The last part deals with legal analysis related to new technology in the context of the requirements of applicable legislation).

- Knowledge transfer in the context of HTA.
- Current use of health technology assessment in European countries.
- European cooperation in health technology assessment

Recommended literature:

1. Garrido, M.V., Kristensen, F. B., Nielsen, C. P., Busse , R.: Health Technology Assessment and Health Policy-Making in Europe. European Observatory on Health Systems and Policies, WHO, 2008, UK, ISBN 978 92 890 4293 2, 181 p.
2. Németh, B., Goettsch, W., Kristensen, F.B., Piniashko, O., Huić, M., Tesař, T., Atanasijevic, D., Lipska, I., Kaló, Z.: The transferability of health technology assessment: the European perspective with focus on central and Eastern European countries, Expert Review of Pharmacoeconomics & Outcomes Research. Published Online. 2020 Jun. Available from: <https://doi.org/10.1080/14737167.2020.1779061>
3. Berger, M. L. et al. Health Care Cost, Quality, and Outcomes.2003. International Society for Pharmacoeconomics and Outcomes Research. 2003, 264p. ISBN 0-9743289-0-1.

Languages necessary to complete the course:

English language.

Notes:

Past grade distribution

Total number of evaluated students: 15

A	ABS	B	C	D	E	FX
86,67	0,0	13,33	0,0	0,0	0,0	0,0

Lecturers: prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Zuzana Koblišková, PhD.

Last change: 01.04.2022

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/24-Mgr-A/22	Course title: History of Pharmacy
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: The evaluation of students takes place in the form of a written exam (70% of the final evaluation) and mandatory is elaboration of a seminar paper in the form of an essay as well (30% of the final evaluation). Minimum success rate: 60%. Rating: A: 100-92%, B: 91-85%, C: 84-78%, D: 77-70%, E: 69-60%, FX: 59% and less. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The theory of pharmacy, its basic concepts and categories, patterns of development, developmental periods from medicine, through differentiation and the emergence of pharmacy as an independent scientific field are interpreted. Special attention is paid to the development of pharmaceutical sciences, research, production, control, supply, pharmacy, education, pharmaceutical historiography and museology. In clarifying these components of pharmacy, emphasis is placed on the interdisciplinary nature of the pharmaceutical sciences and the dynamism of their development in the context of the natural medical and social sciences. The role of personalities in the development of pharmaceutical sciences is illustrated. Prognostic aspects are outlined from the development results.	
Class syllabus: 1. History of pharmacy as a scientific field, basic terminology. 2. Periodization of the history of pharmacy. 3. Prehistoric medicine. 4. Medicine in ancient cultures. 5. Separation of pharmaceutical function from medicine. 6. Pharmacy as a relatively separate field. Pre-classical and classical pharmacy. 7. Differentiation of pharmacy – development of pharmaceutical sciences. 8. Differentiation of pharmacy – development of pharmaceutical branches (industry, wholesale distribution, pharmacy, education, research, control). 9. Pharmaceutical associations and organizations - development with a focus on the territory of Slovakia. 10. History of drugs and medicines.	

Recommended literature:

Zebroski Bob: A Brief History of Pharmacy. Hummanity's Search for Wellness. Publisher: Routledge, 2015, 260 pages.
Bell Jacob: Historical Sketch of the Progress of Pharmacy in Great Britain. Cambridge Library Collection. 2014, 424 pages.
Amstrong Anthony C., Cartwright N. Anthony: History of Medicine We Take. Pen and Sword Books Ltd. 2020, 272 pages.
Higby Gregory, Stroud Elaine C.: The History of Pharmacy A Selected Annotated Bibliography. Routledge. 218, 338 pages.

Languages necessary to complete the course:

English language

Notes:**Past grade distribution**

Total number of evaluated students: 3

A	ABS	B	C	D	E	FX
66,67	0,0	0,0	33,33	0,0	0,0	0,0

Lecturers: prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Lucia Masaryková, PhD., Ing. Mgr. Ingrid Slezáková, MHA, MPH

Last change: 01.04.2022

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/32-Mgr-A/21	Course title: Hospital Pharmacy
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Students are evaluated in writing during the semester, the minimum success rate is 60%. Rating: A: 93-100%, B: 85-92%. C: 77-84%, D: 69-76%, E: 60-68%, Fx: less than 60%. The final evaluation of students takes place in the form of an oral exam. The oral exam is evaluated according to the knowledge demonstrated by the student in the range according to the scale of continuous assessment. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: By completing the study course, the student acquires a general overview of the field of hospital pharmacy, which in a theoretical and practical position deals with the issue of providing pharmaceutical care to patients in medical facilities.	
Class syllabus: <ul style="list-style-type: none"> - The position of the pharmacist in the health care system. - Teaching is provided in hospital pharmacies (in the form of exercises). - Demonstration and acquisition of practical skills in the preparation and dispensation of drugs to inpatients. - Emphasis on the practical assumption of responsibility for the prepared and dispensed drug to outpatients and inpatients. - Demonstration of drug effects and drug side effects. - Preparation and dispensing of drugs in cooperation with a specialist. - Progressive forms of drug distribution in the clinical environment. - Practical use of the hospital drug formulary. - Work with a patients medication cards in hospital wards. - Participation in patient management – medication practice. 	
Recommended literature: 1. Bissel, P., Traulsen, J.M.: Sociology and pharmacy practice, London, Pharmaceutical Press, 2005, 226 p.	

2. Sexton, J., Nickless G., Green, Ch.: Pharmaceutical Care Made Easy, London, Pharmaceutical Press, 2006, 178 p.
3. Edwards, C., Stillman, P.: Minor Illness or Major Disease? The clinical pharmacist in the community. Fourth edition, London, Pharmaceutical Press, 2006, 285 p.
4. Stephens, M.: Hospital Pharmacy, London, Pharmaceutical Press, 2006, 285 p.
5. Harman, R.J.: Handbook of Pharmacy Health Education, second edition, London, Pharmaceutical Press, 2001, 299 p.
6. European Pharmacopoeia – Ph. Eur. 10th Edition

Languages necessary to complete the course:

English language.

Notes:

The course is obligatory elective and it is taught only in the 8th semester of study.

Past grade distribution

Total number of evaluated students: 30

A	ABS	B	C	D	E	FX
83,33	0,0	0,0	13,33	0,0	3,33	0,0

Lecturers: prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Ľubica Lehocká, PhD.

Last change: 19.01.2023

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/07-Mgr-A/22	Course title: Hygiene of Pharmaceutical Facilities
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites:	
Course requirements: During the semester there will be one written test with the number of points 20, to obtain the final rating A it is necessary to obtain at least 18.5 points, to obtain the rating B at least 17 points, to obtain rating C at least 15 points, to obtain rating D at least 13.5 points and evaluation E at least 12 points. Credits will not be awarded to students who obtain less than 12 points from any written examination. To obtain credit, it is necessary to provide a final exam in writing with a minimum success rate of 60%.	
Learning outcomes: The subject focuses mainly on the explanation of the facts that are most important for the pharmacist. The rules used for compliance with hygiene air, water and waste in environment will be the first information to topic. The aim of environmental health is to inform students about how to improve the health status of the population, how to create conditions in environment that will ensure, respectively contributed to the protection of human health, its healthy development, physical and mental well-being. Food hygiene and tools general use is a field which studies the process of nutrition and addresses how their ensure for the physiological needs of man. Nutrition can increase the overall fitness of the organism, however, if it is irrational, causes the emergence of the widespread outbreak of civilization diseases (obesity, diabetes, cardiovascular disease, tumours). Health risks associated with food are caused by foreign substances contained in food. Therefore, following to the basic rules of nutrition learn students the adverse effects of contaminants in food and their prevention against them. In terms of experts, pharmacist obtains in the last part of the subject the necessary knowledge and information about observing the rules of hygiene, of the pharmaceutical equipment, of the work in these facilities and the hygiene in the preparation of pharmaceuticals, which requires discipline, knowledge of the dangerous factors and basic knowledge of effective measures necessary to achieve the health security in terms of microbiological contamination of pharmaceutical equipment.	
Class syllabus: In the first part, the Hygiene of pharmaceutical equipment determines the basic elements of the components of the environment and their effects on human health - specifically, the position of hygiene and its role in health and the environment, air hygiene, water, waste. In the second part,	

students get acquainted with the basic rules of nutrition - specifically the hygiene of nutrition and food. The third part emphasizes the hygiene of work, pharmaceutical facilities, and hygiene rules in the preparation of drugs. The basic content of the hygiene of pharmaceutical equipment is based on the current state of individual departments concerning the hygiene of a particular environment and rules or methods used in practice - hygiene requirements in pharmacy, drug handling and drug control and evaluation of microbiological purity of pharmaceutical products from sterility requirements and non-sterility according to Ph. Eur.

Syllabus of lectures:

1. A basic glossary of terms. The position of hygiene in the health system. Tasks of hygienic service. Man and his environment.
2. Environmental epidemiology.
3. Hygiene of air-physical, chemical, and biological factor effect on humans. Air quality in the preparation of drugs.
4. Hygiene of water-physical, chemical, and biological factor effect on humans. Properties of water depending on its origin and use. Drinking water supply. Water in pharmaceutical facilities.
5. Soil, solid wastes, hazardous wastes. Waste - health risks for humans. Providing solid, liquid and special waste. Wastes from pharmaceutical manufacture.
6. Occupational hygiene and health in context with environmental health. Factors of the work environment that affect human performance. Work performance, ergonomics and relaxation.
7. Nutrition and health. Energy and nutrients. Nutritional needs and recommendations at different times of life.
8. Contamination of food. Poisoning and infections associated with nutrition. Hygiene of food preparation.
9. Hygiene of pharmaceutical equipment, requirements for construction and operation. Sanitary hygiene. Environmental contamination of the pharmacy and hygienic regime. Personal hygiene of workers in the pharmaceutical facility.
10. Microbiological quality of pharmaceutical preparations. Hygiene of drug preparation. Hygiene measures from the point of view of the good manufacturing practice.
11. Products are required to be sterile. Requirements of the European Pharmacopoeia.
12. Products does not require to comply with the test for sterility. Requirements of the European Pharmacopoeia.
13. The impact of the environment on the human immune system.

Laboratory practices:

- 1) The air in the galenical laboratory. Air quality in the preparation of drugs.
- 2) Water Aqua purificata (Purified water). Water quality requirements for drug preparation.
- 3) Validation of the hygienic regime. Validation of disinfectants.
- 4) Microbiological quality of drugs. Requirements for the microbiological purity of pharmaceutical products.
- 5) Products are required to be sterile preparations according to Ph.Eu.
- 6) Products are not required with the test for sterility according to Ph.Eu.

Recommended literature:

Ághová Ľ. and co.: Hygiene (Environmental medicine), Comenius University, Bratislava 1997 textbook, pp.200

European Pharmacopoeia – actual version, selected chapters

Bencko V. et al.: Hygiene and epidemiology (selected chapters), Prague: The Karolinum Press, 2007, pp. 270

Riddley R. John and Channing John: Occupational Health and Hygiene, Butterworth-Heinemann Ltd., Oxford, UK, 1999, pp. 241

Languages necessary to complete the course:

English language.

Notes:

The course is provided only in the winter semester and the capacity of the course is limited to 20 students, in the extraordinary cases of higher interest students will be selected to a maximal number of 25.

Past grade distribution

Total number of evaluated students: 72

A	ABS	B	C	D	E	FX
56,94	0,0	16,67	9,72	8,33	4,17	4,17

Lecturers: doc. Mgr. Martina Hrčka Dubníčková, PhD., doc. Mgr. Andrea Bilková, PhD., Mgr. Eva Drobná, PhD., PharmDr. Hana Kiňová Sepová, PhD., PharmDr. Gabriela Greifová, PhD., Mgr. Jana Hricovíniová, PhD.

Last change: 10.04.2025

Approved by: doc. Mgr. Martina Hrčka Dubníčková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/24-Mgr-A/22	Course title: Immunodiagnostics
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: The student may have excused max. 2 practical classes, that will be individually examined. The student must submit correctly prepared and evaluated protocols and assigned tasks from all completed practical classes. There will be one written test during the semester; to pass, at least 60 % points must be obtained. The final exam is in written form and for successful completion it is necessary to obtain at least a rating of 60 % points.	
Learning outcomes: Students will become familiar with methods and principles of human immune profile diagnosis, factors of cellular and humoral immunity, as well as serological, immunochemical, and molecular biology techniques used to evaluate the parameters of the immune system and their use in the diagnosis of diseases. At the same time, the student will gain knowledge about the isolation and processing of samples from the patient (e.g., serum, plasma, or various types of blood cells), as well as how to use them for immunodiagnostic purposes.	
Class syllabus: The subject of Immunodiagnostics builds on the knowledge of basic and clinical immunology. It deals with the human immune profile, the state of cellular and humoral immunity and the immunochemical and molecular biology techniques used to evaluate it. It deals in detail with the latest types of vaccines (DNA, mRNA, vectors, VLPs, etc.), preparation of monoclonal antibodies and immunodiagnostic preparations, including rapid tests available in pharmacies. A separate part is devoted to up to date immunoanalytical techniques used for detection of antigens and antibodies, without which current diagnosis of diseases is not possible.	
Recommended literature: Shawkatová I. and co-aut.: Laboratory methods in immunology, Comenius University, Bratislava, 2014. Buc M., Javor J.: Basic and clinical immunology for dentistry student, Comenius University, Bratislava, 2017. Buc M.: Basic and clinical immunology, Comenius University, Bratislava, 2020.	
Languages necessary to complete the course:	

English language.						
Notes:						
Past grade distribution						
Total number of evaluated students: 5						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	100,0	0,0	0,0	0,0
Lecturers: doc. Mgr. Andrea Bilková, PhD., PharmDr. Hana Kiňová Sepová, PhD., Mgr. Eva Drobná, PhD., PharmDr. Gabriela Greifová, PhD., doc. Mgr. Martina Hrčka Dubníčková, PhD., Mgr. Jana Hricovíniová, PhD.						
Last change: 28.04.2025						
Approved by: PharmDr. Hana Kiňová Sepová, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/23-Mgr-A/22	Course title: Immunology
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 5	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites:	
Course requirements: There will be 2 written tests during the semester; to pass, at least 60 % points must be obtained from each of them. Student has to write a report on each laboratory practice with the correct evaluation of obtained results. Maximum 2 laboratory practices may be apologised, and the student will be examined of the missed lesson. The final exam will be in written form and for its successful passing it is necessary to obtain at least 60 % of points.	
Learning outcomes: Student will gain knowledge about the mechanisms and functions of the immune system and its main significance for human life. He/She will understand that drugs applied to the body act through cellular and humoral immune mechanisms, and these are essential in the prevention and treatment of all diseases.	
Class syllabus: The subject Immunology deals with the knowledge of basic and clinical immunology. The student is familiarized with the composition and function of the human immune system, mechanisms of cell and humoral immunity, as well as the preventive, therapeutic and practical use of immunology in medicine and in pharmaceutical practice. In basic immunology, the subject deals with inflammation, fever, structure, and function of complement, cytokines, antigens, and antibodies. Emphasis is placed on the preparation and use of monoclonal antibodies in pharmacy and medicine, without which modern diagnosis and therapy of diseases would not be possible. The clinical part of immunology lectures is focused on anti-infective, anti-tumour and transplant immunity and deals also with immunopathological diseases as well as the role of immunomodulators in the prevention and therapy of some diseases. Finally, it focuses also on the production, application, and the use of vaccines and preparations for passive immunization.	
Recommended literature: Buc, M: Basic and Clinical Immunology, Comenius University, Bratislava, 2020. Shawkatová, I. et al.: Laboratory methods in immunology, Comenius University, Bratislava, 2014. Buc. M.: Basic and Clinical Immunology, Comenius University, Bratislava, 2008.	

Languages necessary to complete the course: English language.						
Notes:						
Past grade distribution Total number of evaluated students: 48						
A	ABS	B	C	D	E	FX
6,25	0,0	2,08	25,0	16,67	35,42	14,58
Lecturers: PharmDr. Hana Kiňová Sepová, PhD., doc. Mgr. Andrea Bilková, PhD., doc. Mgr. Martina Hrčka Dubničková, PhD., Mgr. Jana Hricovíniová, PhD.						
Last change: 10.04.2025						
Approved by: doc. Mgr. Andrea Bilková, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KGF/16-Mgr-A/22	Course title: Innovative Dosage Forms and Biological Medicines
Educational activities: Type of activities: practicals / lecture Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites: FaF.KGF/05-Mgr-A/22 - Pharmaceutical Technology (1)	
Course requirements: Attendance of the lectures and practical exercises is obligatory. Methods and options for compensating absences will be defined in the course syllabus. The course is completed when at least 60% is achieved in the final written exam. Assessment: A: 93.00–100.00%, B: 85.00–92.99%, C: 77.00–84.99%, D: 69.00–76.99%, E: 60.00–68.99%, FX: less than 60.00%.	
Learning outcomes: Knowledge acquired by passing this course interlocks with previously acquired basic knowledge about conventional dosage forms and provide further detailed information about new trends in formulation and new applications of dosage forms. The aim is to enhance the student's knowledge in the field of innovative dosage forms and biological medicines.	
Class syllabus: Lectures: Drug delivery systems and dosage forms for targeting. New excipients for new-generation drug formulations. Drug carriers: polymeric carriers, drug-carrier complexes, nanoparticles, nanofibres, and microspheres. Lipid carriers: NLC, SLN, and liposomes: formulation, drug incorporation, liposomal dosage forms and their perspectives. Micro- and nanoemulsions, self-emulsifying systems, multiple and dry emulsions, micro- and nanosuspensions, formulation, and applications. New trends in dermal and transdermal applications of drugs. Innovative solid and semi-solid dosage forms. Biological medicines (BM), biosimilars, dosage forms, Fill/Finish operations, and excipients in the production of BM. Formulation, stability, and methods of evaluation of BM. BM in hormonal therapy – insulin dosage forms, possibilities in controlled liberation. Application devices. Growth hormones – use, side-effects. Enzyme therapy - lactase, pancreatase, serapeptase etc. Transfusion preparations and their quality. Plasma processing. Blood products. Medicines prepared or isolated from plasma. Thrombin inhibitors. Erythropoietins, granulocytes, colony-stimulating factors. Combination Products – wearable pumps, autoinjectors pre-filled syringes. BM in oncology - interleukins, interferons, monoclonal antibodies, antibody fragments, hematopoietic growth factors. Vaccines and BM for immune system response modulation. Allergen immunotherapy.	

DNA formulations for gene therapy. Other applications of BM – dermatology, rheumatology, gastroenterology, sclerosis multiplex, macular degeneration, etc.
Practical exercises: Formulation of new dosage forms: nanodispersion drug carriers, microemulsions, nanoemulsions, and their comparison with conventional dosage forms (emulsions). Study of the influence of different excipients on the drug formulation and the physico-chemical properties. In vitro drug release assay from the prepared formulations.

Recommended literature:

Aulton, M. E.: Aulton's Pharmaceutics: the design and manufacture of medicines. Edinburgh: Churchill Livingstone,
European Pharmacopoeia current edition. Strasbourg: EDQM.
<https://uniba.sk/en/about/faculties-and-units/comenius-university-academic-library/external-electronic-information-resources/>
Currently available literature is listed in lectures or practical exercises with relevant themes.

Languages necessary to complete the course:

English

Notes:

The course is only available: in the summer term, if at least 5 students are registered, the capacity is limited to 20 students.

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: PharmDr. Veronika Šimunková, PhD., PharmDr. Veronika Mikušová, PhD., PharmDr. ThLic. Mária Raučinová, PhD., PharmDr. Miroslava Špaglová, PhD., PharmDr. Desana Matušová, PhD., Ing. Michael Kenneth Lawson, PhD., Mgr. Daniel Krchňák, DiS

Last change: 16.08.2024

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/23-Mgr-A/20	Course title: Innovative Medicines in Pharmacotherapy
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Phartmacology (1), Social Pharmacy and Pharmacoeconomics	
Course requirements: Mandatory 80% attendance at lectures and seminar work, in particular cases a written test. Scale of assessment (preliminary/final): Ongoing 0 / final 100	
Learning outcomes: By completing the course, the student will gain knowledge about the advances in pharmacotherapy achieved in recent decades, the milestones in the treatment of major diseases and the importance of investment in science and research. At the same time, by completing the course, the student gets familiar with examples of innovative medical procedures in selected medical disciplines in the world and in Slovakia, as well as with obstacles or solutions that appear in practice when using new procedures.	
Class syllabus: - Characteristics of the concept and meaning of innovations in medicine (focus on pharmacotherapy) - Research and development of new medicines with a focus on practical demonstrations of what innovation brings to patients, physicians and society - The importance of the availability of innovation (Market Access and current trends seeking a compromise between availability and the rising costs of securing innovation entry) - Information on the growing role of the patient in decision-making processes, which also influences the direction of future investments in innovation - Practical examples of innovations in selected medical disciplines (1. Oncology 2. Hematooncology 3. Rheumatology and Dermatology 4. Cardiology 5. Vaccines 6. Hepatology 7. Neurology)	
Recommended literature: www.efpia.eu/topics/innovation , Laws 362/2011 and 363/2011 as amended, www.ema.europa.eu , www.nice.org.uk , www.sukl.sk	
Languages necessary to complete the course: Slovak, English	
Notes:	

maximum number of students: 40, in case of higher interest - selection will be made based on: grade average (years 1-3), average from subjects Pharmacology and Social pharmacy and pharmacoeconomics, motivation letter, certificate (exam) proving knowledge of english language

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: prof. PharmDr. Ján Klimas, PhD., MPH

Last change: 01.12.2021

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/17-Mgr-A/22	Course title: Latin Medicinal Terminology
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: active participation on seminars, taking the final test with the overall grade at least 60%. Grading scale: 100 – 91% = A 90 – 81% = B 80 – 73% = C 72 – 66% = D 65 – 60% = E 59 – 0% = Fx Scale of assessment (preliminary/final): 0/100	
Learning outcomes: At the end of the course, students can understand the terminology correctly and use it in acquiring knowledge and practice within their field. Professional medical terminology includes mainly terms of the Latin and Greek origin used in medicine. Anatomical, pathological terms. Acquired information about specialized terms and their development helps students orient themselves to their field and understand their specialisation in the broader social and historical context, especially with increasing overall knowledge.	
Class syllabus: 1. Introduction to Latin Grammar 2. Basic Grammatical Terms 3. Syntactic Structure of Terms 4. Pronunciation of Latin Sounds 5. 1st Declension 6. 2nd Declension 7. Review of grammar 8. 3rd Latin Consonant Declension - Masculines and Feminines 9. 3rd Latin Consonant Declension - Neutres 10. 3rd Latin Vowel Declension 11. 3rd Greek Consonant Declension	

12. 3rd Greek Vowel Declension

13. Final overview of grammar

Recommended literature:

- VALLOVÁ, Eleonóra and Tomáš HAMAR. Latin Language for Pharmacy Students. Bratislava: Comenius University Bratislava, 2011. ISBN 978-80-223-2890-6.
- OZÁBALOVÁ, Ľudmila, VALLOVÁ, Eleonóra and Tomáš HAMAR. Trojjazyčný latinsko-anglicko-slovenský slovník pre študentov farmácie a medicíny. Bratislava: Univerzita Komenského, 2017. ISBN 978-80-223-4347-3.

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 73

A	ABS	B	C	D	E	FX
6,85	0,0	8,22	15,07	16,44	21,92	31,51

Lecturers: Mgr. Nicola Sipekiová, PhD.

Last change: 28.04.2023

Approved by: Mgr. Nicola Sipekiová, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/18-Mgr-A/19	Course title: Latin Pharmaceutical Terminology
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 2.	
Educational level: I.II.	
Prerequisites:	
Course requirements: active participation on seminars, final test with the overall grade at least 60%. Grading scale: 100 – 91% = A 90 – 81% = B 80 – 73% = C 72 – 66% = D 65 – 60% = E 59 – 0% = Fx Scale of assessment (preliminary/final): 0/100	
Learning outcomes: After successfully completing the course, the student is able to understand pharmaceutical terminology, and to use it correctly. Pharmaceutical terminology mainly includes terms from botany, pharmacognosy, chemistry, galenics and prescription. Acquired information on pharmaceutical terms helps students to better orient themselves in their chosen field, and to see the problematics of their specialization in a broader social and historical context, especially with the increase in the total amount of knowledge.	
Class syllabus: 1. Grammatical overview of lessons 1 – 6 2. 3rd Declension Adjectives 3. Comparison of Adjectives 4. Adverbs 5. 4th Declension 6. 5th Declension 7. Review of grammar 8. Numerals 9. Verbs 10. Latin Prefixes and Suffixes 11. Greek Prefixes and Suffixes	

12. Compound Words of Greek Origin
 13. Compound Words of Latin Origin and Hybrid Words

Recommended literature:

- VALLOVÁ, Eleonóra and Tomáš HAMAR. Latin Language for Pharmacy Students. Bratislava: Comenius University Bratislava, 2011. ISBN 978-80-223-2890-6.
- OZÁBALOVÁ, Ľudmila, VALLOVÁ, Eleonóra and Tomáš HAMAR. Trojjazyčný latinsko-anglicko-slovenský slovník pre študentov farmácie a medicíny. Bratislava: Univerzita Komenského, 2017. ISBN 978-80-223-4347-3.

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 82

A	ABS	B	C	D	E	FX
21,95	0,0	26,83	18,29	13,41	2,44	17,07

Lecturers: Mgr. Nicola Sipekiová, PhD.

Last change: 28.04.2023

Approved by: Mgr. Nicola Sipekiová, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/27-Mgr-A/22	Course title: Legal Rudiments for Pharmacists
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Course requirements: During the semester, two practical cases will be solved using uncommented legislation of 25 points each. Credits will not be awarded to a student who obtains less than 12 points from any written test. The minimum success limit for both written tests is 60 %. Evaluation scale: A: 92-100%, B: 83-91%, C: 76-82%, D: 68-75%, E: 60-67%, Fx: 59% and less.	
Learning outcomes: Student receive an overview and practical skills in those areas of law with which he will come into contact after graduation as an economically active person, especially in the field of liability law, civil, labor and administrative law.	
Class syllabus: <ul style="list-style-type: none"> - Introduction to legal disciplines - legal norms, principles, general concepts. - Basics of civil law - Act No. 40/1964 Coll. Civil code. - Civil, criminal, disciplinary and contractual liability for damage/injury. - Introduction to employment law. - Employment relationship - pre-contractual relations, commencement and termination of employment. - Rights and obligations of the contracting parties. - Job description and work discipline - Responsibility in labor law. - Decisions, applications - Administrative proceedings - administrative bodies, procedural parties, representation 	
Recommended literature: 1. Appelbe, G.E., Wingfield, J.: Dale and Appelbe s Pharmacy Law and Ethics, London, Pharmaceutical Press, 2005, 593 p. 2. Wingfield, J., Badcott, D.: Pharmacy ethics and decision making, London, Pharmaceutical Press, 2007, 313 p. 3. Veatch, R.M., Haddad, A.: Case studies in pharmacy ethics, Oxford, Univesity Press, 2008, 331 p.	

Languages necessary to complete the course: English language.						
Notes:						
Past grade distribution Total number of evaluated students: 3						
A	ABS	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: prof. PharmDr. Tomáš Tesař, PhD., MBA						
Last change: 19.01.2023						
Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/18-Mgr-A/22	Course title: Management Basics in Pharmacy
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 4.	
Educational level: I.II.	
Prerequisites:	
Course requirements: 1. Compulsory attendance at seminars. Absence from the seminar must be documented with the reason for absence and the seminar must be made up by agreement with the teacher. 2. Continuous test with no minimum pass mark. 3. Completion of the course is by written examination with a minimum pass mark of 60%. Grade: A = 100-95%, B = 94-85%, C = 84-75%, D = 74-65%, E = 64-60%, FX = 59% or less.	
Learning outcomes: By completing the course, the student acquires knowledge of the theory of management and marketing with a focus on the specifics of healthcare. The student knows the basic knowledge of general management, managerial functions (decision-making, planning, control, leadership) and management as a process in the field of healthcare. He gets an overview of strategic, personnel, financial and crisis management and quality management of health care, team leadership and motivation. The student also gains basic knowledge of marketing (market, segmentation, market position, customers, marketing mix - product, price, distribution, marketing communication) in the field of healthcare and pharmacy. The student can use theoretical knowledge in the form of practical discussion, solution of case studies and management games in seminars.	
Class syllabus: The course presents a selection of thematic specific areas from the extensive issues of management and marketing theory with a focus on the specifics of management and marketing in healthcare and pharmacy: <ul style="list-style-type: none"> - General theory of management, manager's thinking, and directions. - Management as a process. - Managerial functions - management, decision-making, planning, control, leadership. - Strategic management. - Financial management. - Organization, organizational structure - personnel management. - Management and quality control. - Team leadership and motivation. - Specifics of healthcare management and managers. 	

- Crisis management in healthcare.
- Specifics of management procedures in pharmacy - patient and medical facility management.
- Basics of marketing in pharmacy - market, segmentation, market position, customer, marketing mix (product, price, distribution, marketing communication). Advertising in pharmacy.
- Marketing of medicines and assortment in the pharmacy.
- Marketing of medical equipment - pharmacy.
- Marketing and management in a pharmaceutical company.

Recommended literature:

1. Desselle, S.P., Zgarrick, D.P., Alston, G.L. Pharmacy Management. 2000, third edition, American Society of Health-System Pharmacists, Med Graw Hill, Inc. 2010, 715p., ISBN 978-0-07-177431-4.
2. Kelly, W.N. Pharmacy. What it is and How it works. CRP Press, Taylor & Francis Group. LLC. 2012. 452p. ISBN 978-1-4398-5305-4.
3. Kotler, P. et al. Marketing management. Harlow: Pearson Education Limited, 2016. ISBN 978-1-292-09323-9.
4. Royal Pharmaceutical Society. Medicines, Ethics and Practice. The Professional guide for pharmaceuticals. Edition 39, July 2015, 202p.
5. Quin, S. Management Basic, 1st edition, 2010, 75p., ISBN 978-87-7681-717-6
6. Pownall, I., Effective Management Decision Making, 2012, 236p. ISBN 978-87-403-0120.

Languages necessary to complete the course:

English language.

Notes:

Maximum capacity 20 students.

Past grade distribution

Total number of evaluated students: 41

A	ABS	B	C	D	E	FX
19,51	0,0	24,39	26,83	17,07	12,2	0,0

Lecturers: doc. PharmDr. Daniela Mináriková, PhD., prof. PharmDr. Tomáš Tesař, PhD., MBA

Last change: 15.02.2024

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFChL/23-Mgr-A/25	Course title: Mathematic for Pharmacists
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: None	
Course requirements: During the semester, students write 10 to 12 written tests of 2.5 to 5 points each, and a written test of 100 points is written at the exam. The points from the midterm tests at the seminars and the actual test at the exam are added together. To obtain an A rating, it is necessary to obtain a total of 93 points or more, to obtain a B rating at least 85 points, to obtain a C rating at least 78 points, to obtain a D rating at least 70 points, and to obtain an E rating at least 61 points. Scale of assessment (preliminary/final): 40/60	
Learning outcomes: After completing the course, students will master the basics of higher mathematics, practical applications of discrete mathematics methods, an introduction to mathematical analysis, differential and integral calculus. They will use this knowledge in the study of physics, physical chemistry, biophysics, analytical chemistry, pharmaceutical technology, pharmacokinetics, as well as other related professional subjects of the pharmacy study program.	
Class syllabus: Discrete mathematics – propositional logic, sets. Arithmetic. Nuts. System of linear equations. Relations and Functions - Definition and graph of a function of one variable. Elementary functions and their properties. Differential calculus - limit and derivative, geometrical and physical meaning, investigation of the course of a function, Taylor development. Integral calculus - primitive function, indefinite and definite integral and its applications. First order ordinary differential equations and their applications in natural sciences and pharmacy. Functions of several variables – partial derivative, geometric meaning, extrema of functions of two variables. Lectures on the subject Mathematics for Pharmacists are supplemented by a seminar where students verify their theoretical knowledge and acquire skills in solving mathematical examples.	
Recommended literature:	

D. L. StancI, M.L. StancI: Calculus for Management and the Life and Social Sciences, 2nd ed., R.D. Irwin, Boston, MA, 1990.
R. L. Finney, G. B. Thomas Jr.: Calculus and Analytic Geometry, 9th ed., Addison-Wesley, Reading, 1996.

Languages necessary to complete the course:

English

Notes:

The course is offered during winter semester only.

Past grade distribution

Total number of evaluated students: 5

A	ABS	B	C	D	E	FX
20,0	0,0	0,0	40,0	20,0	0,0	20,0

Lecturers: prof. Ing. Vladimír Frecer, DrSc., doc. Mgr. Marcela Chovancová, PhD., Mgr. Mária Klacsová, PhD., RNDr. Michal Cagalinec, PhD.

Last change: 31.03.2025

Approved by: prof. Ing. Vladimír Frecer, DrSc.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KZT/01-Mgr-A/25	Course title: Medical Devices
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Attendance of the lectures is obligatory. Methods and options for compensating absences will be defined in the course syllabus. The semester ends with a comprehensive semester-written exam (test). The minimum level for passing this test is 60%. Assessment scale: A: 93,00–100,00%, B: 85,00–92,99%, C: 77,00–84,99%, D: 69,00–76,99%, E: 60,00–68,99%, FX: 59,99% and less.	
Learning outcomes: The student acquires basic knowledge about medical devices and handling them. Emphasis is placed on medical devices (MD) that are available in pharmacy and medical supplies dispensaries. The students' knowledge also includes the process of the MDs' market access. The course focuses on important attributes of MDs, these are quality and safety. The student acquires knowledge on those MDs which are the most frequently indicated in medical and preventive health care. The student learns the MD properties, and material used, and can specify proper handling, including storage, renovation options, and disposal.	
Class syllabus: Definition of medical devices (MDs) and an interface with drugs, MDs classification, Regulatory aspects of placing MD on the market, declaration of conformity, registration, distribution of MDs, MDs for wound healing (dry wound healing, wet wound healing, burns), MDs in outpatient health care, MDs for self-monitoring, Medical devices in mother and child care, MDs for compression therapy, MDs for diabetics, MDs for incontinent patients and for patients with stoma, MDs for patients with hearing and vision disorders, MDs made of metal, MDs in vitro diagnostic purposes,	

Rehabilitation and compensation of the MDs.						
Recommended literature: European legislation European Pharmacopoeia, current edition, Strasbourg: EDQM Aulton, M. E.: Aulton's Pharmaceutics: the design and manufacture of medicines. Edinburgh: Churchill Livingstone. https://uniba.sk/en/about/faculties-and-units/comenius-university-academic-library/externalelectronic-information-resources/ Ecker, W. 2019. Medical Devices and IVDs. Market Access under the new EU-Regulations. National Library of Germany. Edition by Dr. Wolfgang Ecker, 2nd. edition, Feb 2019. 239 p. ISBN 978-3-7481-3746-7 Ecker, W., Labek, G., Mittermayr, T. et al. 2020. Clinical Evaluation and Investigation of Medical Devices under the new EU-regulation. National Library of Germany. Edition by Michael Ring, 2020. 260 p. ISBN 978-3-7519-3766-5						
Languages necessary to complete the course: English						
Notes: The course is available only in the winter term if at least 5 students are registered. The total capacity of the course is limited to 40 students.						
Past grade distribution Total number of evaluated students: 0						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: PharmDr. Milica Molitorisová, PhD., PharmDr. Zuzana Baťová, PhD., M.Sc. Ludmila Oreská, PhD., PharmDr. Eva Rybárová, PharmDr. Attila Kulcsár, PhD., PharmDr. Kristína Szmicseková, PhD.						
Last change: 29.05.2025						
Approved by: doc. Mgr. Martina Hrčka Dubníčková, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/20-Mgr-A/22	Course title: Medical Writing
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: English B2 (upper-intermediate level)	
Course requirements: - active participation in seminars - mid-term test (15%) -final test (85%) To complete the course, the student must achieve at least 60%. A - 100% - 91% B - 90% - 81% C - 80% - 73% D - 72% - 66% E - 68% - 60%	
Learning outcomes: After completing the seminars of Medical writing students get the understanding of the medical concepts and terminology, knowledge of relevant guidelines as regards the structure and contents of specific documents, and good writing skills. They become familiar with searching medical literature, understanding and presenting research data, the document review process, and editing and publishing requirements.	
Class syllabus: Medical writing involves writing different types of documents for different purposes, and for different audiences. 1. Medical Education (physician, patient) 2. Medical marketing of healthcare products 3. Publication/Presentation 4. Research Documents 5. Regulatory Documents	
Recommended literature: Taylor, R.B.: Medical Writing. Springer International Publishing AG, 2018	

Languages necessary to complete the course: English language						
Notes:						
Past grade distribution Total number of evaluated students: 2						
A	ABS	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: PaedDr. Viera Žufková, PhD., Mgr. Natália Kližanová						
Last change: 21.05.2025						
Approved by: PaedDr. Viera Žufková, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KFB/06-Mgr-A/22			Course title: Medicinal Plants			
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 2						
Recommended semester: 5.						
Educational level: I.II.						
Prerequisites: FaF.KFB/03-Mgr-A/22 - Pharmaceutical Botany						
Course requirements: Scale of assessment (preliminary/final): 20/80						
Learning outcomes:						
Class syllabus: Particular interest in the course Medicinal Plants and to their organs that constitute herbal drugs. Other topics are the field production of important domestic species as well as the possibility of introduction of selected foreign taxa to island conditions, with respect to practical needs.						
Recommended literature: Vaverkova S. et al.: Botany and medicinal plants. Bratislava UK, 1995, 106 pages Burnie G. et al.: Botanica. Gordon Cheers, Publ. Random Australia, 1998, 920 page						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 26						
A	ABS	B	C	D	E	FX
80,77	0,0	3,85	11,54	3,85	0,0	0,0
Lecturers: prof. Ing. Miroslav Habán, PhD., Mgr. Ondrej Ďuriška, PhD.						
Last change: 27.03.2022						
Approved by: prof. Ing. Miroslav Habán, PhD., prof. PharmDr. Pavel Mučaji, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KChTL/13-Mgr-A/20	Course title: Metallo drugs and Nanoparticles as Modern Pharmaceuticals
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Final evaluation: examination in the form of a written comprehensive test. A: 90,01 % – 100,00 %; B: 82,01 % – 90,00 %; C: 74,01 % – 82,00 %; D: 66,01 % – 74,00 %; E: 60,01 % – 66,00 %; Fx: ≤ 60,00 %. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The aim of the course is to apply basic knowledge and skills in bioinorganic/biocoordination chemistry, as well as nanotechnology, in the field of pharmacy.	
Class syllabus: The lectures focus on modern research directions in the development of new medicines with the aid of bioinorganic chemistry. Besides bioactive metal complexes, the current research on applications of nanoparticles in diagnostics and therapy (nanomedicine) is covered as well. Metal complexes as well as nanoparticles offer new possibilities for the development of bioactive compounds with mechanism of pharmacological action different from purely organic compounds, thus providing medicines with extended spectrum of activity. The first part of the lectures deals with pharmacologically active metal complexes. After a brief historic introduction, main features of current usage of these compounds are presented, especially in antimicrobial and anticancer therapies. Subsequently, new directions and perspectives in the development of metal-based drugs are outlined. The second part of the lectures deals with the modern research area of nanomedicine. Along with the basic physico-chemical properties of nanoparticles, fundamental methods for their synthesis and characterization are described. The lectures conclude with the discussion of various types of bioactivity of nanoparticles and their prospective application in pharmacology.	
Recommended literature: Kaim W., Schwederski B., Klein A. Bioinorganic chemistry: inorganic elements in the chemistry of life. Chichester: John Wiley & Sons Ltd 2013. Dabrowiak J.C. Metals in Medicine (2nd ed.) Chichester: John Wiley & Sons Ltd 2017. Lawrance G.A. Introduction to Coordination Chemistry. Chichester: John Wiley & Sons Ltd 2010.	

Burgess R. Understanding Nanomedicine – An Introductory Textbook. Boca Raton: CRC Press 2012.
P. Prasher, M. Sharma: Silver Nanoparticles: Synthesis, Functionalisation and Applications, Bentham, 2022.

Languages necessary to complete the course:
english

Notes:
The course is held only in summer semester.

Past grade distribution
Total number of evaluated students: 9

A	ABS	B	C	D	E	FX
44,44	0,0	33,33	11,11	0,0	0,0	11,11

Lecturers: Ing. Ladislav Habala, Dr.rer.nat, doc. Ing. Martin Pisárčik, CSc.

Last change: 22.03.2024

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/11-Mgr-A/22	Course title: Microbiology
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 5	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: The condition is the completion of all practical exercises, submission of reports and in the continuous evaluation 60 % success in tests (2 written tests per semester, obtain 60 % of each). The subject exam has two parts: written and oral. The results from all forms of the test contribute equally to the evaluation result. A: 100-92%, B: 91-84%, C: 83-76%, D: 75-67%, E: 66-60%.	
Learning outcomes: By passing through the subject, the result should be knowledge of the basics of general microbiology and the characteristics of the most important microorganisms from a pharmaceutical point of view (infectious disease agents, producers of antimicrobial drugs and other pharmaceutically used substances, eg vaccines). In practical activities, these are the basics of working with microorganisms and their evidence in pharmaceuticals.	
Class syllabus: Characteristics of microorganisms and their properties, characteristics of bacteria, fungi, protozoa, viruses and prions, basics of biochemistry and genetics of microorganisms, interaction of microorganisms with the environment and host, pathogenicity and virulence, fight against unwanted microorganisms, pharmaceuticals in prophylaxis and therapy of infectious diseases, effect of antimicrobial drugs, mechanisms of resistance of microorganisms to antimicrobial substances, importance of microorganisms for pharmacy and their use in pharmacy, ecology of microorganisms inhabiting pharmaceutical plants and medicinal products, microbiological control, quality of drugs.. Lectures: 1. Subject of the microbiology. Pharmaceutical microbiology. Characterization and classification of microorganisms. 2. Bacterial growth. Bacterial culture and cultivation. Reproduction of bacterial cells. Biofilm. Communication between bacteria. Genetics of bacteria. Modifications and mutations. 3. Relationships between microorganisms and their hosts. Factors and principles of pathogenicity, virulence and infection. 4. Properties of selected bacterial species. Spirochetes, Chlamydia, Proteobacteria. 5. Morphology, habitat, pathogenicity, therapy, prophylaxis of infections caused by gram-positive bacteria.	

6. Antibiotics and synthetic antimicrobial chemotherapeutics
7. Bacterial resistance to antibiotics and non-antibiotic antimicrobial agents.
8. Properties, structure and replication of viruses.
9. Classification of viruses. Properties of selected viral species.
10. Structure, habitat, reproduction and pathogenicity of fungi and protozoa and helminths. Medically important species. Antifungal and antiprotozoal antibiotics and chemotherapeutics.
11. Sterilization, disinfection and preservation. Principles and practice. Sterilization control and sterility testing.
12. Ecology of microorganisms as it affects pharmaceutical industry. Microbial spoilage of pharmaceutical products.

PRACTICAL EXERCISES:

Exercise 1: Laboratory safety. Manipulation of microorganisms. Pipette handling. Aseptic technique. Gram stain. Examination of bacteria – Bright field microscopy.

Exercise 2: Growth of microbial population. Measuring microbial growth.

Recommended literature:

Murray P.R., Rosenthal K.S., Pfaller M.A.: Medical Microbiology 9th Ed., Elsevier Books 2020, ISBN 13: 9780323673228

Talaro K.P., Chess B.: Foundations in Microbiology, 8th Ed., McGraw Hill, New York 2012, ISBN 978-0-07-131673-6. Denyer S. P., Hodges N. A, Gorman S. P.: Hugo & Russell's Pharmaceutical Microbiology, 8th Ed., Blackwell, Oxford 2011, ISBN 978-1-4443-3063-2. .

Slonczewski J. L., Foster J. W.: Microbiology. Norton, New York 2009, ISBN

978-0-393-97857-5. Pemmerville J. C.: Alcamo's Laboratory Fundamentals in Microbiology, Jones and Bartlett Publ. Sudbury 2007, ISBN-13: 9-780-7637-4303-1.

Actor J. K.: Elsevier's Integrated: Immunology and Microbiology, Mosby Elsevier, 2007, ISBN-13: 978-0-323-03389-3.

Languages necessary to complete the course:

English language.

Notes:

Past grade distribution

Total number of evaluated students: 83

A	ABS	B	C	D	E	FX
4,82	0,0	8,43	8,43	14,46	25,3	38,55

Lecturers: Mgr. Eva Drobná, PhD., doc. Mgr. Martina Hřčka Dubníčková, PhD., doc. Mgr. Andrea Bilková, PhD., PharmDr. Hana Kiňová Sepová, PhD., PharmDr. Gabriela Greifová, PhD., Mgr. Jana Hricovíniová, PhD.

Last change: 10.04.2025

Approved by: doc. Mgr. Martina Hřčka Dubníčková, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFCh/08-Mgr-A/22	Course title: Molecular Basis of Drug Development
Educational activities: Type of activities: practicals / lecture / seminar Number of hours: per week: 1 / 1 / 1 per level/semester: 14 / 14 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Final Assessment: written final examination. The evaluation of exam: 100 – 92 % (evaluation level A), 91 – 84 % (B), 83 – 76 % (C), 75 – 68 % (D), 67 – 60 % (E), less than 60 % (FX, not passed). Scale of assessment (preliminary/final): 0 / 100	
Learning outcomes: Basic knowledge of modern methods and principles used in the design, research and development of drugs in the rational drug design.	
Class syllabus: The main objective of the subject is to provide new knowledge to students in the field of molecular basics of drug development, focusing mainly on methods of drug design (classical procedures, rational methods, chemical and biological information systems in the field of drug design, structure-activity relationships, methods of molecular modeling and molecular graphics), drug targets (proteins, enzymes, receptors, nucleic acids, lipids), drug-receptor interaction (thermodynamic, kinetic and structural analysis of drug-receptor interaction) and drug development (development of drugs from natural sources, synthetic analogs, receptor theories, 3D structure aided drug development, computer-aided drug development (CADD)). This subject is a part of pharmaceutical chemistry - its general part, whose methods and principles are generally applicable in drug development in any therapeutic group.	
Recommended literature: Text Books (latest edition): An Introduction to Medicinal Chemistry, Graham L. Patrick. Principles of Medicinal Chemistry, W.O. Foye, T. L. Lemke, David A. Williams. The Practice of Medicinal Chemistry, Camille G. Wermuth. Medicinal Chemistry. Principles and Practice., F. D. King.	
Languages necessary to complete the course: English.	

Notes:						
Past grade distribution Total number of evaluated students: 23						
A	ABS	B	C	D	E	FX
34,78	0,0	39,13	8,7	8,7	0,0	8,7
Lecturers: PharmDr. Vladimír Garaj, PhD., Ing. Stanislava Šoralová, PhD.						
Last change: 28.03.2022						
Approved by: PharmDr. Vladimír Garaj, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/22-Mgr-A/22	Course title: Molecular Biology of Drug Effects
Educational activities: Type of activities: practicals / lecture Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: 100% participation in all forms of education. The final exam has a writing form and for successful completion, it is necessary to obtain a minimal 60%. Scale of assessment (preliminary/final): Grade A corresponds to obtaining min. 92% of the maximum number of points; B - 84%, C - 76%, D - 68%, E - 60%, Fx less than 60%.	
Learning outcomes: After completing of lectures the student is able to understand deeper knowledge about the flow of genetic information and its possible influencing by drugs, about cell signaling systems due to the mechanisms of drug effects, and about the molecular-biological basis of some diseases and their therapy (f.e. influenza, AIDS, Alzheimer's disease). By completing of laboratories the student will acquire a basic practical routine in the molecular biology laboratory practice (isolation of nucleic acids from biological material, electrophoretic procedures, PCR).	
Class syllabus: The flow of genetic information – the influencing possibilities of drugs: replication, transcription, translation and posttranslational modifications. Mutations and DNA repair mechanisms. Intracellular compartments and protein transport. Molecular-biological basis of some diseases. Principles of cell communication (cell signalling system). Networking of protein kinases and integration of signal processing. Transport processes in the cell. Principles of the DNA recombinant technology. Principles of gene manipulations. DNA and RNA vaccines.	
Recommended literature: Lectures. Elliott W.H., Elliott D.C.: Biochemistry and Molecular Biology. 4th ed. Oxford University Press 2009. Rudge M.S., Patterson C.: Principles of Molecular Medicine. 2nd ed. Humana Press, 2006.	
Languages necessary to complete the course: English language	
Notes:	

Past grade distribution						
Total number of evaluated students: 28						
A	ABS	B	C	D	E	FX
17,86	0,0	17,86	25,0	28,57	10,71	0,0
Lecturers: RNDr. František Bilka, PhD., doc. PharmDr. Marek Obložinský, PhD., Ing. Ludmila Pašková, PhD., Mgr. Ivana Holková, PhD., PharmDr. Andrea Balažová, PhD.						
Last change: 10.04.2025						
Approved by: RNDr. František Bilka, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KTV/06-Mgr-A/24	Course title: Movement and Health
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 6., 8.	
Educational level: I.II.	
Prerequisites:	
Course requirements: - active participation in lectures - 100% participation - successful completion of a written examination A 92-100%, B 84-91%, C 76-83%, D 68-75%, E 60-67%, Fx< 60% Scale of assessment (preliminary/final): 0/100	
Learning outcomes: By completing the course, students will gain information about the latest systems and methods of exercise, which can effectively solve acute and chronic problems of the organ and locomotor system. They will get acquainted with the possibilities and choice of physical activity in case of movement deficit. They will learn to prevent and solve problems after injuries using specific exercises and methods of regeneration. Physical activity also in your free time, and thus gain habits to create an optimal lifestyle in the long run.	
Class syllabus: - What precedes sports activity with a recommendation of when, where and how to start. - Physical activity focused on the physical development of healthy people (fitness training) and improving the health of specific groups of the population. - Exercise (preventive and curative) methods, methods and systems of exercises that help with diseases, injuries and stressful periods of life. - Specific exercise programs, focused on a selected health problem. - Specifics of physical activity in healthy people and people with diseases of the organ or musculoskeletal system. - An overview of the most common injuries and injuries in selected sports activities, how to prevent them. - Focus on individual physical activities, with specifics for age, health and interest groups. Methodical videos - basic principles, procedures and principles of movement therapy: 1. Physical activity in everyday life 2. Addressing the negative consequences of physical activity 3. Regeneration after physical and mental stress 4. Developmental kinesiology	

5. Back pain
6. Joint pain
7. Overweight and obesity - obese patient
8. Diabetes mellitus II. type
9. Bronchial asthma
10. Osteoporosis
11. Arterial hypertension
12. Hormonal imbalance

Recommended literature:

- BINOVSÝ, A. 2001. Systematická a funkčná športová anatómia. Bratislava 2001. ISBN: 80-88901-42-1
- ČALKOVSKÁ, A. a kol. 2010. Fyziológia človeka pre nelekárske študijné programy. Martin: Osveta 2010. ISBN 978-80-8063-344-8
- KENNEY, W. – WILMORE, J. – COSTILL, D. 2015. Physiology of sport and exercise. 6. Vyd. Champaign: Human Kinetics, 627 s. ISBN: 978-1-4504-7767-3
- MÁČEK, M. a kol. 2010. Základy zátěžové fyziologie. www.tvl.lf2.cuni.cz. 2010
- McARDLE VD, Katch V L., Exercise Physiology. Lippincott Williams & Wilkins, Baltimore, 2007, 1068 s.
- NOVOTNÝ, Jan. 2014. Sportovní medicína. 1. vyd. Brno: Masarykova univerzita, 123 s. ISBN 978-80-210-7408-8
- POWERS SK & Howley ET., Exercise Physiology, theory and Application of Fitness and performance, 6.vyd, McGraw-hill Int. Edition, 2007.
- UKROPEC, J. – UKROPCOVÁ, M. 2012. Adipose tissue and skeletal muscle plasticity in obesity and metabolic disease. Dyslipidemia - from prevention to treatment. - Rijeka : InTech, s. 141-172. - ISBN 978-953-307-904-2.
- UKROPCOVÁ, M. – UKROPEC, J.: 2013. Fyzická aktivita, obezita a zdravie. Klinická obezitológia. Brno: Facta Medica, 2013. s. 102-122, ISBN 978-80-904731-7-1.

Languages necessary to complete the course:

English language

Notes:

Past grade distribution

Total number of evaluated students: 7

A	ABS	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: Mgr. Dalibor Ludvig, PhD., Mgr. Lenka Nagyová, PhD., PaedDr. Martina Tibenská, PhD., Mgr. Michal Tokár, PhD.

Last change: 10.04.2025

Approved by: PaedDr. Martina Tibenská, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFANF/08-Mgr-A/20	Course title: New Trends in Analytical Chemistry
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 4.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Obligatory elective course. Final assessment: after passing laboratory practices – examination. Presence on all forms of education is obligatory. Examination is performed in written form (in person, in case of distance learning (e.g. during the pandemic period) exam can be performed via MS Teams according to the teacher’s decision). It is necessary to reach at least 60% of a total score for successful passing of the examination. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The course expands the knowledge gained in the module Analytical Chemistry II with the latest trends in the procedures of pretreatment and analysis of pharmaceutically relevant samples. In this context, it deals with the automation and miniaturization of the analytical procedure, using new materials (sensors, stationary phases, additives), methodologies (LIF, MS / MS, UHPLC, SFC, CDEKC, etc.), combined techniques (especially LC-MS, CE -MS) and multidimensional (2D LC, 2D-CE) techniques, on-line (e.g. SPE-LC) and miniaturized (microdialysis, microextraction, etc.) sample preparation prior to analysis. The student will learn the importance and the strategy of optimization, and practical application potential of such methods increasingly promoted in the effectiveness of analytical procedures in research and routine pharmaceutical laboratories. When developing a reliable analytical method, students will also become familiar with the basics of validation of methods in the pharmaceutical analysis according to existing guidelines. Laboratory exercises are focused on the use of modern instrumental techniques, which are selected separation methods (liquid chromatography, gas chromatography, capillary zone electrophoresis, isotachophoresis), methods of polycomponent elemental analysis (radionuclide X-ray fluorescence analysis), the latest approaches in electrochemical and spectral analytical methods as well as computer simulation methods and molecular modeling methods. The knowledge and experience that students will gain after completing the course will be a good basis for successful completion of the thesis, as well as in doctoral studies (PhD.).	
Class syllabus: <ul style="list-style-type: none"> • Advanced sample preparation methods prior to instrumental analysis 	

- o microdialysis
- o Microextraction (mSPE, mLLE)
- o Ultrafiltration
- o Ultracentrifugation
- Development, optimization, and validation of an analytical method for pharmaceutical use.
- o Optimization and validation parameters of the method for pharmaceutical analysis
- o Validation protocol in pharmaceutical analysis
- o National and transnational pharmacopoeias in the process of validation of analytical methods
- New electrochemical methods and their specifics
- o Traditional vs. new electrode materials (carbon, metal, nanomaterials)
- o Electrode modifications (nanoparticles, enzymes, polymers, mediators, ionic liquids, nucleic acids)
- o Electrode formats: traditional, miniaturized, screen-printed
- o Advanced electrochemical techniques
- o Affinity and biocatalytic biosensors for biomedical research and practice
- New trends in spectral methods
- o Advanced Optical Methods (LIF)
- o Advanced NMR techniques (2D NMR)
- o Trends in mass spectrometry (tandem mass spectrometry, MSn), and ionization techniques (ESI, APPI, APCI, MALDI, ICP, ...)
- New trends in chromatographic separation methods
- o New types of stationary phases (monoliths, solid-core particles, functional group modifications)
- o Advances in instrumental design (UHPLC, UHTLC, SFC)
- o Miniaturization of HPLC systems (micro, nano)
- o Peak capacity, orthogonality, and chromatographic modes in the two-dimensional arrangement, LC-LC (heart cut analytical approach), LCxLC (comprehensive analytical approach)
- o Combined multidimensional chromatographic techniques LC-GC
- New trends in electrophoretic separation methods
- o Principles, advantages, limitations, and possibilities of using online sample pretreatment techniques
- o Miniaturization of systems (chips)
- o Combined multidimensional techniques (ITP-ITP, ITP-CZE, CZE-CZE)
- o Hybrid separation techniques (capillary electrochromatography (CEC), micellar electrokinetic chromatography (MEKC))

Recommended literature:

Mikuš, P., Maráková, K.: Hyphenated electrophoretic techniques in advanced analysis. Bratislava : KARTPRINT, 2012. 217 s. (scientific monograph)

Languages necessary to complete the course:

english language

Notes:

Past grade distribution

Total number of evaluated students: 20

A	ABS	B	C	D	E	FX
35,0	0,0	10,0	15,0	25,0	10,0	5,0

Lecturers: prof. RNDr. Peter Mikuš, PhD.

Last change: 16.02.2023

Approved by: prof. RNDr. Peter Mikuš, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KJ/14-Mgr-A/20	Course title: Odborná jazyková príprava z nemeckého jazyka (4)
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 1., 3., 5., 7., 9.	
Educational level: I.II.	
Prerequisites:	
Course requirements: - active participation of students in classroom - midterm test (15%) - final test (85%) To complete the course successfully a student must achieve at least 60%. Scale of assessment (preliminary/final): 15/85	
Learning outcomes: Students are able to use basic German grammar and practice the basic skills of listening, speaking, reading and writing in the present tense with an emphasis upon correct oral and written expressions and aural comprehension. Students are also introduced to various aspects of German culture in Germany and in German speaking countries focusing on the professional environment of pharmacies.	
Class syllabus: The course is for absolute beginners in German language who would like to obtain basic communication skills and grammar structures needed for everyday life in the academic and professional environment in a German speaking country.	
Recommended literature: Schritte international 5: Deutsch als Fremdsprache / Kursbuch + Arbeitsbuch mit Audio-CD zum Arbeitsbuch und interaktiven Übungen: Niveau B1/1, Hueber, 2009. Schritte international 6: Deutsch als Fremdsprache / Kursbuch + Arbeitsbuch mit Audio-CD zum Arbeitsbuch und interaktiven Übungen: Niveau B1/2, Hueber, 2009.	
Languages necessary to complete the course: English language, previous knowledge of German language is needed for this course.	
Notes: The course is held only in winter semester. It is highly recommended to take the course in the 5th semester of the study.	

Past grade distribution						
Total number of evaluated students: 0						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: Mgr. Katarína Batková						
Last change: 30.07.2020						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KChTL/04-Mgr-A/24	Course title: Organic Chemistry (1)
Educational activities: Type of activities: lecture / laboratory practicals / seminar Number of hours: per week: 2 / 3 / 1 per level/semester: 28 / 42 / 14 Form of the course: on-site learning	
Number of credits: 8	
Recommended semester: 2.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Recommendation: General and Inorganic Chemistry	
Course requirements: Seminars: The student is required during the semester to complete all the seminars. During the course each student must write 4 interim tests (0-20 points) and 1 final test (0-40 points). To fulfill the conditions for the examination the student is to reach more than 60% of the total point value of all tests. The points reached within the seminars are multiplied by the factor of 0,3 and their value is 30% of the exam value in case of a successful completion of the exam. The coefficient obtained from the seminars applies solely to the academic year in which it was obtained. Laboratory exercises: The student is required during the semester to complete all laboratory exercises and according to the study programme is to write one test from the laboratory techniques (0-40 points) and independently perform four synthetic tasks (0-10 points). To fulfill the conditions needed for the examination the student is to reach from the laboratory exercises more than 60% of the total point value. Gained points are then multiplied by the factor of 0,1 and their value is 10% of the exam value in case of a successful completion of the exam. Examination: The course examinations are held predominantly in written form in the examination period. Participation at the exam is subject to the full completion of the seminars and acquisition of more than 60% of the total point score from the seminars. It is recommended to pass the exam from Organic Chemistry 1. Successful completion of the exam test is conditional on obtaining more than 60% from each section of the written test. At the successful completion, the test's average point value obtained from both parts is multiplied by the factor of 0,6. The total mark of the exam is created by the value obtained from seminars (40%) and the examination test (60%). Grading scale of the overall result of the exam (after taking into account the outcome of the interim control): A: 90,01 % – 100,00 %; B: 82,01 % – 90,00 %; C: 74,01 % – 82,00 %; D: 66,01 % – 74,00 %; E: 60,01 % – 66,00 %; Fx: ≤ 60,00 %. Scale of assessment (preliminary/final): 30+10/60	
Learning outcomes: The course provides a comprehensive preparation of theoretical organic chemistry, as well as practical training in the field of organic synthesis focusing on the field of selected pharmaceutically	

important compounds. The gained skills are necessary for the completion of further chemical and also pharmaceutically oriented courses, such as Pharmaceutical Chemistry. The course is comprehensively designed, focusing on Master Degree accredited study programme of Pharmacy.

Class syllabus:

In theoretical teaching the main attention is paid to systematic organic chemistry. According to each group of compounds the course deals with their physical-chemical characteristics, properties, reactivity, types and mechanisms of reactions with emphasis on the importance in chemistry of pharmaceuticals and other following chemical courses of pharmaceutical study. As for natural substances only basic knowledge is provided. Mastering the knowledge of theoretical teaching and their application is the subject of seminars. The course of Organic Chemistry 2 is one of the fundamental courses in a comprehensive chemical preparation of students of pharmacy. When teaching the subject emphasis is placed on the use of acquired knowledge of organic chemistry in pharmacy and medicine. The course is comprehensively designed, focusing on Master Degree accredited study programme of Pharmacy.

Teaching includes self-study of educational videos, assigned problems and independent student work.

Recommended literature:

1. Devínsky F. et al. Organic Chemistry for Pharmacy Students. Comenius University Press, Bratislava, 2010
2. McMurry, J.W., Begley, T.P.: The Organic Chemistry of biological Pathways, W. H. Freeman, 2nd ed., 2015
3. Miklášová, N., Habala, L., Lintnerová, L.: LABORATORY TECHNIQUES AND SYNTHESSES IN ORGANIC CHEMISTRY, Comenius University Press, Bratislava, 2022

Languages necessary to complete the course:

English language

Notes:

The course is held only in summer semester.

Past grade distribution

Total number of evaluated students: 19

A	ABS	B	C	D	E	FX
5,26	0,0	0,0	36,84	31,58	10,53	15,79

Lecturers: doc. PharmDr. Jindra Valentová, PhD., Mgr. Lucia Lintnerová, PhD., Mgr. Peter Herich, PhD., RNDr. Roman Mikláš, PhD., Mgr. Klára Stankovianska, PhD.

Last change: 10.04.2025

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KChTL/05-Mgr-A/24	Course title: Organic Chemistry (2)
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 2 per level/semester: 28 / 28 Form of the course: on-site learning	
Number of credits: 6	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Recommendation: Organic Chemistry 1	
Course requirements: Seminars: The student is required during the semester to complete all the seminars. During the course each student must write all seminars tests. To fulfill the conditions for the examination the student is to reach more than 60% of the total point value of all the tests. The points reached within the seminars are multiplied by the factor of 0,4 and their value is 40% of the exam value in case of a successful completion of the exam. The coefficient obtained from the seminars applies solely to the academic year in which it was obtained. Examination: The course examinations are held predominantly in written form in the examination period. Participation at the exam is subject to the full completion of the seminars and acquisition of more than 60% of the total point score from the seminars. It is recommended to pass the exam from Organic Chemistry 1. Successful completion of the exam test is conditional on obtaining more than 60% from each section of the written test. At the successful completion, the test's average point value obtained from both parts is multiplied by the factor of 0,6. The total mark of the exam is created by the value obtained from seminars (40%) and the examination test (60%). Grading scale of the overall result of the exam (after taking into account the outcome of the interim control): A: 90,01 % – 100,00 %; B: 82,01 % – 90,00 %; C: 74,01 % – 82,00 %; D: 66,01 % – 74,00 %; E: 60,01 % – 66,00 %; Fx: ≤ 60,00 %. Scale of assessment (preliminary/final): 40/60	
Learning outcomes: The course provides a comprehensive preparation of theoretical organic chemistry, as well as practical training in the field of organic synthesis focusing on the field of selected pharmaceutically important compounds. The gained skills are necessary for the completion of further chemical and also pharmaceutically oriented courses, such as Pharmaceutical Chemistry. The course is comprehensively designed, focusing on Master Degree accredited study programme of Pharmacy	
Class syllabus: In theoretical teaching the main attention is paid to systematic organic chemistry. According to each group of compounds the course deals with their physical-chemical characteristics, properties,	

reactivity, types and mechanisms of reactions with emphasis on the importance in chemistry of pharmaceuticals and other following chemical courses of pharmaceutical study. As for natural substances only basic knowledge is provided. Mastering the knowledge of theoretical teaching and their application is the subject of seminars. The course of Organic Chemistry 2 is one of the fundamental courses in a comprehensive chemical preparation of students of pharmacy. When teaching the subject emphasis is placed on the use of acquired knowledge of organic chemistry in pharmacy and medicine. The course is comprehensively designed, focusing on Master Degree accredited study programme of Pharmacy.

Teaching includes self-study of educational videos, assigned problems and independent student work.

Recommended literature:

1. Devínsky F. et al. Organic Chemistry for Pharmacy Students. Comenius University Press, Bratislava, 2010
2. McMurry, J.W., Begley, T.P.: The Organic Chemistry of biological Pathways, W. H. Freeman, 2nd ed., 2015

Languages necessary to complete the course:

English language

Notes:

The course is held only in winter semester.

Past grade distribution

Total number of evaluated students: 25

A	ABS	B	C	D	E	FX
4,0	0,0	8,0	28,0	28,0	16,0	16,0

Lecturers: doc. PharmDr. Jindra Valentová, PhD., RNDr. Roman Mikláš, PhD., Mgr. Lucia Lintnerová, PhD., Mgr. Klára Stankovianska, PhD.

Last change: 10.04.2025

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/13-Mgr-A/24	Course title: Pathology
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 2 per level/semester: 28 / 28 Form of the course: on-site learning	
Number of credits: 6	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Mandatory 100% participation in laboratory exercises and lectures and sufficiently demonstrated readiness for practical exercises. Students' readiness for the exercises is continuously verified by tests (written, oral). Excused absence from exercises (max. 2x) is replaced by: a) substitution; b) by preparing a written work; c) written or oral examination. During the semester, students take 2 interim assessment tests (pre-tests), whose writing on at least 60% of each test conditions the possibility to participate in the final exam. Students take the final (examination) test in computer form. A pass rate of at least 60% is required for recognition of the examination test. Evaluation (mark and score): A 92-100%, B 84-91%, C 76-83%, D 68-75%, E 60-67%, FX < 60%. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: Completing the subject, students will gain knowledge of general pathology - focused on the fundamental cellular and tissue responses to pathologic stimuli, and special pathology – oriented on the specific responses of specialized organs and systems of the diseased organism. Students recognize the causes of disease, underlying mechanisms that result in the clinical signs, symptoms, and subsequent complications. Student could understand the structural and functional changes at the level of cells, tissues, organs, and systems of the diseased organism, as well as the disturbances in the regulatory mechanisms. The obtained knowledge helps him to bridge basic science to pharmacology and clinically oriented subjects.	
Class syllabus: Introduction to pathology. Concept of disease and illness, etiology, pathogenesis, clinical manifestations, classification, and incidence of diseases. Principles of molecular pathogenesis and genetics. Genetic abnormalities, developmental disorders. Hereditary diseases. Pain – etiopathogenesis, symptomatology, consequences, prophylaxis. Mechanisms of disturbances in vascular circulation. Inflammation - etiology, acute, chronic, pathomechanisms, role of blood elements, mediators. Edema. Fever. General symptomatology – causes, pathomechanisms. Alterations in blood pressure and circulation. Hypertension. Etiopathogenesis, symptomatology, compensatory mechanisms, complications. Shock (hypovolemic, cardiogenic, septic, anaphylactic, neurogenic, endocrine). Alterations in coronary circulation. Ischemic disease of the	

heart. Myocardial Infarction. Definition, type/form/clinical manifestation, etiopathogenesis, symptomatology, compensatory mechanisms, consequences. Rhythm disturbances. Heart failure. Diseases of the respiratory system. Cough, Asthma. Bronchitis, Obstructive airways disease. Respiratory insufficiency. Alterations of the digestive function. Basic manifestations of GIT disorders. Peptic ulceration - disturbances of the Gastric Juice Production. Liver diseases - jaundice, hepatitis, cirrhosis, failure.

Alterations of the Hormonal Regulation. Pathophysiology of renal disorders. General symptomatology, Glomerular diseases. Tubulo-interstitial disorders. Renal Failure. Selected disorders of the nervous system. Epilepsy, neurodegenerative disorders (Alzheimer Disease, Parkinson Disease). Sleeping disorders, memory disturbances, pathophysiology of ANS. Psychiatric disorders - anxiety and personality disorders, depression, bipolar disorder, schizophrenia. Basic concepts in oncology. Definitions and epidemiology. Classification. Benign and malignant neoplasia. Clinical manifestation, Metastasis, Prognosis. Disorders of the Sensory System.

In the practical part of subject students practice communicating ideas, interpret relevant data, analyze problems, and solve them. Students will focus on practicing basic terminology, pathophysiology of symptoms, cases in selected systems, diagnostic tests, e.g. cognitive ability testing, analysis of records of pathologically altered functions of selected organs, investigative techniques, biochemical examinations. Pathophysiology of skin changes in childhood, adulthood, older age, and infectious diseases. Diets and recommendations for special diets.

Teaching includes self-study of educational videos, assigned problems and independent student work.

Recommended literature:

MOHAN, Harsh. 2014. Textbook of pathology. 7th edition. New Delhi, India: Jaypee Brothers Medical Publishers (P), ISBN 978-9351523697

KUMAR Vinay, Abul ABBAS, Jon ASTER. 2017. Robbins Basic Pathology. 10th edition. Philadelphia, Pennsylvania: Elsevier Science, ISBN 9780323353175

PORTH, Carol, Kathryn J. GASPARD a Kim A. NOBLE. 2011. Essentials of pathophysiology: concepts of altered health states. 3rd ed. Philadelphia: Wolters Kluwer, ISBN 9781582557243

GREENE, Russell J. HARRIS, Norman D. 2008. Pathology and Therapeutics for Pharmacists. A basis for clinical pharmacy practice. 3rd ed. London: Pharmaceutical Press, ISBN 9780853696902

RIEDE, Ursus-Nikolaus and Martin WERNER. 2004. Color Atlas of Pathology. 1st ed. Stuttgart: Thieme, ISBN 9783131277817

UNDERWOOD, James C.E. 2004. General and Systemic Pathology, 4th ed. NY: Churchill Livingstone, ISBN 9780443073342

KOSÍROVÁ, Stanislava et al. 2022. Selected questions for the pathology exam for pharmacy students. Bratislava. ISBN 9788022355087

Languages necessary to complete the course:

English language

Notes:

Past grade distribution

Total number of evaluated students: 25

A	ABS	B	C	D	E	FX
4,0	0,0	8,0	36,0	8,0	36,0	8,0

Lecturers: doc. PharmDr. Tomáš Rajtík, PhD., doc. PharmDr. Stanislava Kosírová, PhD., PharmDr. Eva Kráľová, PhD., PharmDr. Dominika Dingová, PhD., PharmDr. Boris Dudík, PhD., PharmDr. Zuzana Kiliánová, PhD., Mgr. Barbora Kaločayová, PhD., Mgr. Kristína Ferenczyová, PhD., Mgr. Linda Bartošová, PhD.

Last change: 12.09.2024

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/27-Mgr-A/20	Course title: Pathology of Rare Diseases
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Obligatory attendance at 80% of lectures and preparation of a seminar work: the seminar work consists of a professional translation of the ORPHANET article on the selected rare disease into the slovak version of the Encyclopedia of Rare Diseases, preparation of an article about rare disease for the general public, which will be published on the website www.sazch.sk and a presentation on the given rare disease at the seminar.	
Learning outcomes: By completing the course, the student will gain basic information on a heterogeneous and large group of diseases with low prevalence (6 - 8000 rare diseases with a prevalence of no more than 5 per 10 000 EU population). The aim is to inform students about basic approaches, scientific knowledge and information sources where they will be able to find important information about rare diseases in the future. Afterwards, the student will be introduced to selected rare diseases, which are already treated in Slovakia within the national network of rare disease centres. An interest in physiology and pathology, or completion of courses in this field, as well as a good knowledge of the English language are an advantage	
Class syllabus: <ul style="list-style-type: none"> - The concept and definition of rare diseases in Europe and worldwide - Rare disease diagnosis and prevention - The importance of patient groups for the development of the topics - Practical examples of selected rare diseases - metabolic diseases, diseases of the respiratory system, diseases of the nervous system, neuromuscular diseases, diseases of the blood, diseases of the immune system 	
Recommended literature: <ul style="list-style-type: none"> • Kubáčková K. kolektív: Vzácna onemocnění, Mladá fronta 2014, s 304, ISBN ISBN 9788020431493 • www. orpha.net • http://www.rd-action.eu/ 	

- <https://www.health.gov.sk/Clanok?2-vyzva-ERN-30-11-2019>
- https://ec.europa.eu/health/ern_en
- https://ec.europa.eu/health/non_communicable_diseases/rare_diseases_sk

Strana: 2

- <http://sazch.sk/pracoviska-pre-zch/>

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: PharmDr. Eva Malíková, PhD., doc. PharmDr. Tatiana Foltánová, PhD., PharmDr. Eva Kráľová, PhD., Ing. arch. Radoslav Herda, MUDr. Viera Nemčeková, PhD., PharmDr. Jana Schweigertová, PhD., RNDr. Daniela Gašperíková, DrSc.

Last change: 04.06.2024

Approved by: doc. PharmDr. Tatiana Foltánová, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KFB/03-Mgr-A/22			Course title: Pharmaceutical Botany			
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 3 per level/semester: 28 / 42 Form of the course: on-site learning						
Number of credits: 6						
Recommended semester: 4.						
Educational level: I.II.						
Prerequisites:						
Course requirements: Scale of assessment (preliminary/final): 50/50						
Learning outcomes:						
Class syllabus: Main attention in the field of systematic botany and ecology is paid to basic taxonomical units with respect to diacritical characteristic of medicinal plants. In the field of plant cytology the course focuses on morphological and functional differences of plant cells and on cell inclusions that present determinant characteristic in plant/drug description. The anatomy of individual types of plant tissues is detail in accordance with their development stage attributes and function. In the field of organology the course focuses on the anatomy and morphology of particular plant tissues with respect to specific characteristics of pharmaceutically important species.						
Recommended literature: Simpson M.: Plant Systematics. Ed.Amsterdam, Elsevier, 2006, 589 pages Weier E., Stocking R., Barbour M.: Botany an Introduction to plant Biology. Ed. Wilez-Sons Publ. Comp. New York, 1984, 693 pages Vaverkova S. et al.: Botany and medicinal plants. Bratislava UK, 1995, 106 pages						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 39						
A	ABS	B	C	D	E	FX
5,13	0,0	25,64	17,95	30,77	12,82	7,69
Lecturers: prof. Ing. Miroslav Habán, PhD., Mgr. Ondrej Ďuriška, PhD.						
Last change: 27.03.2022						
Approved by: prof. Ing. Miroslav Habán, PhD., prof. PharmDr. Pavel Mučaji, PhD.						

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/500-Mgr-A/25	Course title: Pharmaceutical Chemistry
Number of credits: 4	
Recommended semester: 7., 8..	
Educational level: I.II.	
Course requirements: The state exam can be taken by a student who has successfully completed the following subjects: Analytical Chemistry (1), Analytical Chemistry (2), Drug Analysis, Biochemistry, Pharmaceutical Physics, Pharmaceutical Chemistry (1), Pharmaceutical Chemistry (2), Physical Chemistry, Organic Chemistry (1), Organic Chemistry (2), General and Inorganic Chemistry.	
Learning outcomes: By passing the exam, the student demonstrates comprehensive knowledge from the entire field of theoretical chemistry, analytical chemistry, molecular biology and pharmaceutical chemistry. The graduate understands the connection of professional knowledge from various areas of pharmaceutical chemistry and is able to analyze and apply theoretical knowledge while providing pharmacy health care and performing other professional activities of a pharmacist.	
Class syllabus: The state exam consists of an oral theoretical exam before a state examination committee. The student randomly selects one question from the designated categories.	
State exam syllabus:	
Last change: 12.09.2025	
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH	

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFCh/05-Mgr-A/00	Course title: Pharmaceutical Chemistry (1)
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 5	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Recommendation. The KCHTL/01-Mgr-A/00 Organic Chemistry (1), KCHTL/02-Mgr-A/00 Organic Chemistry (2), KFANF/01-Mgr-A/00 Analytical Chemistry (1), KFANF/02-Mgr-A/00 Analytical Chemistry (2) and KBMBL/03-Mgr-A/00 Biochemistry courses are very strongly recommended to be successfully passed (with the final evaluation A-E) for the Pharmaceutical Chemistry (1) course.	
Course requirements: Conditions for successful completion of lectures and seminars from the Pharmaceutical Chemistry (1) course a) Personal attendance at lectures (mandatory part of the education!) – a student is rigorously required to attend to all lectures following the schedule published at an official dashboard/web site of the Department of Pharmaceutical Chemistry CU; personal attendance at seminars – a student is rigorously required to attend to all seminars following the schedule published at an official dashboard/web site of the Department of Pharmaceutical Chemistry CU. b) Successful course completion based on successful passing of all semestral preliminary evaluations with achievement of adequate (percentage) success Students' knowledge will be verified in a written form at 3rd and 5th seminar, respectively (two preliminary tests have to be passed); the content of preliminary tests, their evaluation as well as granting of preliminary evaluation will be the competence of the teachers responsible for teaching (supervising) of the seminars. Each preliminary evaluation (each test) will consist of the questions following the topics listed in Syllabus of Lectures as well as Syllabus of Seminars. To pass all scheduled Seminars and semestral preliminary evaluations (2 preliminary tests), 60% or higher rate of the maximum point score must be achieved from each test. c) The Granting of the Final Evaluation (Exam) from the Pharmaceutical Chemistry (1) Course The final written exam from the Pharmaceutical Chemistry (1) course will last 120 minutes; particular terms, times and rooms for the exams will be listed in AIS-2.	

Student is obliged to register for a particular term of the exam from the Pharmaceutical Chemistry (1) course via AIS-2 only. Only a student who is properly registered for the final exam via given electronic system will be allowed to take the exam.

The attendance of a student at the exam from the Pharmaceutical Chemistry (1) course is allowed only when all requirements listed in both a) and b) sections are fulfilled.

The exam from the Pharmaceutical Chemistry (1) course will be in a written form, i.e., a student will complete the test consisting of 25 questions. Each question will be evaluated by 2 points (the maximum number of points from the exam: 50 pts.).

The set of questions will be based on the topics listed in Syllabus of Lectures as well as Syllabus of Seminars. Thus, the questions will cover i) knowledge from general Pharmaceutical Chemistry, ii) definitions and chemical classifications (divisions) of particular pharmacodynamic classes (with a very precise chemical division of particular compounds – drugs), iii) chemical structures of selected compounds – drugs, iv) structure-biological activity relationships, structure-pharmacokinetics relationships as well as structure–toxicity relationships in detail (including a general chemical structure the compounds belonging into a relevant pharmacodynamic group as well as one drug, which chemical structure is precisely drawn), and (v) general biotransformation pathways related to particular compounds – drugs.

Evaluation of the exam from the Pharmaceutical Chemistry (1) course will be as follows: 50–47 points (evaluation level „A“), 46–44 points („B“), 43–39 points („C“), 38–35 points („D“), 34–30 points („E“), less than 30 points („FX“; not passed).

Thus, minimal requirements for the Pharmaceutical Chemistry (1) course to be successfully passed are as follows: 60% (60% and more) from the maximum point score.

Scale of assessment (preliminary/final): 0 / 100. a) Seminars from the Pharmaceutical Chemistry (1) course. Successful completion of Seminars, thus, the opportunity to participate in the final evaluation (exam) from the Pharmaceutical Chemistry (1) course, is based on successful completion of two preliminary evaluations. There is the requirement to obtain at least 60% or more of the maximum point score from each preliminary evaluation. The obtained (point) evaluation from the preliminary ones is not explicitly taken into account in the final evaluation (exam). b) Exam from the Pharmaceutical Chemistry (1) - weight in the final evaluation: 100%. The evaluation of exam from the Pharmaceutical Chemistry (1) course and the assignment of relevant classification grades is given in the „Conditions for Successful Completion of Lectures and Seminars from the Pharmaceutical Chemistry (1) Course“ section. The exact point score from the seminars will be considered in the final evaluation (exam) from the Pharmaceutical Chemistry (1) course.

Learning outcomes:

Pharmaceutical/Medicinal Chemistry (the Pharmaceutical Chemistry (1) course) is a science unto itself, a central science positioned to provide a molecular bridge between basic science of biology and clinical science of medicine (analogous to chemistry being the (central) science between traditional disciplines of biology and physics). From a very broad perspective, a drug design may be divided into two phases fundamental concepts about: a) drugs, receptors, and drug–receptor interactions; b) drug–receptor interactions applied to human disease.

Pharmaceutical/Medicinal Chemistry is interdisciplinary, drawing very suitably on theoretical chemistry, organic chemistry, analytical chemistry, molecular biology, pharmacology, and biochemistry. Despite these complexities, Pharmaceutical/Medicinal Chemistry has its own clear line – the design and discovery of drug molecules with a comprehensive and precise definition and characterization of their properties, taking into account i) structural integrity of the drug molecules (in pharmaceutical, pharmacokinetic and pharmacodynamic phase, respectively), ii) their structural fragments (pharmacophore, toxicophore, metabophore, biophore; interchangeable bioisosteres), iii) their structural properties, iv) physicochemical features (solubility, surface activity, acid-

base and lipohydrophilic properties), v) shape properties (geometric, conformational, topological, steric), vi) stereochemical properties (optical isomers, enantiomers, geometric isomers), vii) electronic properties. Following that knowledge, structure–biological activity relationships are comprehensively investigated (SAR, QSAR).

thorough and deep knowledge, understanding and correct interpretation of all relationships that are explained via this course is extremely important for (almost) all fields of pharmaceutical study.

Class syllabus:

Syllabus of Lectures

1st WEEK: Pharmaceutical Chemistry – General Principles, Current Concepts and Prospectives. Definitions of Terms Used in Pharmaceutical Chemistry (drug, prodrug, drug-like, ligand, receptor, bioavailability, structure–activity relationships (SAR), quantitative structure–activity relationships (QSAR), biotransformation, etc.). Classification of Drugs. Basic Principles in Lead (Drug) Development and Optimization (including some strategies of the optimization). Some Requirements for an „Ideal“ Drug.

The Fate of a Drug in the Body (pharmaceutical, pharmacokinetic and pharmacodynamic aspects).

2nd WEEK: Ligand–Biomacromolecule Interactions, part 1. Types of Interactions Between Ligand and Receptor; Definitions of Some Fundamental Terms (bioactive structural part of a drug, pharmacophore, metabophore, toxicophore, etc.); Enzymes; Interactions Between a Ligand and Enzyme; Interactions Between Ligand and Nucleic Acid, Orthosteric and Allosteric Interactions; Allosteric Modulators (examples of drugs); Interactions from a Chemical Point of View (interactions involved in molecular recognition, non-bonded interactions, i.e., hydrogen bonding, ionic interactions, van der Waals interactions, interactions CH– π , interactions cation– π , hydrophobic interactions, metal chelation interactions, halogen bonding; all issues explained using examples of drugs from various pharmacodynamic groups).

3rd WEEK: Ligand–Biomacromolecule Interactions, part 2. Covalent Interactions; Covalent Bonds; Comparison of Non-Covalent, Irreversible Covalent and Reversible Covalent Inhibitors; Design of Covalent Drugs – Inhibitors; Potential Benefits and Risks Associated with Covalent Inhibitors; Mechanism of Covalent Bond Formation Between a Ligand and Effector Site (all issues explained using examples of drugs from various pharmacodynamic groups); Types of Reactive Functional Groups (irreversible covalent inhibitors, reversible covalent inhibitors); Covalent Inhibitors used in Therapeutic Practice; Covalent Inhibitors in Clinical Trials (all issues explained using examples of drugs from various pharmacodynamic groups).

4th WEEK: Prodrugs; Definition of Some Fundamental Terms; Prodrug Concepts; Basics of Prodrug Design; Purpose of Designing Prodrugs; Classification of Prodrugs; Optimization of Bioavailability (all issues explained using examples of drugs from various pharmacodynamic groups); Advantages of Prodrugs with Optimized Pharmacokinetic Properties. Some Newly Approved Drugs.

Stereochemical Aspects of Drug Development; Definition of Some Fundamental Terms (constitution, configuration, chirality, torsion angles, isomerisms, etc.); Importance of Stereochemical Properties of Drugs for Their Biological Activity (all issues explained using examples of drugs from various pharmacodynamic groups);

Hybrid Molecules, the Privileged Scaffold for Various Pharmaceuticals. Ideal Hybrid Drug Molecules' Characteristics; Different Strategies of Hybrid Design (all issues explained using examples of drugs from various pharmacodynamic groups); Some Hybrid Drugs in Clinical Practice; Brief Introduction into Structure–Activity Relationships within Some Pharmacotherapeutic Classes of Drugs.

5th WEEK: General Anesthetics; Sedatives; Hypnotics; Anticonvulsant Drugs (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

6th WEEK: Psychoactive Drugs, part 1. – Psycholeptic Drugs. Neuroleptics; Anxiolytics (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

7th WEEK: Psychoactive Drugs, part 2. – Psychoanaleptic Drugs. Antidepressants; Psychostimulants; Nootropics (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

Psychoactive Drugs, part 3. – Psychodysleptic Drugs. Psychedelics (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

8th WEEK: Antiparkinsonian Drugs; Emetic Agents; Anti-Emesis Drugs; Antivomitics (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

9th WEEK: Analgesics. Centrally-Acting (Opioid) Analgesics; Analgesics–Antipyretics; Antitussive Drugs; Drugs for the Treatment of Migraine (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

10th WEEK: Non-Steroidal Anti-Inflammatory Drugs (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

11th WEEK: Local Anesthetics; Muscle Relaxants (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

Discussion connected with the topics lectured previously.

12th WEEK: Adrenergics; Antiadrenergics; Antiarrhythmic Agents (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

13th WEEK: Parasympathomimetics; Parasympatholytics; Spasmolytics; Antihistamine Drugs (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

Syllabus of Seminars

1st - 2nd WEEK: Physicochemical Properties of Drugs. Solubility – Increase or Decrease in Solubility of Drugs in Aqueous or Lipophilic Environment; Lipophilic Properties of Drugs; Parameters Describing Lipophilicity. Acid-Base Properties of Drugs; Parameters Describing Acid-Base Properties; Surface Activity of Drugs; Micellar Properties of Drugs.

3rd - 4th WEEK: Biotransformation of Drugs. Phases of the Biotransformation; Biotransformation Pathways and Their Significance (all issues explained using examples of drugs from various pharmacodynamic groups).

5th - 6th WEEK: Vitamins Soluble in Water or Fat (Definitions, fundamental functions of vitamins, chemical structures of chosen vitamins, vitamins' mechanisms of actions, structure–activity relationships, biotransformation pathways).

7th - 8th WEEK: Hormones, part 1. Hormones Derived from Amino Acids; Peptide Hormones and Proteohormones – Hypothalamic Hormones, Pituitary Hormones, Placental Hormones, Ovarian Hormones, Thyroid Hormones, Antithyroideal Compounds – Thyreostatics, Parathyroid Hormones, Pancreatic Hormones, Tissue Hormones (Definitions, fundamental functions of hormones, chemical structures of chosen hormones, hormones' mechanisms of actions, structure–activity relationships, biotransformation pathways).

Eicosanoids (Prostacyclins, Thromboxanes, Prostaglandins, Dihydroxyleukotrienes, Peptidoleukotrienes, Lipoxins)

Peroral Antidiabetic Drugs (Definitions, drugs - systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

Pharmacotherapy of Osteoporosis (Definitions, drugs – systematic chemical classification, chemical structures of chosen drugs, mechanisms of action, structure–activity relationships, biotransformation pathways).

9th - 10th WEEK: Hormones, part 2. Steroidal Hormones – Sexual Hormones and Their Regulators; Hormones of Adrenal Cortex (Definitions, drugs – systematic chemical classification, chemical structures of chosen hormones, mechanisms of action, structure–activity relationships, biotransformation pathways).

11th - 12th WEEK Pharmaceutical Chemistry of Excipients.

Discussion connected with the topics lectured previously.

Recommended literature:

The Lectures from the Pharmaceutical Chemistry (1) Course

Beale, J. M., & Block, J. H. (2011). Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry. 12th Ed. Wolters Kluwer Health (Lippincott Williams & Wilkins), Philadelphia, United States of America, 1022 pp.

Chackalamannil, S., Rotella, D., Ward, S. (2017). Comprehensive Medicinal Chemistry III, 3rd Ed. Elsevier, Amsterdam, Netherlands, 4536 pp.

Patrick, G. L. (2017). An Introduction to Medicinal Chemistry. 6th Ed. Oxford University Press, New York, United States of America, 832 pp.

Pearson, P. G., & Wienkers, L. C. (2019). Handbook of Drug Metabolism. 3rd Ed. (Drugs and the Pharmaceutical Sciences). CRC Press, New York, United States of America, 616 pp.

Roche, V. F., Zito, S. V., Lemke, T. L., & Williams, D. A. (2019). Foye's Principles of Medicinal Chemistry, 8th Ed. Wolters Kluwer Health Adis (ESP), Baltimore, United States of America, 1168 pp.

Silverman, R.B., Holladay, M.W. (2015). The Organic Chemistry of Drug Design and Drug Action. 3rd Ed. Academic Press (Elsevier), San Diego, United States of America, 536 pp.

Strømgaard, K., Krogsgaard-Larsen, P., & Madsen, U. (2016). Textbook of Drug Design and Discovery. 5th Ed. CRC Press, Taylor & Francis Group, Boca Raton, FL, United States of America, 541 pp.

Wermuth, C., Aldous, D., Raboisson, P., & Rognan, D. (2015). The Practice of Medicinal Chemistry. 4th Ed. Academic Press is imprint of Elsevier, San Diego, CA, United States of America; Kidlington, Oxford, United Kingdom, 903 pp.

Languages necessary to complete the course:

English language

Notes:

Past grade distribution

Total number of evaluated students: 690

A	ABS	B	C	D	E	FX
16,09	0,0	21,74	31,01	17,68	11,16	2,32

Lecturers: doc. PharmDr. Ivan Malík, PhD., PharmDr. Matej Maruniak, PhD.

Last change: 22.03.2022

Approved by: doc. PharmDr. Ivan Malík, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFCh/06-Mgr-A/20	Course title: Pharmaceutical Chemistry (2)
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 5 per level/semester: 28 / 70 Form of the course: on-site learning	
Number of credits: 8	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Recommendation. The KCHTL/04-Mgr-A/00 Organic Chemistry (1), KCHTL/05-Mgr-A/00 Organic Chemistry (2), KBMBL/03-Mgr-A/00 Biochemistry and KFCH/05-Mgr-A/00 Pharmaceutical Chemistry (1) courses are very strongly recommended to be successfully passed (with the final evaluation A-E) for the Pharmaceutical Chemistry (2) course.	
Course requirements: a) The Attendance at All Required Forms of Education Attendance at Lectures - active participation is strongly required (Lectures are the mandatory form of education!); Attendance at Laboratory Practicals - Student is obliged to complete all Laboratory Practicals following the schedule published at an official dashboard/web site of the Department of Pharmaceutical Chemistry FPharm CU (100% attendance at the Laboratory Practicals). b) Successful Course Completion Based On Successful Passing of All Semestral Preliminary Evaluations with Achievement of Adequate (Percentage) Success Students' knowledge will be verified in a written form at 3rd and 5th Laboratory Practical, respectively (two preliminary tests have to be passed); the content of preliminary tests, their evaluation as well as granting of preliminary evaluation will be the competence of particular teachers responsible for the teaching (supervising) of the Practicals. To pass successfully all scheduled Laboratory Practicals and semestral preliminary evaluations (2 preliminary tests), 60% or higher rate of the maximum evaluation score must be achieved from each test (in other words, 60% and more). The attendance of a student at a final evaluation (exam) from the Pharmaceutical Chemistry (2) course is based on successful passing of the requirements listed in both a) and b) sections. c) Successful Passing of the Final Evaluation (Exam) from the Pharmaceutical Chemistry (2) Course The exam from the Pharmaceutical Chemistry (2) course will be in a written form, i.e., a student will complete the test consisting of 25 questions. Each question will be evaluated by 2 points (the maximum number of points from the exam: 50 pts.).	

The set of questions will be based on the content of all pharmacodynamic groups listed in Syllabus of Lectures as well as Syllabus of Laboratory Practicals. Thus, the questions will cover i) definitions, chemical classifications of particular pharmacodynamic classes (with a very precise division of particular compounds – drugs), ii) chemical structures of selected compounds – drugs, iii) structure–(biological) activity, structure–pharmacokinetics as well as structure–toxicity relationships in detail (including comprehensible general chemical structure of the compounds from a relevant pharmacodynamic group as well as chemical structure one relevant compound at least) using the knowledge from general Pharmaceutical Chemistry as well as iv) knowledge regarding general biotransformation pathways applied for particular compounds – drugs.

The final written exam from Pharmaceutical Chemistry (2) course will last 120 minutes; particular terms, times and rooms for the exam will be listed in AIS-2.

Evaluation of the exam from the Pharmaceutical Chemistry (2) course will be as follows: 50–47 points (evaluation level „A“), 46–44 points („B“), 43–39 points („C“), 38–35 points („D“), 34–30 points („E“), less than 30 points („FX“; not passed).

Thus, minimal requirements for the Pharmaceutical Chemistry (2) course to be successfully passed are as follows: 60% (60% and more of the maximum point score).

Scale of assessment (preliminary/final): 0 / 100.a) Laboratory Practicals from the Pharmaceutical Chemistry (2) course. Successful completion of Laboratory Practicals, thus, the opportunity to participate in the final evaluation (exam) from the Pharmaceutical Chemistry (2) course, is based on successful completion of two preliminary evaluations. There is a requirement to obtain at least 60% or more of the maximum point score from each preliminary evaluation.

The obtained (point) evaluation from the preliminary ones is not explicitly taken into account in the final evaluation (exam).b) Exam from the Pharmaceutical Chemistry (2) course - weight in the final evaluation: 100%. The evaluation of the exam from the Pharmaceutical Chemistry (2) course and the assignment of relevant classification grades is provided in the „Conditions for Successful Completion of Lectures and Laboratory Practicals from the Pharmaceutical Chemistry (2) Course“ section. The exact score from the Laboratory Practicals will be not taken into consideration in the final evaluation (exam) from the Pharmaceutical Chemistry (2) course.

Learning outcomes:

Pharmaceutical/Medicinal Chemistry (the Pharmaceutical Chemistry (2) course) is a science unto itself, a central science positioned to provide a molecular bridge between basic science of biology and clinical science of medicine (analogous to chemistry being the (central) science between traditional disciplines of biology and physics). From a very broad perspective, a drug design may be divided into two phases fundamental concepts about: a) drugs, receptors, and drug–receptor interactions; b) drug–receptor interactions applied to human disease.

Pharmaceutical/Medicinal Chemistry is interdisciplinary, drawing very suitably on theoretical chemistry, organic chemistry, analytical chemistry, molecular biology, pharmacology, and biochemistry. Despite these complexities, Pharmaceutical/Medicinal Chemistry has its own clear line – the design and discovery of drug molecules with a comprehensive and precise definition and characterization of their properties, taking into account i) structural integrity of the drug molecules (in pharmaceutical, pharmacokinetic and pharmacodynamic phase, respectively), ii) their structural fragments (pharmacophore, toxicophore, metabophore, biophore, etc.; interchangeable bioisosteres), iii) structural properties, iv) physicochemical features (solubility, surface activity, acid-base and lipohydrophilic properties), v) shape properties (geometric, conformational, topological, steric), vi) stereochemical properties (optical isomers, enantiomers, geometric isomers), vii) electronic properties. Following that knowledge, structure–biological activity relationships, structure-pharmacokinetics relationships as well as structure-toxicity relationships are comprehensively investigated (SAR, QSAR).

Thorough and deep knowledge, understanding and correct interpretation of all relationships that are explained via this course is extremely important for (almost) all fields of pharmaceutical study.

Class syllabus:

Syllabus of Lectures

1ST WEEK: Drugs Influencing a Cardiovascular System. Cardiotonics, Cardiotonics. Vasodilating Agents (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

2ND WEEK: Antihypertensives. Drugs Influencing Veins (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

3RD WEEK: Drugs Regulating Blood Coagulation Processes. Blood Substitutes. Lipid-Lowering Drugs – Treatment of Hypercholesterolemia. Treatment of Hypertriglyceridemia (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

4TH WEEK: Hepatoprotective Agents. Diuretics, Anti-Diuresis Drugs. Ligands of Vasopressin Receptors (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

5TH WEEK: Anthelmintics. Isecticidal Agents (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

Discussion connected with the topics lectured previously

6TH WEEK: Cystic Fibrosis. Emerging Cystic Fibrosis Transmembrane Conductance Regulator Modulators as New Drugs for Cystic Fibrosis (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

7TH WEEK: Antifungal Drugs. Anti-Protozoal Agents (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

8TH WEEK: Antimalarial Drugs. Anti-Tuberculosis Drugs. Anti-Leprosy Drugs (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

9TH WEEK: Antibacterial Chemotherapeutics/Antibiotics, part 1. beta-Lactam Antibiotics, beta-Lactamase Inhibitors (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

10TH WEEK: Antibacterial Chemotherapeutics/Antibiotics, part 2. Diaminopyrimidines. Quinolones (Gyrase Inhibitors). Nitrofurans (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

Discussion connected with the topics lectured previously.

11TH WEEK: Antiviral Agents (Definitions, drugs - systematic division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

12TH WEEK: Cytostatics, part 1. Alkylating Agents. Compounds Forming Complexes with DNA. Compounds Generating Reactive Entities. Antimetabolites. Protein Synthesis Inhibitors. Antimitotic Drugs (Definitions, drugs - systematic division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

13TH WEEK: Cytostatics, part 2. Angiogenesis Inhibitors. PROTAC Technology, PROTAC Molecules. Inhibitors of Histone Deacetylases and Other Protein Deacetylases. Inhibitors

of Histone Methyltransferases. MAPK Signaling Pathway Inhibitors. Proteasome Inhibitors (Definitions, drugs - systematic chemical division, chemical structures of some compounds, mechanisms of action, structure–activity relationships, biotransformation pathways).

Syllabus of Laboratory Practicals

1ST-12TH WEEK – PART A

At the Laboratory Practicals, students will calculate theoretical yields of particular reactions steps from convenient syntheses of biologically active compounds – drugs.

Selected drugs to be synthesized: Acetylsalicylic Acid, Paracetamol, Phenacetine, Methyl Salicylate, Parabens (Methyl Paraben, Ethyl Paraben, Propyl Paraben, Isopropyl Paraben, Butyl Paraben etc.), Benzocaine, Lidocaine (Lignocaine), Trimecaine, Sulfanilamide, Phthalylsulfathiazole, Succinylsulfathiazole, Disulfiram, Isoniazid.

Knowledge about the methods, which can be used to purify synthesized compounds (crystallization, adsorption thin-layer chromatography, distillation), purity verification (TLC), methods to determine their melting points; practical using of the knowledge.

Principles of spectral methods to confirm structural identity of compounds (Nuclear Magnetic Resonance (^1H NMR, ^{13}C NMR), Infrared Spectrometry, Ultraviolet/Visible Spectrophotometry, etc.), and chromatographic methods (High-Performance Liquid Chromatography; HPLC); spectral identification of synthesized compounds.

Knowledge about the determinations of some physicochemical properties and/or physicochemical constants related to reaction intermediates and final compounds – drugs, i.e., solubility in various solvents, melting point values, surface properties – surface tension γ (Traube stalagmometric method), electronic properties – $\log \epsilon$ values (UV/Visible Spectrophotometry), electronic properties – acid-base dissociation constants pK_a (titration methods), lipohydrophilic properties – retention factor $\log k$ (Reversed-Phase High-Performance Liquid Chromatography), partition coefficient $\log P_{\text{exp}}$ (shake-flask method), stability properties in acidic, alkaline and oxidizing media as well as kinetics studies; estimation of relevant parameters.

1ST-12TH WEEK – PART B

Extended knowledge regarding pharmacodynamic classes / particular drugs (introduced by a teacher; structure of the presentation: definitions, division of a pharmacodynamic class from a chemical point of view, chemical structures of particular compounds, brief but precise mechanisms of action, structure–activity relationships, structure–pharmacokinetics or structure–toxicity relationships eventually, biotransformation pathways of particular compounds) as follows:

- a) Analgesics–Antipyretics,
- b) Disulfiram,
- c) Drugs Supporting Acidosis. Antacids and Anti-Ulcer Drugs,
- d) Disinfectants and Antiseptics,
- e) Sulfonamides.

Recommended literature:

The Lectures from the Pharmaceutical Chemistry (2) Course

Abraham, D.J., & Rotella, D.P. (2010). *Burger's Medicinal Chemistry and Drug Discovery*, 8 Volume Set. 7th Ed. Wiley, Hoboken, NY, United States of America, 6416 pp.

Avendaño, C., & Menéndez, J.C. (2015). *Medicinal Chemistry of Anticancer Drugs*. 2nd Ed. Elsevier, Amsterdam, the Netherlands; Elsevier, Kidlington, Oxford, United Kingdom; Elsevier, Waltham, MA, United States of America, 744 pp.

Beale, J.M., & Block, J.H. (2011). *Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry*. 12th Ed. Wolters Kluwer Health (Lippincott Williams & Wilkins), Philadelphia, United States of America, 1022 pp.

Chackalamannil, S., Rotella, D., & Ward, S. (2017). *Comprehensive Medicinal Chemistry III*, 3rd Ed. Elsevier, Amsterdam, Netherlands, 4536 pp.

Desai, M.C., Meanwell, N.A., Thurston, D.E., Ganellin, R., Fox, D., Guccione, S., Martinez, A., Rotella, D., Belema, M., Sperandio, D., Shi, P.-Y., Jordan, R., Halcomb, R., Roberts, Ch., Johns, B.A., Griffin, S., Beaulieu, P.L., McCauley, J.A., Sofia, M., Xu, L., Guyer, B., & Peel, M.R. (2013). *Successful Strategies for the Discovery of Antiviral Drugs: RSC (Drug Discovery)*. Drug Discovery Series No. 32, Royal Society of Chemistry, Cambridge, United Kingdom, 533 pp.

Firestine, S.M., Lister, T., Abel-Santos, E., Hedstrom, L., Melander, Ch., Fisher, S., Khursigara, C., Lazarides, L., Garneau-Tsodikova, S., & Balibar, C.J. (2017). *Antibiotic Drug Discovery: New Targets and Molecular Entities*. 1st Ed., Kindle Ed. Drug Discovery Series No. 58, Royal Society of Chemistry, Cambridge, United Kingdom, 285 pp.

Chackalamannil, S., Rotella, D., & Ward, S. (2017). *Comprehensive Medicinal Chemistry III*, 3rd. Ed. Elsevier, Amsterdam, Netherlands, 4536 pp.

Kos, J., & Garaj, V. (2020). *Laboratory Practices from Pharmaceutical Chemistry*. 1st Ed. Faculty of Pharmacy, Comenius University in Bratislava, 184 pp.

Patrick, G.L. (2017). *An Introduction to Medicinal Chemistry*. 6th Ed. Oxford University Press, New York, USA, 832 pp.

Roche, V.F., Zito, S.V., Lemke, T.L., & Williams, D.A. (2019). *Foye's Principles of Medicinal Chemistry*. 8th Ed. Wolters Kluwer Health Adis (ESP), Baltimore, USA, 1168 pp.

Silverman, R.B., & Holladay, M.W. (2015). *The Organic Chemistry of Drug Design and Drug Action*. 3rd. Ed. Elsevier, Waltham, USA, 521 pp.

Silverstein, R.M., Webster, F.X., Kiemle, D., & Bryce, D.L. (2014). *Spectrometric Identification of Organic Compounds*. 8th Ed. John Wiley & Sons, Hoboken, United States of America, 464 pp.

Wermuth, C., Aldous, D., Raboisson, P., & Rognan, D. (2015). *The Practice of Medicinal Chemistry*. 4th Ed. Academic Press (Elsevier), San Diego, CA, USA; Kidlington, Oxford, Great Britain, 903 pp.

Languages necessary to complete the course:

English language

Notes:

Past grade distribution

Total number of evaluated students: 83

A	ABS	B	C	D	E	FX
19,28	0,0	18,07	21,69	21,69	18,07	1,2

Lecturers: doc. PharmDr. Ivan Malík, PhD., PharmDr. Matej Maruniak, PhD.

Last change: 22.03.2022

Approved by: doc. PharmDr. Ivan Malík, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/06-Mgr-A/22	Course title: Pharmaceutical Informatics
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 4.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Compulsory completion of all teaching (lectures, seminars). During the semester, 2 credit tests are written. The final exam takes place in the form of a written test. The minimum success rate is 60%. Grading scale: A = 100-95%, B = 94-85%, C = 84-75%, D = 74-70%, E = 69-60%, FX = 59% and less. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The subject connects the world of medicines and pharmaceuticals with computer science and its current methods and tools. After completing the course, the student is able to work independently and creatively with information systems of medicines and pharmaceuticals, interpret data on medicines and pharmaceuticals in their wide range of pharmaceutical and clinical issues. By completing the course, the student is able to understand pharmacotherapy as an information process, is able to use a computer at work as a clinical tool for decision-making in the field of treatment, generate and interpret outputs, is able to communicate with databases of medicinal products, including searches in digital spaces (including Evidence - based pharmacy) and take advantage of the advances in e-pharmacy and e-health. Successful completion of the course is a student qualified for the use of procedures and techniques of working with pharmaceutical data banks and understands information flows in the field of medicines and pharmaceuticals, including the ability to work with bibliographic databases as a source of new knowledge. Students can use current versions of the application software in their professional activities.	
Class syllabus: The subject of the discipline Pharmaceutical Informatics are medicinal substances and a complex of structured data about them. The course appropriately synthesizes the professional pharmaceutical need for knowledge about medicinal products and pharmaceuticals with the simultaneous necessary electronic form of collection, processing and routine use of pharmaceutical data and information. <ul style="list-style-type: none"> · Information system as a central concept of pharmacoinformatics, · Pharmaceutical computing, · Computer as a means of implementing the professional requirements of the pharmacist for the treatment of professional pharmaceutical data and media, 	

- Current information systems, drug and drug databases,
- Compatibility of pharmaceutical data, their current types and shapes.
- Medicines and medicines, their properties in terms of their IT specificity and taking into account the needs formulated by the information process,
- Local and network technologies in the field of medicines and medicines and work with them,
- Seminars are active and individual communication with computers at workstations of computer laboratories in solving pharmacoinformatics problems,
- Creation of skills, knowledge and skills in solving theoretical and practical information problems related to medicines and medicines,
- Knovelization, virtual libraries, bibliographic databases.

Recommended literature:

Professional journal and Internet resources according to individual topics, as a temporary solution to the forthcoming text.

Languages necessary to complete the course:

English language

Notes:

Past grade distribution

Total number of evaluated students: 43

A	ABS	B	C	D	E	FX
90,7	0,0	6,98	2,33	0,0	0,0	0,0

Lecturers: prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Zuzana Koblišková, PhD.

Last change: 11.09.2024

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF/VP-2-A/22			Course title: Pharmaceutical Internship			
Educational activities: Type of activities: practice Number of hours: per week: per level/semester: 37,5s Form of the course: on-site learning						
Number of credits: 2						
Recommended semester: 1., 2., 3., 4., 5., 6., 7., 8., 9., 10..						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 1						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	100,0
Lecturers: PharmDr. Miroslava Snopková, PhD.						
Last change:						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFChL/21-Mgr-A/21	Course title: Pharmaceutical Physics
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 2 per level/semester: 28 / 28 Form of the course: on-site learning	
Number of credits: 5	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Students are obliged to perform all laboratory experiments prescribed by the teacher and hand in all reports (assessment 0-8 points per report). Students will write at least two tests during semester regarding preparedness to experiment (assessment 0-6 points per test). In the middle and at the end of semester special tests will be written - problem solving regarding preparation and composition of solutions (assessment 0-3 points per test). The total assessment of laboratory practical is the sum of the average value of reports, average value of tests plus two special tests. Laboratory practical is successfully completed when the student achieves at least 10 points, the highest evaluation is 20 points. During examination period students will take an exam with max. points 80. The assessment of this exam is added to the assessment of the laboratory practical and this sum determines the final mark. Students will be given details of the exam in the first week of the semester. The total assessment of the subject: A 92-100 %, B 84-91 %, C 76-83 %, D 68-75, E 60-67, Fx 59% and less. Scale of assessment (preliminary/final): 20/80	
Learning outcomes: By the completion of the subject Pharmaceutical Physics student will achieve basic knowledge from these areas of physics that are necessary for understanding logical relationships in other subjects especially Physical Chemistry and Pharmaceutical Technology. Student will acquire skills needed for successful experimental work in laboratory. Student acquaints with simple physical methods described in pharmacopeia (measurement of density of liquids, surface tension of liquids, viscosity, measurement of melting and boiling point, electrical conductance of liquids, etc.). Emphasis is placed on elaboration, evaluation and interpretation of measured data.	
Class syllabus: Lectures: Physical quantities and units. Kinematics and dynamics of mass point: uniform motion, accelerated motion, circular motion, harmonic vibrations. Newton's laws. Mass and gravity. Mechanical work and power. Kinetic and potential energy.	

Solid body mechanics: rotational motion, friction, distortion.
 Hydrostatics: Pascal law, hydrostatic pressure, Archimedes principle, density and its measurement, surface tension and its measurement.
 Hydrodynamics: flow of ideal liquid, continuity principle, Bernoulli's principle. flow of nonideal liquid. Poiseuille's law.
 Heat and temperature: absolute temperature scale, thermal expansion, processes in ideal gas, state equation of ideal gas, van der Waals equation of real gas, Dalton principle, Avogadro principle, Calorimetry. Transport of heat. 1. Fick's principle.
 Reversible thermodynamics: internal energy and other thermodynamic potentials. Zero, first, second and third 0, I., II. and III. law of thermodynamics.
 Electrostatics: Coulomb law. Intensity and potential of electric field. electrical properties of matter. Electrical current. Ohm's law. Galvanic cells.
 Magnetism: Induction of magnetic field. Magnetic properties of matter Mass spectrometry. Electromagnetic radiation and its dual nature. Geometrical optics, refraction index and its measurement. Interference and polarization of light. RTG radiation. Absorption of electromagnetic radiation. Lambert-Beer law.
 List of laboratory exercises:
 Mass and weight – Weighing on the analytical balance.
 Weighing and preparation of aqueous solutions.
 Density determination by pycnometer.
 Density determination by densimeter.
 Polarimetry.
 Conductometry – determination of the conductivity of acetic acid solutions.
 Boiling point and melting point.
 Surface tension of liquids measured by stalagmometer.
 Determination of viscosity using Höppler viscosimeter.
 Calorimetry – determination of the specific melting heat of ice.
 Refractometry.
 UV VIS spectrometry.

Recommended literature:

Nicholas Giordano: College Physics, Reasoning & Relationship, Volume 1 and 2, Purdue University, BROOK/COLE Gengage Learning., Boston 2013
 Lectures (PowerPoint) accessible on MS Teams
 Study materials for Laboratory Practical from Physics, <https://www.fpharm.uniba.sk/en/divisions/department-of-physical-chemistry-of-drugs/education/>
 Videos for Laboratory Practical from Physics accessible on MS Teams

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 98

A	ABS	B	C	D	E	FX
3,06	0,0	14,29	13,27	20,41	15,31	33,67

Lecturers: RNDr. Alexander Búcsi, PhD., doc. RNDr. Jana Gallová, CSc., Mgr. Mária Klacsová, PhD., Mgr. Lukáš Hubčík, PhD.

Last change: 17.06.2025

Approved by: doc. RNDr. Jana Gallová, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/07-Mgr-A/22	Course title: Pharmaceutical Propaedeutics
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Student evaluation is in the form of an exam, in writing, the minimum scale to pass is 60%. Grades: A: 92-100%, B: 83-91%, C: 76-82%, D: 68-75%, E: 60-67%, Fx: 59% and less. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: Pharmaceutical Propaedeutics is an introductory course to a five-year study program leading to Master of Pharmacy. Students receive basic information about pharmaceutical education, its disciplines, structure and organization. Students will also know how to utilize traditional and electronic information resources available for study at the University. The insight into history of medicine and pharmacy, enrich students' knowledge on how the profession and medicines have evolved. Nowadays prospects of pharmaceutical sciences are demonstrated with an emphasis on developing knowledge, acquired skills and behavior within pharmaceutical professions. The course underlines a uniqueness of pharmacy as an interdisciplinary field, which remarkably interlaces with social, humanistic and natural sciences. With regards to such interconnectivity and applied knowledge to professional life of pharmacists, the course discusses wide spectrum of job opportunities for pharmacists. Learning objectives are aimed on better understanding of pharmacists' roles and responsibilities as well as on their continuing and long-life professional development. Students also explore how pharmacists play an integral role in improving health outcomes for patients, and which pharmaceutical services represent value added contribution to health.	
Class syllabus: <ul style="list-style-type: none"> - Higher education in Slovakia, studying at university. - Comenius University in Bratislava - history and present. - Overview of history of pharmacy. - Pharmaceutical education towards a qualified pharmacist (7-star Pharmacist). - New paradigm in changing pharmaceutical environment. - Pharmaceutical sciences and pharmaceutical industries. - Healthcare systems - organizational structure. - Positioning of pharmacy in healthcare system. - Health strategy - political, legislative and financial aspects. 	

- Development, trends and present profession of a pharmacist.
- Health legislation and pharmacy. Ethical Code for Pharmacists.
- Intro to regulatory affairs.
- Libraries, classical and electronic information resources, the basics of information.

Recommended literature:

- Kelly, W. N. Pharmacy. What It Is and How It Works. 2012, third edition. CRC Press, Taylor & Francis Group, LLC. 2012, 452p. ISBN 978-1-4398-5305-4.
- Bissel, P., Traulsen, J.M.: Sociology and pharmacy practice, London, Pharmaceutical Press, 2005, 226 p.
- Royal Pharmaceutical Society. Medicines, Ethics and Practice. The professional guide for pharmaceuticals. Edition 39, July 2015, 202p.
- Other references – available online – to be specified at lectures
- Carter, J., Slack M., Pharmacy in Public Health. Basics and Beyond. 2010. American Soc. Health-System Pharmacists, Inc. 2010, 390p. ISBN 978-1-58528-172-5.

Languages necessary to complete the course:

English language.

Notes:

Past grade distribution

Total number of evaluated students: 45

A	ABS	B	C	D	E	FX
53,33	0,0	2,22	28,89	0,0	0,0	15,56

Lecturers: prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Ľubica Lehocká, PhD., PharmDr. Lucia Masaryková, PhD.

Last change: 01.04.2022

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/600-Mgr-A/25	Course title: Pharmaceutical Technology
Number of credits: 4	
Recommended semester: 7., 8..	
Educational level: I.II.	
Course requirements: The state exam can be taken by a student who has successfully completed the following subjects: Biopharmaceutical Technology, Pharmaceutical Physics, Pharmaceutical Technology (1), Pharmaceutical Technology (2), Physical Chemistry.	
Learning outcomes: By passing the exam, the student demonstrates comprehensive knowledge in the entire field of pharmaceutical technology and the formulation, evaluation, production and quality assurance of drugs. The graduate understands the connection of professional knowledge from various areas of pharmaceutical technology and is able to analyze and apply theoretical knowledge in the provision of pharmacy health care and the performance of other professional activities of a pharmacist.	
Class syllabus: The state exam consists of an oral theoretical exam before a state exam committee. The student randomly selects one question from the designated categories.	
State exam syllabus:	
Last change: 03.04.2025	
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH	

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KGF/05-Mgr-A/22	Course title: Pharmaceutical Technology (1)
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 4 / 5 per level/semester: 56 / 70 Form of the course: on-site learning	
Number of credits: 9	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: KFCHL/08-Mgr-A/00 Physical Chemistry, KFANF/02-Mgr-A/00 Analytical Chemistry (2) KFB/05-Mgr-A/00 Pharmacognosy (2); KFCH/06-Mgr-A/00 Pharmaceutical Chemistry (2)	
Course requirements: Attendance of the lectures and practical exercises is obligatory. On each practical, a test is written, and at least 60% must be achieved from each test. Methods and options for compensating absences will be defined in the course syllabus. The course is completed when at least 60% is achieved in the final oral exam. Assessment: A: 93.00–100.00%, B: 85.00–92.99%, C: 77.00–84.99%, D: 69.00–76.99%, E: 60.00–68.99%, FX: less than 60.00%. Scale of assessment (preliminary/final): 20/80	
Learning outcomes: Learning outcomes: Pharmaceutical technology deals with the composition, formulation, manufacturing, evaluation, and quality of medicines and drug products. It studies the conditions under which drugs and pharmaceutical excipients are transformed into a medicines by technological processes, and the relationships of the medicines to the effect and action of the drug. After passing the course, the student will have a complex theoretical knowledge of drug products and medicines as dispersion and application systems and practical experience in dosage forms. The students will be able to prepare basic dosage forms (e.g., gels, solutions, ointments, creams, sterile products, etc).	
Class syllabus: Introduction to the subject. Pharmaceutical technology (galenics). Biogalenics. Medicine as an application and dispersion system. Systematic classification of medicines and their forms. Technological procedures and equipment for the preparation and production of medicines. Pharmaceutical auxiliary substances - excipients. Colloidal dispersion systems, lyophilic and lyophobic colloids. Dispersion system - emulsions, suspensions, powders.	

<p>Medicines obtained by extraction methods. Oral and oral liquid medications. Oral and oral solid medicines - granules, tablets, films, lozenges and chewing gum Parenteral drugs - injections, infusion solutions - production, use. Parenteral drugs with controlled distribution. Eye medicines, nasal medicines, ear medicines. Technology of preparation of vaccines and radiopharmaceuticals Rectal and vaginal medications Quality control of medicines</p>						
<p>Recommended literature: Aulton, M. E.: Aulton´s Pharmaceutics: the design and manufacture of medicines. Edinburgh: Churchill Livingstone, European Pharmacopoeia current edition. Strasbourg: EDQM. Lectures in Pharmaceutical technology Tichý E., Starýchová L., Čuchorová M.: Solid dosage forms – Laboratory practices, Bratislava UK, 2015 Tichý E., Špaglová M., Bartoníková K.: Liquid dosage forms – Laboratory practices, Bratislava UK, 2016 Tichý E., Šimunková V., Halenárová A.: Emulsions, suspensions, ointments, creams, pastes, suppositories, and pessaries – Laboratory practices, Bratislava UK, 2017 https://www.fpharm.uniba.sk/pracoviska/ustredna-kniznica/externe-informacne-zdroje/</p>						
<p>Languages necessary to complete the course: English</p>						
<p>Notes:</p>						
<p>Past grade distribution Total number of evaluated students: 61</p>						
A	ABS	B	C	D	E	FX
22,95	0,0	26,23	19,67	18,03	8,2	4,92
<p>Lecturers: PharmDr. Mária Čuchorová, PhD., PharmDr. Alžbeta Lengyelová, PharmDr. Veronika Šimunková, PhD., PharmDr. ThLic. Mária Raučinová, PhD., PharmDr. Miroslava Špaglová, PhD., Ing. Michael Kenneth Lawson, PhD., doc. PharmDr. Juraj Piešťanský, PhD., PharmDr. Miroslava Potůčková, PhD., PharmDr. Zuzana Berkešová, PhDr. Eva Nováková, PharmDr. Paula Čermáková, PharmDr. Andrea Halenárová, PharmDr. Patrícia Jackuliaková, Mgr. Ivana Kopáčová, PharmDr. Andrej Kováč, PhD., Mgr. Daniel Krchňák, DiS, Ing. Silvia Molnárová</p>						
<p>Last change: 12.09.2024</p>						
<p>Approved by: prof. PharmDr. Ján Klimas, PhD., MPH</p>						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KGF/06-Mgr-A/22	Course title: Pharmaceutical Technology (2)
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 4 / 5 per level/semester: 56 / 70 Form of the course: on-site learning	
Number of credits: 9	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Attendance of the lectures and practical exercises is obligatory. On each practical exercise, a test is written, and at least 60 % must be achieved from each test. Methods and options for compensating absences will be defined in the course syllabus. The course is completed when at least 60% is achieved in the final oral exam. Assessment: A: 93.00–100.00%, B: 85.00–92.99%, C: 77.00–84.99%, D: 69.00–76.99%, E: 60.00–68.99%, FX: less than 60.00%	
Learning outcomes: Pharmaceutical technology deals with the composition, formulation, manufacturing, evaluation, and quality of medicines and drug products. It studies the conditions under which drugs and pharmaceutical excipients are transformed into medicines by technological processes, and the relationships of the medicines to the effect and action of the drug. After passing the course, the student will have a complex theoretical knowledge of the drug products and medicines as dispersion and application systems and practical experience in the compounding of dosage forms. The students will be able to prepare basic dosage forms (e.g., tablets, coated tablets, extracts, emulsions, etc.).	
Class syllabus: <ul style="list-style-type: none"> • Semi-solid preparations for cutaneous application. The basis for semi-solid preparations. Production. • Transdermal therapeutic systems. Medicinal and cutaneous patches. • Solid dosage forms for oral application (tablets, coated tablets, capsules). • Preparations for inhalation. Aerodispersions. • Modified release dosage forms. Time- and site-specific drugs. • Dosage microforms. Drug carriers - lipid and polymeric nanoparticles. • Drug release, release, and absorption kinetics. • Biopharmacy, mechanism of drug transfer through biological membranes, bioavailability. • Stability and stabilization of drug products. • Quality assurance in pharmaceutical production and quality control. • Pharmaceutical packs and packaging. • Biologics and biosimilars. 	

Recommended literature:

Aulton, M. E.: Aulton's Pharmaceutics: the design and manufacture of medicines. Edinburgh: Churchill Livingstone,

Lectures in Pharmaceutical technology

Tichý E., Starýchová L., Čuchorová M.: Solid dosage forms – Laboratory practices, Bratislava UK, 2015

Tichý E., Špaglová M., Bartoníková K.: Liquid dosage forms – Laboratory practices, Bratislava UK, 2016

Tichý E., Šimunková V., Halenárová A.: Emulsions, suspensions, ointments, creams, pastes, suppositories, and pessaries – Laboratory practices, Bratislava UK, 2017

European Pharmacopoeia current edition. Strasbourg: EDQM.

<https://www.fpharm.uniba.sk/pracoviska/ustredna-kniznica/externe-informacne-zdroje/>

Languages necessary to complete the course:

English

Notes:**Past grade distribution**

Total number of evaluated students: 133

A	ABS	B	C	D	E	FX
20,3	0,0	19,55	19,55	19,55	15,79	5,26

Lecturers: PharmDr. Alžbeta Lengyelová, PharmDr. Veronika Šimunková, PhD., PharmDr. ThLic. Mária Raučinová, PhD., PharmDr. Mária Čuchorová, PhD., PharmDr. Miroslava Špaglová, PhD., PharmDr. Veronika Mikušová, PhD., Ing. Michael Kenneth Lawson, PhD., PharmDr. Desana Matušová, PhD., PharmDr. Miroslava Potúčková, PhD., doc. PharmDr. Juraj Piešťanský, PhD., PharmDr. Jarmila Prieložná, Mgr. Daniel Krchňák, DiS, PharmDr. Zuzana Berkešová, PharmDr. Paula Čermáková, PharmDr. Andrea Halenárová, Mgr. Ivana Kopáčová, PhD. Eva Nováková

Last change: 16.08.2024

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/700-Mgr-A/25	Course title: Pharmacognosy
Number of credits: 4	
Recommended semester: 7., 8..	
Educational level: I.II.	
Course requirements: The state exam can be taken by a student who has successfully completed the following subjects: Biochemistry, Pharmaceutical Botany, Pharmaceutical Physics, Pharmacognosy (1), Pharmacognosy (2), Physical Chemistry, Organic Chemistry (1), Organic Chemistry (2), General and Inorganic Chemistry, General Biology.	
Learning outcomes: By passing the exam, the student demonstrates comprehensive knowledge of the entire field of pharmaceutical botany and pharmacognosy. The graduate understands the interconnection of professional knowledge from various areas of pharmacognosy and is able to analyze and apply theoretical knowledge in the provision of pharmacy health care and the performance of other professional activities of a pharmacist	
Class syllabus: The state exam consists of an oral theoretical exam before a state exam committee. The student randomly selects one question from the designated categories.	
State exam syllabus:	
Last change: 03.04.2025	
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH	

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFB/04-Mgr-A/24	Course title: Pharmacognosy (1)
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 3 per level/semester: 28 / 42 Form of the course: on-site learning	
Number of credits: 7	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Conditions for the successful completion of laboratory practices: <ul style="list-style-type: none"> – students are obliged to wear a white lab coat, which is necessary for laboratory work – a 100-% attendance at the laboratory practices is required – written protocols/reports from each laboratory practice are to be handed in – microscopic slides shall be handled with care – the fee to be paid for a broken microscopic slide is 2 € – students must pass two tests in the course of the semester, each of maximum 100 points; the point yield should be at least 60 % (each test). To students who fail to reach at least 60 % of points in any of the semestral tests, the chance to write a reparative test (once each) will be given and they should then reach an average of at least 60 % of points (average is to be calculated of both tests). Note: Successful passing of the laboratory practices, including the written tests, is the basic requirement to attend the exam in Pharmacognosy (1). The examiners will take into account the grades from the written tests when classifying the course of Pharmacognosy (1). Students may enter Pharmacognosy (2) in the summer semester even though been graded FX in Pharmacognosy (1). Scale of assessment (preliminary/final): 1/1	
Learning outcomes: After successful completion the student is able to discriminate basic structural classes of secondary metabolites and their biogenetic origin, to determine the plant drug identity by its macroscopic and microscopic properties.	
Class syllabus: During lectures students will be informed on the pharmacognostical part of the pharmacopoeia, especially about herbal drug monographs, on plant constituents biogenesis from primary and secondary metabolites point of view, on their function and importance in plant bodies, on classification systems and characterisation of all secondary metabolites classes based on chemical properties. Students will acquire an overview about used drugs and their main constituents, which could be a part of official phytotherapies. Content of macroscopical and microscopical part of	

practice: anatomical and morphological drug characterisation, macroscopical drug recognition in tea mixtures based on diacritic values.
Teaching includes self-study of educational videos, assigned problems and independent student work.

Recommended literature:

Nagy - Mučaji: Pharmacognosy : Natural remedies. – 1st Ed. - Bratislava : FaF UK, 2002. - 72 s.
Czige-Tóth-Tekel'ová: Practical Pharmacognosy. Microscopical and Macroscopical Identification of Herbal Drugs. FPharm CU 2013, ISBN 978-80-223-3354-2.
Current version of the European Pharmacopoeia.

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 54

A	ABS	B	C	D	E	FX
7,41	0,0	50,0	16,67	14,81	7,41	3,7

Lecturers: prof. PharmDr. Pavel Mučaji, PhD., prof. Ing. Milan Nagy, CSc., doc. PharmDr. Szilvia Czige, PhD., doc. PharmDr. Silvia Bittner Fialová, PhD., PharmDr. Vladimír Forman, PhD., Mgr. Jaroslav Tóth, PhD.

Last change: 03.06.2024

Approved by: prof. PharmDr. Pavel Mučaji, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFB/05-Mgr-A/22	Course title: Pharmacognosy (2)
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 5 per level/semester: 28 / 70 Form of the course: on-site learning	
Number of credits: 8	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Course requirements: 1. Conditions for successful completion of the exercise: - obtaining a minimum of 60% points in each of the tests, - development and presentation of an analytical protocol, - complete the prescribed exercises. 2. Continuous evaluation of practical exercises: - 2 semester tests - always with a maximum of 100 points; - a student who fails to obtain at least 60% of the marks in each of the two tests is entitled to one retake test in each of the prescribed tests. The result of a given retake test, if at least 60% of the points, will be substituted for the number of points of the retake prescribed test. The focus of the retake test will be the same as that of the failed test. If the student does not score at least 60% on both of the semester tests, the focus of the retake test will include the topics of both failed tests. If the student fails to meet the minimum average score requirement of 60% on the above tests, the instructor will award the student a grade of FX, which will prevent the student from attending the Pharmacognosy (2) examination. Such student shall be required to take the failed/absent prescribed tests when the Pharmacognosy (2) course is carried forward to the next academic year. The final average % grade (score of at least 60%) for the tests will be included in the overall course grade by 1/3, with the remaining 2/3 being the exam grade. Scale of assessment (preliminary/final): 1/2	
Learning outcomes: After successful completion of the training process, the student is able to classify herbal medicines according to their use in prevention and therapy, to correlate their biological effects with their main types of content substances, to know the classification of adverse effects and interactions of natural medicines, and to assess the quality of a herbal drug on the basis of pharmacognostic pharmacopoeial evaluation.	
Class syllabus: Students receive information on the classification of drugs according to therapeutic use, including basic information on side effects and drug interactions caused by ingredients of natural origin.	

Emphasis is placed on herbal drugs and their active substances, which are part of the registered phytopharmaceuticals in EU countries or are registered in the current edition of the European Pharmacopoeia. In the chemical part of the practical exercises, students are introduced to selected pharmacopoeial methodologies for testing the identity of drugs and the determination of the content of active substances. They are also trained in the basic procedures of extraction and isolation of substances from plant material with emphasis on chromatographic methods.

Recommended literature:

Nagy - Mučaji: Pharmacognosy : Natural remedies. – 1st Ed. - Bratislava : FPharm CU, 2002. - 72 p.

Mučaji - Nagy: Pharmacognosy : Analytical and chromatographic practice. - 2nd rev. Ed. - Bratislava : FPharm CU, 2011. - 75 p.

Current version of the European Pharmacopoeia.

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 34

A	ABS	B	C	D	E	FX
5,88	0,0	32,35	20,59	8,82	5,88	26,47

Lecturers: prof. PharmDr. Pavel Mučaji, PhD., prof. Ing. Milan Nagy, CSc., doc. PharmDr. Szilvia Czigele, PhD., doc. PharmDr. Silvia Bittner Fialová, PhD., PharmDr. Vladimír Forman, PhD., Mgr. Jaroslav Tóth, PhD.

Last change: 20.02.2025

Approved by: prof. PharmDr. Pavel Mučaji, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFChL/16-Mgr-A/25	Course title: Pharmacokinetic Modelling and Drug Development
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Mathematics for Pharmacists, Physical Chemistry, Pharmaceutical Chemistry, Pharmacology, Toxicology	
Course requirements: The exam consists of a written test worth 80 points. To obtain an A rating, a total of 74 points or more is required, to obtain a B rating at least 68 points, to obtain a C rating at least 62 points, to obtain a D rating at least 55 points, and to obtain an E rating at least 48 points.	
Learning outcomes: The course is suitable for students of Pharmacy program who are aiming to pursue a research carrier. Students will hear about mathematical models of disposition kinetics of chemicals in the body and will master physicochemical principles of relationships between pharmacokinetic profile and molecular structure of potential drugs. After passing the course the students will be familiar with methods of determination and in silico prediction of transport properties of drugs. They will obtain a broader picture of the complex issue of research and optimization of properties of compounds undergoing pharmaceutical development. The student will be able to use the acquired skills in drug discovery programs.	
Class syllabus: Phenomenological approach to transport and fate of a drug in the organism. Principles and mathematical models of kinetics of absorption, disposition and biological effect of a drug. Pharmacokinetic compartmental models of distribution based on the physiology of human body. Kinetic parameters and their significance in drug design. Methods for prediction of physicochemical properties and kinetic parameters of bioactive compounds from their molecular structure. Optimization of biological screening tests and interpretation of experimental data.	
Recommended literature: M. Boroujerdi: Pharmacokinetics: Principles and Applications, McGraw-Hill, New York, NY, U.S.A., 2002. E. H. Kerns, L. Di: Drug-like Properties: Concepts, Structure Design and Methods, Elsevier, Burlington, MA, U.S.A., 2008.	

G. Keserü, D. C. Swinney: Thermodynamics and Kinetics of Drug Binding, Vol. 65, Series: Methods and Principles in Medicinal Chemistry, Wiley-VCH Verlag, Weinheim, Germany, 2015.
G. L. Patrick: An Introduction to Medicinal Chemistry, 5th Ed., Oxford University Press, Oxford, UK, 2013.

Languages necessary to complete the course:

English

Notes:

The capacity of the course is restricted to 10 - 15 students. Priority will be given to students with better grades (superior weighted study average determined according to the Study Code of the Faculty of Pharmacy). Please consult the teacher before signing up for this course.

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: prof. Ing. Vladimír Frecer, DrSc., Mgr. Mária Klacsová, PhD.

Last change: 31.03.2025

Approved by: prof. Ing. Vladimír Frecer, DrSc.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/800-Mgr-A/25	Course title: Pharmacology
Number of credits: 4	
Recommended semester: 7., 8..	
Educational level: I.II.	
Course requirements: The state exam can be taken by a student who has successfully completed the following courses: Analytical monitoring of drug levels in practice, Anatomy and physiology, Biochemistry, Pharmacology (1), Pharmacology (2), Genetics and pharmacogenomics, Immunology, Clinical pharmacy and pharmacotherapy, Clinical pharmacology and pharmacotherapy, Microbiology, Pathology, Biotechnology, Toxicology, General biology.	
Learning outcomes: By passing the exam, the student demonstrates comprehensive knowledge in the entire field of basic and clinical pharmacology, pharmacotherapy and clinical pharmacy. The graduate understands the connection of professional knowledge from various areas of pharmacology and is able to analyze and apply theoretical knowledge in the provision of pharmacy health care and in the performance of other professional activities of a pharmacist.	
Class syllabus: The state exam consists of an oral theoretical exam before a state examination committee. The student randomly selects one question from the designated categories.	
State exam syllabus:	
Last change: 03.04.2025	
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH	

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/08-Mgr-A/20	Course title: Pharmacology (1)
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 3 per level/semester: 28 / 42 Form of the course: on-site learning	
Number of credits: 6	
Recommended semester: 4.	
Educational level: I.II.	
Prerequisites:	
Course requirements: During the semester, students pass 2 midterm tests; to pass the test at least 60% of maximum score is required. Successful completion of the semester is followed by a comprehensive exam test. The student must demonstrate mastery of at least 60% of the required knowledge. The exam result is graded: A (at least 92%), B (at least 83%), C (at least 76%), D (at least 68%), E (at least 60%) and Fx (less than 60% of the maximum number points). Scale of assessment (preliminary/final): 0/100	
Learning outcomes: Pharmacology is a profile subject of pharmaceutical study which is linked with both pharmacy and medicine. The subject is part of five leading subjects included into a complex state exam finishing the study at Faculty of Pharmacy.	
Class syllabus: Introduction to the study, general principles how drugs act. Drug toxicity. Pharmacodynamics and pharmacokinetics as basic parts of pharmacology. Receptor theory. Agonism, antagonism, receptor proteins, cellular mechanism of intercellular signal transduction. Desensitization and tachyphylaxis. Drug interactions. Adverse reactions to drugs. Basic pharmacokinetic processes and parameters. Autonomic nervous system. Adrenergic and cholinergic transmission. Neuromuscular blocking drugs, skeletal muscle relaxants. Peripheral autacoids.	
Recommended literature: Ritter J., Flower R. et al.: Rang and Dale's Pharmacology, 9th ed. London, Elsevier, 2019 Lüllmann, H., Mohr, K., Wehling, M.: Pharmacology and Toxicology. Thieme, 2004 Katzung, B. G.: Basic and Clinical pharmacology. 14e McGraw-Hill, 2018	
Languages necessary to complete the course: English	
Notes:	

Past grade distribution						
Total number of evaluated students: 114						
A	ABS	B	C	D	E	FX
7,02	0,0	22,81	20,18	25,44	13,16	11,4
Lecturers: doc. Mgr. Peter Vavrinec, PhD., doc. Mgr. Diana Vavrincová, PhD., doc. PharmDr. Marek Máťuš, PhD., prof. PharmDr. Ján Klimas, PhD., MPH, doc. PharmDr. Peter Křenek, PhD., PharmDr. Zuzana Kiliánová, PhD., doc. PharmDr. Anna Paul Hrabovská, PhD., prof. PharmDr. Adriana Duriš Adameová, DrSc., PharmDr. Gabriel Dóka, PhD., doc. PharmDr. Tomáš Rajtík, PhD., PharmDr. Katarína Hadová, PhD.						
Last change: 13.09.2023						
Approved by: doc. PharmDr. Marek Máťuš, PhD., prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/09-Mgr-A/25	Course title: Pharmacology (2)
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 4 / 2 per level/semester: 56 / 28 Form of the course: on-site learning	
Number of credits: 7	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: During the semester, students pass 2 midterm tests; to pass the test at least 60% of maximum score is required. Successful completion of the semester is followed by a comprehensive exam. The student must demonstrate mastery of at least 60% of the required knowledge. The exam result is graded: A (at least 92%), B (at least 83%), C (at least 76%), D (at least 68%), E (at least 60%) and Fx (less than 60% of the maximum number points). Scale of assessment (preliminary/final): 0/100	
Learning outcomes: Pharmacology is a profile subject of pharmaceutical study which is linked with both pharmacy and medicine. The subject is part of five leading subjects included into a complex state exam finishing the study at Faculty of Pharmacy.	
Class syllabus: Specific part of pharmacology deals with drugs affecting major organ systems and with their effects on subcellular and cellular structures and/or tissues, including adverse and toxic effects of drugs. Pharmacology of pain – General and Local anesthetics, analgesic drugs. Anti-inflammatory drugs. Drugs influencing CNS – neurotransmitters, classification. Drugs of neurodegenerative diseases. Antiparkinsonics. Antiepileptics. Anxiolytic and Hypnotic drugs. Antipsychotics. Antidepressants. CNS stimulants and psychotomimetic drugs. Cardiovascular system – therapy of heart failure. Antianginal drugs. Lipid lowering drugs. Antihypertensives. Antidysrhythmics. Vasoactive drugs. Anticoagulant and Antiplatelet drugs. Pharmacology of respiratory system (antiasthmatics, drugs against cough). Drugs influencing gastrointestinal system. Pharmacology of endocrine and reproductive system. Antibacterial, antiviral, antifungal and antiprotozoal drugs. Cancer therapy. Biopharmaceuticals.	
Recommended literature: Ritter J., Flower R. et al.: Rang and Dale's Pharmacology, 9th ed. London, Elsevier, 2019 Lüllmann, H., Mohr, K., Wehling, M.: Pharmacology and Toxicology. Thieme, 2004	

Katzung, B. G.: Basic and Clinical pharmacology. 14e McGraw-Hill, 2018						
Languages necessary to complete the course: English						
Notes:						
Past grade distribution Total number of evaluated students: 26						
A	ABS	B	C	D	E	FX
0,0	0,0	11,54	15,38	34,62	19,23	19,23
Lecturers: prof. PharmDr. Ján Klimas, PhD., MPH, doc. PharmDr. Peter Křenek, PhD., doc. PharmDr. Marek Máťuš, PhD., doc. Mgr. Diana Vavřincová, PhD., doc. Mgr. Peter Vavřinec, PhD., PharmDr. Zuzana Kiliánová, PhD., doc. PharmDr. Anna Paul Hrabovská, PhD., prof. PharmDr. Adriana Duriš Adameová, DrSc., PharmDr. Gabriel Dóka, PhD., doc. PharmDr. Tomáš Rajtík, PhD., PharmDr. Katarína Hadová, PhD.						
Last change: 31.03.2025						
Approved by: doc. PharmDr. Marek Máťuš, PhD., prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/29-Mgr-A/20	Course title: Pharmacology of Orphan Drugs
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Completion of the courses Pathology of Rare Diseases and Pharmacology 1 is an advantage	
Course requirements: Mandatory attendance at 100% of lectures and processing of information about the selected drug in the form of a professional contribution, which will be published in the journal of the Slovak Chamber of Pharmacists Lekárnické listy. Weight of the interim / final assessment: The interim assessment consists of the assessment of ppt presentations on assigned topics. The final assessment is based on the interim assessment together with the assessment of the presentation of the contribution to the journal of the Slovak Chamber of Pharmacists Lekárnické listy.	
Learning outcomes: The subject develops the issue of rare diseases from the perspective of pharmacology but also current research projects in this area. It introduces students to treatable rare diseases. It explains the mechanisms of effects of drugs on rare diseases, indications and contraindications. By completing the subject, the student will gain basic information about treatable rare diseases, the development of drugs for rare diseases and registration, the effects of drugs on rare diseases, but also risks. He/she will gradually become familiar with selected drugs for metabolic rare diseases, rare diseases of the cardiovascular, respiratory, nervous and immune systems, or rare neuromuscular diseases and rare blood diseases. It is an advantage to complete the subject Pathology of Rare Diseases or Pharmacology 1.	
Class syllabus: <ul style="list-style-type: none"> • Concept and definition of rare disease medicines in Europe and worldwide • Research in the field of rare diseases • Practical examples of selected rare disease medicines – metabolic diseases, respiratory diseases, nervous system, neuromuscular diseases, blood diseases, immune system 	
Recommended literature: KUBÁČKOVÁ K.: Vzácná onemocnení v kosce, Maldá fronta 2014, ISBN 9788020431493, KUBÁČKOVÁ K.: Vzácné nádory v onkologii, Mladá fronta, 2015, ISBN 9788020436580, www.orpha.net , http://www.irdirc.org/ , https://www.ema.europa.eu/en , www.sukl.sk	

Languages necessary to complete the course: English language						
Notes:						
Past grade distribution Total number of evaluated students: 0						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers:						
Last change: 10.04.2025						
Approved by: doc. PharmDr. Tatiana Foltánová, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFChL/22-Mgr-A/22	Course title: Physical Chemistry
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 3 per level/semester: 28 / 42 Form of the course: on-site learning	
Number of credits: 6	
Recommended semester: 2.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Laboratory practicals: An accomplishment of all experiments assigned by the teacher and completed by experimental reports is compulsory. Reports are evaluated (0 – 4 points/report). The student's preparation for the assigned experiment is monitored by short tests (0 – 6 points/test). Final evaluation of laboratories (10 points maximum) is assessed as a sum of both averages, from reports and tests. Five point score is the minimum for successful completion of laboratories. Final exam is by written form and is worth maximally 60 points, including the points gained from laboratories. Grade expressed by percentage: A 92-100%, B 84-91%, C 76-83%, D 68-75%, E 60-67%, Fx < 59% Scale of assessment (preliminary/final): 10/50	
Learning outcomes: The course is addressed to selected areas of physical chemistry to achieve the necessary theoretical background for professional qualifications of pharmacists and their competences according to European pharmacopoeia. The aim of the course is to provide understanding of theoretical principles and methods applied in specialized pharmaceutical areas like: -technology of preparation of pharmaceuticals, drug formulae optimization and quality control -analysis and control of drugs, pharmaceuticals, radiopharmaceuticals, and excipients -action of drugs on the molecular level, drug absorption, transport through biological membranes, its distribution in living body, pharmaco-dynamics and pharmaco-kinetics. Students will acquire necessary skills for proper experimental work in the laboratory. Emphasis is put on elaboration, evaluation and interpretation of measured data.	
Class syllabus: Introduction to physical chemistry, chapters selected for pharmacists, terminology Structure of matter, atoms and molecules, forces and interactions Stability of elements, nuclear decay, kinetics of nuclear decay Basic principles of molecular spectroscopy (UV-VIS, luminescence, IR, Raman, NMR spectroscopy). Chemical thermodynamics. Gibb's free energy, entropy, spontaneity of processes. Chemical potential, activity. Phase equilibria, Gibb's phase rule, phase diagrams. Mono-, di- and multi-compounds systems.	

Solutions. Ideal and real solutions. Osmotic pressure, isotonic solutions. Condensed systems, eutectic mixtures in pharmacy
 Chemical equilibria, standard thermodynamic functions
 Electrochemistry. Strong and weak electrolytes, solubility product constant. Acid-base equilibria.
 Chemical kinetics. Simple and complex reactions. Catalysis. Enzymatic catalysis.
 Colloidal systems. Surfactants. Sedimentation and diffusion. Membranes and related phenomena. Donnan's equilibria.
 The lectures from physical chemistry are completed by practical exercises, where the students verify their theoretical knowledge in practice. We put the accent on acquiring the basic knowledge necessary for professional qualifications of pharmacists and their competences according to European pharmacopoeia, and additional subjects, mainly pharmaceutical technology.

Recommended literature:

Atkins, P. W.: Physical Chemistry, 6th edition, Oxford University Press, 1998
 Connors, K. A.: Thermodynamics of Pharmaceutical Systems : an Introduction for Students of Pharmacy. Hoboken : Wiley Interscience, 2002. 344 s.
 Amiji M.M., Sandmann B.J.: Applied Physical Pharmacy. New York : McGraw-Hill, 2003. 462 s.
 Laboratory Manual for Physical Chemistry, compiled by teachers of the Department of Physical Chemistry of Drugs.

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 64

A	ABS	B	C	D	E	FX
3,13	0,0	3,13	21,88	10,94	18,75	42,19

Lecturers: prof. RNDr. Daniela Uhríková, CSc., prof. Ing. Vladimír Frečer, DrSc., doc. RNDr. Jana Gallová, CSc., Mgr. Lukáš Hubčík, PhD., Mgr. Mária Klacsová, PhD., Ing. Jarmila Oremusová, CSc., RNDr. Alexander Búcsi, PhD.

Last change: 29.03.2022

Approved by: prof. RNDr. Daniela Uhríková, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KTV/01-Mgr-A/19			Course title: Physical Education and Sport (1)			
Educational activities: Type of activities: practicals Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 1.						
Educational level: I.II.						
Prerequisites:						
Course requirements: - active participation in lectures - 100% participation						
Learning outcomes: Lectures provide knowledge about the importance of health prevention through active physical movement of adult individuals, families and children. Practical exercises to give it ownership of the skills and practical guides.						
Class syllabus: Course contents: Level of knowledge - PE and sport as a significant social phenomenon, knowledge of the other links courses (anatomy and human physiology, biology, biochemistry, physics) to understand the structure of movement in sport. Relationship of health and vigorous physical activity. Motor level - prevention hypokinesia, expansion base exercises, candidates give ownership of movement skills in sports, tourist and recreational activities, guidance on physical exercise for maintaining health.						
Recommended literature: Stowasser, J. at al.: Telesná výchova pre študentov Farmaceutickej fakulty UK. Bratislava, 1993. 120 s.						
Languages necessary to complete the course: English language						
Notes:						
Past grade distribution Total number of evaluated students: 117						
A	ABS	B	C	D	E	FX
58,97	0,0	8,55	3,42	0,0	0,85	28,21
Lecturers: Mgr. Lenka Nagyová, PhD., PaedDr. Martina Tibenská, PhD., Mgr. Dalibor Ludvig, PhD., Mgr. Michal Tokár, PhD.						

Last change: 02.05.2024

Approved by: PaedDr. Martina Tibenská, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KTV/02-Mgr-A/19			Course title: Physical Education and Sport (2)			
Educational activities: Type of activities: practicals Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 2.						
Educational level: I.II.						
Prerequisites:						
Course requirements: - active participation in lectures - 100% participation						
Learning outcomes: Lectures provide knowledge about the importance of health prevention through active physical movement of adult individuals, families and children. Practical exercises to give it ownership of the skills and practical guides.						
Class syllabus: Level of knowledge - PE and sport as a significant social phenomenon, knowledge of the other links courses (anatomy and human physiology, biology, biochemistry, physics) to understand the structure of movement in sport. Relationship of health and vigorous physical activity. Motor level - prevention hypokinesia, expansion base exercises, candidates give ownership of movement skills in sports, tourist and recreational activities, guidance on physical exercise for maintaining health.						
Recommended literature: Stowasser, J. at al.: Telesná výchova pre študentov Farmaceutickej fakulty UK. Bratislava, 1993. 120 s.						
Languages necessary to complete the course: English language						
Notes:						
Past grade distribution Total number of evaluated students: 91						
A	ABS	B	C	D	E	FX
72,53	0,0	8,79	0,0	0,0	0,0	18,68
Lecturers: Mgr. Lenka Nagyová, PhD., Mgr. Dalibor Ludvig, PhD., PaedDr. Martina Tibenská, PhD., Mgr. Michal Tokár, PhD.						
Last change: 02.05.2024						

Approved by: PaedDr. Martina Tibenská, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KTV/03-Mgr-A/20			Course title: Physical Education and Sport (3)			
Educational activities: Type of activities: practicals Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 3.						
Educational level: I.II.						
Prerequisites:						
Course requirements: - active participation in lectures - 100% participation Scale of assessment (preliminary/final): 0/100						
Learning outcomes: Lectures provide knowledge about the importance of health prevention through active physical movement of adult individuals, families and children. Practical exercises to give it ownership of the skills and practical guides.						
Class syllabus: Level of knowledge - PE and sport as a significant social phenomenon, knowledge of the other links courses (anatomy and human physiology, biology, biochemistry, physics) to understand the structure of movement in sport. Relationship of health and vigorous physical activity. Motor level - prevention hypokinesia, expansion base exercises, candidates give ownership of movement skills in sports, tourist and recreational activities, guidance on physical exercise for maintaining health.						
Recommended literature: Stowasser, J. at al.: Telesná výchova pre študentov Farmaceutickej fakulty UK. Bratislava, 1993. 120 s.						
Languages necessary to complete the course: English language						
Notes:						
Past grade distribution Total number of evaluated students: 53						
A	ABS	B	C	D	E	FX
52,83	0,0	20,75	0,0	0,0	1,89	24,53
Lecturers: Mgr. Michal Tokár, PhD., Mgr. Dalibor Ludvig, PhD., Mgr. Lenka Nagyová, PhD., PaedDr. Martina Tibenská, PhD.						

Last change: 02.05.2024

Approved by: PaedDr. Martina Tibenská, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KTV/04-Mgr-A/20			Course title: Physical Education and Sport (4)			
Educational activities: Type of activities: practicals Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 4.						
Educational level: I.II.						
Prerequisites:						
Course requirements: - active participation in lectures - 100% participation Scale of assessment (preliminary/final): 0/100						
Learning outcomes: Lectures provide knowledge about the importance of health prevention through active physical movement of adult individuals, families and children. Practical exercises to give it ownership of the skills and practical guides.						
Class syllabus: Level of knowledge - PE and sport as a significant social phenomenon, knowledge of the other links courses (anatomy and human physiology, biology, biochemistry, physics) to understand the structure of movement in sport. Relationship of health and vigorous physical activity. Motor level - prevention hypokinesia, expansion base exercises, candidates give ownership of movement skills in sports, tourist and recreational activities, guidance on physical exercise for maintaining health.						
Recommended literature: Stowasser, J. at al.: Telesná výchova pre študentov Farmaceutickej fakulty UK. Bratislava, 1993. 120 s.						
Languages necessary to complete the course: English language						
Notes:						
Past grade distribution Total number of evaluated students: 45						
A	ABS	B	C	D	E	FX
66,67	0,0	6,67	2,22	0,0	0,0	24,44
Lecturers: Mgr. Dalibor Ludvig, PhD., PaedDr. Martina Tibenská, PhD., Mgr. Lenka Nagyová, PhD., Mgr. Michal Tokár, PhD.						

Last change: 02.05.2024

Approved by: PaedDr. Martina Tibenská, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KTV/05-Mgr-A/20	Course title: Physical Education and Sport (5)
Educational activities: Type of activities: practicals Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: - activity, 100% attendance - completion of FMS testing	
Learning outcomes: Our goal is an educated student and his active approach to proper and healthy movement. Based on the latest knowledge in the field of functional disorders of the movement system of the general population and incorrect movement stereotypes, based on the FMS (Functional Movement Screen) method and the DNS (Dynamic Neuromuscular Stabilization) concept, after completing the course, students can theoretically and practically evaluate and correct wrong movement stereotypes of a person , By obtaining information about the correct technique of exercises, it will lead to the elimination of overloading of individual parts of the body in their ordinary life, which often results in chronic pain, for example in the back. They will learn to restore, protect or improve the movement function of the body, restore correct posture and correct movement patterns, gradually eliminate muscle imbalances. Students will also learn proper breathing.	
Class syllabus: <ul style="list-style-type: none"> • Diagnostics – Functional Movement Screen (FMS), a system for evaluating movement patterns. • Correct synchronization, anatomical positions of body segments. • Postural reactivity – punctum fixum, punctum mobile. • Postural stabilization – improvement of body posture, even during movements. • Change-correction of movement patterns – DNS. • Activation of reflex locomotion patterns. • Ipsilateral and contralateral movement pattern. • By stimulating reflex points - quadropedal walking. • Use of exercise aids (Flowin, Bosu, Valslide, Theraband, Swiss Ball, Kettlebell). • Postural disharmony in anatomical disorders. 	
Recommended literature: BARDENET, S.,M., MICCA, J.,J., DeNOYELLES, J.,T. et al. Functional movement screen normative values and validity in high schol athletes: can the FMS be used as a predictor of	

injury? [online]. Int J sports Phys Ther v.10(3) [cit. 2018-03-28]. 2015, Dostupné z: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4458917/>

CHORBA, R., S. CHORBA, D., J., BOUILLON, L., E., et al.. Use of a functional movement screening tool to determine injury risk in female collegiate athletes. 2010, [online].

[cit. 2018-03-26]. Dostupné z: <https://www.ncbi.nlm.nih.gov/pubmed/21589661>

ČERMÁK, J. a kol., Záda už mě nebolí. Praha, 4. rozšířené a doplněné vydání, 2005. ISBN: 80-7236-117-1.

HAVLÍČKOVÁ, L. Fyziologie tělesné zátěže I., Nakladatelství Karolinum, Praha, 2004. ISBN 80-7184-875-1.

COOK, G. et. al. Movement: Functional Movement Systems: Screening, Assessment and Corrective Strategies. On Target Publications. 2010. pp. 373-379. ISBN: 978-1931046725.

REIMAN, M. P. a R. C. MANSKE. Functional testing in human performance. Champaign, IL; Leeds: Human Kinetics, 2009. s. 31. ISBN: 9780736068796.

KOLÁŘ, P. et al., Rehabilitace v klinické praxi. 1. vydání. Praha: Galén. 2009. ISBN: 978-80-7262-657-1.

KOLÁŘ, P. Posturální reaktivita. 2017. [online]. [cit. 2017-5-5]. Dostupné z: <http://www.dns-cz.com/diagnostika-poruch-dle-dns>

KRAČMAR, B. Kineziologická analýza sportovního pohybu, Nakladatelství: TRITON, ISBN 2002. 80-7254-292-3.

LEWIT, K. Manipulační léčba v rámci léčebné rehabilitace, Praha, 1990. ISBN: 80-7030-096-5.

LEWIT, K. Manipulační léčba v myoskeletární medicíně 5. Přepřacované vydání, Nakladatelství Sdelovací technika spol s.r.o., 1996. ISBN 80-86645-04-5

MACHOVÁ, J., D. KUBÁTOVÁ, et al. Výchova ke zdraví. Praha: Grada, 2009. ISBN: 9788024727158

MUŽÍK, V., P. VLČEK, et al., Škola, pohyb a zdraví: výzkumné výsledky a projekty. 1. vyd. Brno: MU. 2010. ISBN 978-80-210-5371-7.

VÉLE, F., Kineziologie pro klinickou praxi Vydání. 1. Praha: Grada Publishing, 1997. ISBN 80-7169-256-5.

VÉLE, F., Kineziologie, Praha: Triton. 2006. ISBN 80-7254-837-9.

Languages necessary to complete the course:

English language

Notes:

Past grade distribution

Total number of evaluated students: 10

A	ABS	B	C	D	E	FX
80,0	0,0	0,0	0,0	10,0	0,0	10,0

Lecturers: Mgr. Dalibor Ludvig, PhD., Mgr. Lenka Nagyová, PhD., PaedDr. Martina Tibenská, PhD., Mgr. Michal Tokár, PhD.

Last change: 02.05.2024

Approved by: PaedDr. Martina Tibenská, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/09-Mgr-A/23	Course title: Practice in Community Pharmacy (1)
Educational activities: Type of activities: practice Number of hours: per week: per level/semester: 20t Form of the course: on-site learning	
Number of credits: 20	
Recommended semester: 9.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: KORF/12- Mgr-A/00 Social Pharmacy and Pharmacoeconomics, KORF/10- Mgr-A/00 Retail Pharmacy, Legislation and Ethics	
Course requirements: Assessment of students is done electronically during practice and in written form in the end of practice (written assessment is made by pharmacy where the student took practice). The final evaluation is arithmetical average of both, the electronic and written assessment. Grading A: 100-93 %, B: 92-85 %, C: 84-77 %, D: 76-69 %, E: 68-60 %, Fx: 59 % and less.	
Learning outcomes: Getting acquainted with the real pharmacy environment, basic knowledge of the pharmacy's assortment of drugs, mastering of basic pharmaceutical activities under supervision of assigned professional in the pharmacy.	
Class syllabus: Characteristics of medical prescription, pharmaceutical dispensing, assortment of drugs in the pharmacy, handling pharmaceutical software, individually and mass prepared medicines, dispensing care, informing, consulting and counseling activities in providing of pharmaceutical care, self-medication (drugs dispensed without medical prescription, nutritional additives, additional assortment), medical devices, basic economic knowledge, ethical aspects of the pharmacist's profession, ethical codex of a healthcare professional.	
Recommended literature: 1. Hungman, B.: Healthcare Communication, London, Pharmaceutical Press, 2009, 304 p. 2. Veatch, R.M., Haddad, A.: Case studies in pharmacy ethics, Oxford, Univesity Press, 2008, 331 p. 3. Bissel, P., Traulsen, J.M.: Sociology and pharmacy practice, London, Pharmaceutical Press, 2005, 226 p. 4. Wingfield, J., Badcott, D.: Pharmacy ethics and decision making, London, Pharmaceutical Press, 2007, 313 p.	

5. Appelbe, G.E., Wingfield, J.: Dale and Appelbe s Pharmacy Law and Ethics, London, Pharmaceutical Press, 2005, 593 p.
6. Sexton, J., Nickless G., Green, Ch.: Pharmaceutical Care Made Easy, London, Pharnaceuticl Press, 2006, 178 p.
7. Edwards, C., Stillman, P.: Minor Illness or Major Disease? The clinical pharmacist in the community.Fourth edition, London, Pharmaceutical Press, 2006, 285 p.
8. Stephens, M.: Hospital Pharmacy, London, Pharmaceutical Press, 2006, 285 p.
9. Harman, R.J.: Patient Care in Community Practice, London, Pharmaceutical Press, 2002, 203 p.
10. Harman, R.J.: Handbook of Pharmacy Health Education, second edition, London, Pharmaceutical Press, 2001, 299 p.
11. European Pharmacopoeia – Ph. Eur. 8th Edition

Languages necessary to complete the course:

Notes:

e- Protocol of the practice is a formal evidence of undertaking of the mandatory extent of professional pharmaceutical practice according to Council Directive 85/432/EHS, 85/433/EHS, 2001/19/ES – requirements for study of pharmacy and for recognition of professional qualifications.

One week of practice is a time span characterized by five working days with 8 working hours per day. To fulfill the requirements of Council Directive 85/432/EHS, 85/433/EHS, students must complete 120 days of practice with 8 working hours per day.

Time period for the practice is set for a period of 01.08.2015 – 31.12.2015.

Past grade distribution

Total number of evaluated students: 344

A	ABS	B	C	D	E	FX
38,08	0,0	40,99	20,06	0,58	0,29	0,0

Lecturers: PharmDr. Ľubica Lehocká, PhD., PharmDr. Miroslava Snopková, PhD.

Last change: 04.08.2023

Approved by: PharmDr. Ľubica Lehocká, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/08-Mgr-A/20	Course title: Practice in Community Pharmacy (2)
Educational activities: Type of activities: practice Number of hours: per week: per level/semester: 4t Form of the course: on-site learning	
Number of credits: 6	
Recommended semester: 10.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: Social Pharmacy and Pharmacoeconomics	
Course requirements: Assessment of students is done electronically during practice and in written form in the end of practice (written assessment is made by pharmacy where the student took practice). The final evaluation is arithmetical average of both, the electronic and written assessment. Grading A: 100-93 %, B: 92-85 %, C: 84-77 %, D: 76-69 %, E: 68-60 %, Fx: 59 % and less. Scale of assessment (preliminary/final): 50/50	
Learning outcomes: Getting acquainted with the real pharmacy environment, basic knowledge of the pharmacy's assortment of drugs, mastering of basic pharmaceutical activities under supervision of assigned professional in the pharmacy.	
Class syllabus: Characteristics of medical prescription, pharmaceutical dispensing, assortment of drugs in the pharmacy, handling pharmaceutical software, individually and mass prepared medicines, dispensing care, informing, consulting and counseling activities in providing of pharmaceutical care, selftreatment (drugs dispensed without medical prescription, nutritional additives, additional assortment), medical devices, basic economic knowledge, ethical aspects of the pharmacist's profession, ethical codex of a healthcare professional.	
Recommended literature: 1. Hungman, B.: Healthcare Communication, London, Pharmaceutical Press, 2009, 304 p. 2. Veatch, R.M., Haddad, A.: Case studies in pharmacy ethics, Oxford, Univesity Press, 2008, 331 p. 3. Bissel, P., Traulsen, J.M.: Sociology and pharmacy practice, London, Pharmaceutical Press, 2005, 226 p. 4. Wingfield, J., Badcott, D.: Pharmacy ethics and decision making, London, Pharmaceutical Press, 2007, 313 p.	

5. Appelbe, G.E., Wingfield, J.: Dale and Appelbe s Pharmacy Law and Ethics, London, Pharmaceutical Press, 2005, 593 p.
6. Sexton, J., Nickless G., Green, Ch.: Pharmaceutical Care Made Easy, London, Pharnaceuticl Press, 2006, 178 p.
7. Edwards, C., Stillman, P.: Minor Illness or Major Disease? The clinical pharmacist in the community.Fourth edition, London, Pharmaceutical Press, 2006, 285 p.
8. Stephens, M.: Hospital Pharmacy, London, Pharmaceutical Press, 2006, 285 p.
9. Harman, R.J.: Patient Care in Community Practice, London, Pharmaceutical Press, 2002, 203 p.
10. Harman, R.J.: Handbook of Pharmacy Health Education, second edition, London, Pharmaceutical Press, 2001, 299 p.
11. European Pharmacopoeia – Ph. Eur. 8th Edition

Languages necessary to complete the course:

English language

Notes:

e-Protocol of the practice is a formal evidence of undertaking of the mandatory extent of professional pharmaceutical practice according to Council Directive 85/432/EHS, 85/433/EHS, 2001/19/ES – requirements for study of pharmacy and for recognition of professional qualifications.

One week of practice is a time span characterized by five calendar days with 8 working hours per day.

Past grade distribution

Total number of evaluated students: 18

A	ABS	B	C	D	E	FX
33,33	0,0	38,89	16,67	11,11	0,0	0,0

Lecturers: PharmDr. Ľubica Lehocká, PhD., PharmDr. Miroslava Snopková, PhD.

Last change: 10.04.2025

Approved by: PharmDr. Ľubica Lehocká, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KChTL/10-Mgr-A/22	Course title: Principles of Molecular Modelling
Educational activities: Type of activities: practicals / lecture Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 4.	
Educational level: I.II.	
Prerequisites:	
Course requirements: preliminary evaluation: project elaboration from practicals final evaluation: final test A: 90,01 % – 100,00 %; B: 82,01 % – 90,00 %; C: 74,01 % – 82,00 %; D: 66,01 % – 74,00 %; E: 60,01 % – 66,00 %; Fx: ≤ 60,00 %. Scale of assessment (preliminary/final): 40/60	
Learning outcomes: The course should educate the students about the basic principles of computer chemistry and the methods of computer aided molecular design.	
Class syllabus: To master the subject Principles of Molecular Modeling at a sufficient level, knowledge of the subject Organic Chemistry 1 is required. The students work with the programs available at the Department of Chemical Theory of Drugs – Alchemy, Chemwind or Chems sketch, Rasmol, MS Word, with the use of the internet network and available databases (PDB). Primarily students work on the tasks on molecules designed as potential drugs, such as finding the optimal conformation of the molecule, electron distribution in the molecule, the relationship between the structure and properties. They learn how to browse the PDB database and the principle of docking of molecules in enzyme active site. During the tuition students will elaborate their given project, each on their own molecule.	
Recommended literature: Alan Hinchliffe : Molecular Modeling for Beginners, Wiley, 2003.	
Languages necessary to complete the course: English language	
Notes: The course is held only in summer semester. Minimum of 2 students must be signed up for the course to take place.	

Past grade distribution						
Total number of evaluated students: 29						
A	ABS	B	C	D	E	FX
72,41	0,0	13,79	10,34	0,0	0,0	3,45
Lecturers: Mgr. Lucia Lintnerová, PhD., doc. Ing. Martin Pisárčik, CSc., Mgr. Peter Herich, PhD.						
Last change: 14.04.2022						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFChL/13-Mgr-A/22	Course title: Problem solving in Physics
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Student writes at least two tests during semester and the assessment of these tests determines the final mark. The limit for successful completion of the subject is 60%. Conditions for Course Completion could be changed in the case of distance form of study. Assessment: A 92-100 %, B 84-91 %, C 76-83 %, D 68-75, E 60-67, Fx 59% and less. Scale of assessment (preliminary/final): 100/0	
Learning outcomes: By completion of the subject student acquires skills in solving problems in physics in the extent needed for pharmacy students. Physical principles are applied to problems regarding different parts of pharmacy, medicine and daily life.	
Class syllabus: Problems solved during seminar are related to the topic of lectures in the subject Pharmaceutical physics: Physical quantities and units. Kinematics and dynamics of mass point. Newton's laws. Mass and gravity. Mechanical work and energy. Solid body mechanics. Hydrostatics and hydrodynamics. Heat, thermodynamics. Electrostatics. Electrical current. Magnetism. Radiation.	
Recommended literature: Nicholas Giordano: College Physics, Reasoning & Relationship, Volume 1 and 2, Purdue University, BROOK/COLE Gengage Learning., Boston 2013 Lectures (PowerPoint) accessible on MS Teams Study materials for Laboratory Practical in Physics, https://www.fpharm.uniba.sk/en/divisions/department-of-physical-chemistry-of-drugs/education/	
Languages necessary to complete the course: English	
Notes:	

Past grade distribution						
Total number of evaluated students: 15						
A	ABS	B	C	D	E	FX
40,0	0,0	26,67	6,67	0,0	0,0	26,67
Lecturers: RNDr. Alexander Búcsi, PhD., prof. Ing. Vladimír Frečer, DrSc., doc. RNDr. Jana Gallová, CSc., Mgr. Mária Klacsová, PhD.						
Last change: 17.06.2025						
Approved by: RNDr. Alexander Búcsi, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFChL/14-Mgr-A/22	Course title: Problem solving in physical chemistry
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 1	
Recommended semester: 2., 4., 6., 8., 10.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Continuous assessment by tests (minimum 2 per semester) and final test. Evaluation/grade: A 92-100 %, B 84-91 %, C 76-83 %, D 68-75, E 60-67 %, Fx <60 % Scale of assessment (preliminary/final): 30/70	
Learning outcomes: The course help students to acquire skill in solving selected problems in Physical chemistry using adequate mathematics and numerical calculation. At the same time this course provides understanding of theoretical principles applied in specialized pharmaceutical areas like analysis of drugs, drug formulae quality control, pharmacokinetics, action of drugs on the molecular level, drug absorption, etc.	
Class syllabus: Students will improve their theoretical knowledge obtained at lectures on Physical chemistry by solving problems related to selected chapters as structure of molecules and spectral methods (UV-VIS, IR, NMR), kinetics of radioactive decay, chemical thermodynamics esp. phase equilibriums and solutions, electrochemistry and acid-base equilibriums, chemical kinetics, colloids and surfaces.	
Recommended literature: Atkins, P. W.: Physical Chemistry, 6th edition, Oxford University Press, 1998 Connors, K. A.: Thermodynamics of Pharmaceutical Systems : an Introduction for Students of Pharmacy. Hoboken : Wiley Interscience, 2002. 344 s. Amiji M.M., Sandmann B.J.: Applied Physical Pharmacy. New York : McGraw-Hill, 2003. 462 s. Laboratory Manual for Physical Chemistry, compiled by teachers of the Department of Physical Chemistry of Drugs.	
Languages necessary to complete the course: English	
Notes:	

Past grade distribution						
Total number of evaluated students: 7						
A	ABS	B	C	D	E	FX
42,86	0,0	28,57	0,0	0,0	14,29	14,29
Lecturers: prof. Ing. Vladimír Frecer, DrSc., prof. RNDr. Daniela Uhríková, CSc.						
Last change: 29.03.2022						
Approved by: prof. Ing. Vladimír Frecer, DrSc.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/30-Mgr-A/24	Course title: Public Health and Pharmaceutical Care
Educational activities: Type of activities: practicals / lecture Number of hours: per week: 2 / 2 per level/semester: 28 / 28 Form of the course: on-site learning	
Number of credits: 5	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Course requirements: 1. Obligatory participation in exercises. Absence on the laboratory practical must be proved by the reason for absence and the practical must be replaced in agreement with the teacher. 2. Continuous test with a minimum success rate of 60%. Rating: A = 100-95%, B = 94-85%, C = 84-75%, D = 74-65%, E = 64-60%, Fx = 59% and less. In the case of Fx assessment, the student has one alternative attempt. 3. Completion of the subject is done by a written final exam. Rating: A = 100-95%, B = 94-85%, C = 84-75%, D = 74-65%, E = 64-60%, Fx = 59% and less. Only students who have met the above conditions (required participation in exercises, mid-term test minimum 60%) are accepted for the exam.	
Learning outcomes: By completing the course, the student will gain basic theoretical and practical knowledge about the public health of the population, health determinants, health education and promotion, protection, and prevention of chronic and infectious diseases. The student masters the basic principles of epidemiology and pharmacoepidemiology, epidemiological methods, studies, and indicators. The student has an overview of the organization and implementation of intervention programs to protect and promote health in the provision of pharmaceutical care and pharmaceutical services in public pharmacies in cooperation with other departments, especially general practitioners. They will also be acquainted with forensic activity in pharmacy. By completing the exercises, the student will gain practical skills in reducing the risk factors for chronic diseases and infectious diseases in primary prevention, screening programs, biochemical measurements performed in public pharmacies ("Point-of-Care Testing"), which can connect with proper dispensing and counselling activities and patient education.	
Class syllabus: Public health care - legislation, content, content. Public health - national and international strategies, programs, and institutions to protect and promote the health of society. Determinants of health and health status of the population. Basics of epidemiology and pharmacoepidemiology - methods, studies, indicators. Epidemiology and prevention of infectious diseases - vaccine-preventable diseases, immunization program. Surveillance as a method of work in epidemiology. Epidemiology	

of non-communicable diseases - risk factors, population impacts, monitoring. Health education and support. Health prevention and protection. Forensic aspects in pharmacy. Public health programs and interventions in public pharmacies - primary prevention, screening and biochemical measurements in public pharmacies and related dispensing and counselling and patient education in public pharmacies.

Recommended literature:

Materials available in www.moodle.uniba.sk

1. Pharmacy 2030: A Vision for Community Pharmacy in Europe, PGEU
2. Professional standards for public health practice for pharmacy. Royal Pharmaceutical Society, 2014
3. Public health a practical guide for community pharmacists, Pharmaceutical Services Negotiating Committee
4. Health 2020 A European policy framework and strategy for the 21st century, WHO 2013, ISBN 978-92-890-0279-0
5. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice
6. Standards of medical care in diabetes, ADA 2021
7. Cancer Screening Recommendations from the ACS: A Summary of the 2017 Guidelines
8. Elmore J.G. et al. Jekel's Epidemiology, biostatistics, preventive medicine and public health. 8th edition, Elsevier 2020, ISBN 978-0-323-64201

Languages necessary to complete the course:

English language.

Notes:

Past grade distribution

Total number of evaluated students: 52

A	ABS	B	C	D	E	FX
44,23	0,0	42,31	5,77	5,77	1,92	0,0

Lecturers: doc. PharmDr. Daniela Mináriková, PhD., prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Ľubica Lehocká, PhD.

Last change: 11.09.2024

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFANF/13-Mgr-A/20	Course title: Radiopharmaceuticals
Educational activities: Type of activities: practicals / lecture Number of hours: per week: 1 / 2 per level/semester: 14 / 28 Form of the course: on-site learning	
Number of credits: 4	
Recommended semester: 5.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Compulsory participation on the course educational activities is one of the conditions. For the admission to the final exam, it is necessary to complete the continuous assessment from laboratory practicals to at least 60% of total points (consisting of fulfilment of all assigned tasks, submission of protocol (report) from every topic, as well as 1 control written test). The final exam (in written form) - it is necessary to obtain at least 60% of total points for successful passing the exam. Exam evaluation: A = 100-92%; B = 91.99-83%; C = 82.99-74%; D = 73.99-66%; E = 65.99-60%; FX = less than 60%. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The completion of the course contributes to the achievement of a comprehensive qualification and knowledge of a pharmacist and is connected with the laboratory of the faculty with distinctive requirements. The student acquires a basic theoretical knowledge about the rules of radioactivity, ionizing radiation, specifics of radioactive sources, diagnostic/therapeutic radiopharmaceuticals and related procedures as well as practical skills in a radiopharmaceutical preparation, quality control using proper analytical methods, as well as in ensuring radiation protection and safety. The acquired skills can be utilized in the field of preparation, quality control, and the use of radiopharmaceuticals (as a specific category of drugs) in the departments of nuclear medicine and other specialized departments in the diagnostic and/or therapeutic process of various diseases.	
Class syllabus: The content and syllabus of the course is in compliance with requirements of the International and European Pharmacopoeia, which include several monographs on Radiopharmaceutical Preparations, as well as with current guidelines and requirements for radiation protection. <ul style="list-style-type: none"> • Radiopharmaceuticals: fundamentals, characteristics, importance. • Radiation protection. • Production of radionuclides. • Dosimetry and radiation detection. • Effects of ionizing radiation on human organism. • Preparation and quality control of radiopharmaceuticals. 	

- Radiopharmaceuticals in the clinical practice (diagnostics and therapy).
- Nuclear medicine imaging techniques.

Recommended literature:

SAHA, G.P. Fundamentals of Nuclear Pharmacy. New York : Springer, 2010, p.409. (textbook)
 SAMPSON, C.B. Textbook of Radiopharmacy. Yverdon : Gordon and Breach Science Publishers, 1994.
 Council of Europe. European Pharmacopoeia online, current version. Strasbourg : EDQM.
 Current laws/ordinances/guidelines on radiation protection and on handling of the radioactive materials and substances.

Languages necessary to complete the course:

english language

Notes:

Past grade distribution

Total number of evaluated students: 42

A	ABS	B	C	D	E	FX
9,52	0,0	28,57	38,1	14,29	9,52	0,0

Lecturers: RNDr. Jozef Motyčka, PhD.

Last change: 02.04.2022

Approved by: PharmDr. Mária Bodnár Mikulová, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF/VP-1-A/20			Course title: Research Project			
Educational activities: Type of activities: practicals Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 1., 2., 3., 4., 5., 6., 7., 8., 9., 10..						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 2						
A	ABS	B	C	D	E	FX
50,0	0,0	0,0	0,0	0,0	0,0	50,0
Lecturers: doc. PharmDr. Silvia Bittner Fialová, PhD.						
Last change:						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF/PVP-A/20			Course title: Research Project and Presentation			
Educational activities: Type of activities: practicals Number of hours: per week: 4 per level/semester: 56 Form of the course: on-site learning						
Number of credits: 2						
Recommended semester: 4.						
Educational level: I.II.						
Prerequisites:						
Course requirements:						
Learning outcomes:						
Class syllabus:						
Recommended literature:						
Languages necessary to complete the course:						
Notes:						
Past grade distribution Total number of evaluated students: 1						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	100,0
Lecturers: PharmDr. Andrea Balažová, PhD.						
Last change:						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/10-Mgr-A/22	Course title: Retail Pharmacy, Legislation and Ethics
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 2 per level/semester: 28 / 28 Form of the course: on-site learning	
Number of credits: 4	
Recommended semester: 8.	
Educational level: I.II.	
Prerequisites:	
Recommended prerequisites: KORF/12- Mgr-A/00 Social Pharmacy and Pharmacoeconomics	
Course requirements: A student attends lectures and seminars in full extend. Students are evaluated in writing during the semester, the minimum success rate is 60%. Rating: A: 93-100%, B: 85-92%, C: 77-84%, D: 69-76%, E: 60-68%, Fx: less than 60%. The final evaluation of students takes place in the form of the written exam, the minimum success rate is 60%. Rating: A: 93-100%, B: 85-92%, C: 77-84%, D: 69-76%, E: 60-68%, Fx: less than 60%.	
Learning outcomes: After completing the course, the student acquires knowledge and skills in pharmacy care, an overview of the overall content of the course Retail pharmacy and its position in pharmaceutical practice, the subject of which is working with the drug and its administration to the patient under certain conditions. A student masters the work with a prescription, ePrescription and information he/she obtains from it, but also other professional information he obtains from literature and electronic databases. Students are acquainted with basic information on the storage of drugs and medicines, on the individual preparation of medicines and on the control of pharmaceutical raw materials that are subject to an identity test.	
Class syllabus: <ul style="list-style-type: none"> - Introduction to pharmacy. - Providing expert information and advice on the use of medicines, including risks and their interactions, in order to ensure the effective and safe use of medicines, with particular emphasis on non-prescription medicines. - Individual preparation of drugs. - Control of drugs and medicines. - Dispensing of human and veterinary medicines, dietetic food and medical devices. - Provision of expert information and advice on the use of veterinary medicines, including compliance with the withdrawal period for animal keepers. 	

- Providing information and advice on the dispensing of medical devices to ensure their proper use or function.
- Administration and documentation of material, personnel and professional.
- Agenda of drug preparation, its registration and dispensation.
- Cooperation in the creation of drug forms.
- Performing routine physiological examinations.
- Communication with health insurance companies.
- Cooperation with external applications - drug information system.
- Drug interactions and electronic search.
- Quality management of pharmaceutical activities.
- Revision activity.
- Managerial and statistical communication.
- Categorization of drugs and pricing policy.
- Provision of medicines, drugs, dietetics and medical devices.

Recommended literature:

1. Hungman, B.: Healthcare Communication, London, Pharmaceutical Press, 2009, 304 p.
2. Veatch, R.M., Haddad, A.: Case studies in pharmacy ethics, Oxford, Univesity Press, 2008, 331 p.
3. Bissel, P., Traulsen, J.M.: Sociology and pharmacy practice, London, Pharmaceutical Press, 2005, 226 p.
4. Wingfield, J., Badcott, D.: Pharmacy ethics and decision making, London, Pharmaceutical Press, 2007, 313 p.
5. Appelbe, G.E., Wingfield, J.: Dale and Appelbe s Pharmacy Law and Ethics, London, Pharmaceutical Press, 2005, 593 p.
6. Sexton, J., Nickless G., Green, Ch.: Pharmaceutical Care Made Easy, London, Pharmaceuticl Press, 2006, 178 p.
7. Edwards, C., Stillman, P.: Minor Illness or Major Disease? The clinical pharmacist in the community. Fourth edition, London, Pharmaceutical Press, 2006, 285 p.
8. Stephens, M.: Hospital Pharmacy, London, Pharmaceutical Press, 2006, 285 p.
9. Harman, R.J.: Patient Care in Community Practice, London, Pharmaceutical Press, 2002, 203 p.
10. Harman, R.J.: Handbook of Pharmacy Health Education, second edition, London, Pharmaceutical Press, 2001, 299 p.
11. European Pharmacopoeia – Ph. Eur. last Edition

Languages necessary to complete the course:

English language.

Notes:

Past grade distribution

Total number of evaluated students: 444

A	ABS	B	C	D	E	FX
17,12	0,0	25,0	23,2	19,59	14,64	0,45

Lecturers: PharmDr. Miroslava Snopková, PhD., PharmDr. Ľubica Lehocká, PhD., PharmDr. Lucia Masaryková, PhD.

Last change: 18.09.2023

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFB/12-Mgr-A/22	Course title: Safety of Herbal Medicines and Food Supplements
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Course requirements: A 100-% attendance at the lectures is required. Students have to prepare a seminar work. Only the corrected and accepted version of this seminar work will enable students to take part at the final examination of the subject. The final exams will have the form of a written test. Grading rules: 100-92/A, 91-84/B, 83-76/C, 75-68/D, 67-60/E, 59-0/FX. Scale of assessment (preliminary/final): 0/1	
Learning outcomes: Upon completion of this course the student is able to assess safety issues of herbal medicines and food supplements, their safety in specific populations and situations, including side effects, contraindications, and potential interactions.	
Class syllabus: The lectures deal with herbal medicines, their safety in specific populations and situations, including their side effects, contraindications (diseases, pregnancy, lactation, children, elderly people), potential interactions. Herbal medicines – Community code related to medicinal products for human use – EMA – recommendations. Food supplements (foods) – General food law – EFSA – health claims. Adulteration problems of (traditional) herbal medicines, foods. Seminars / seminar works include food supplements quality and safety; herbal drugs in herbal medicinal products and food supplements, their active compounds and adulteration; clinically significant herbal medicines-drugs interaction. This course is an addition and follow-up to the information gained in the compulsory subject of Pharmacognosy (1) and (2), supplements it with information necessary in pharmacy practice.	
Recommended literature: European law: Medicinal products for human use; General food; Food supplements; Novel foods; Health claims; etc. Natural Medicines Comprehensive Database. Stockley's Drug Interactions. The Essential Guide to Herbal Safety. WHO Monographs on Selected Medicinal Plants. Monographs: EMA, EFSA, Ph. Eur.; Lexicomp Database; Scientific Journals.	
Languages necessary to complete the course:	

English						
Notes: Winter Semester only, min. 5 students, max. 15 students.						
Past grade distribution Total number of evaluated students: 0						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0
Lecturers: doc. PharmDr. Szilvia Czigle, PhD., Mgr. Jaroslav Tóth, PhD.						
Last change: 27.02.2024						
Approved by: prof. PharmDr. Pavel Mučaji, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KChTL/07-Mgr-A/19	Course title: Selected Chapters in Inorganic Chemistry
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 1.	
Educational level: I.II.	
Prerequisites:	
Course requirements: final evaluation: examination in form of the summary test A: 90,01 % – 100,00 %; B: 82,01 % – 90,00 %; C: 74,01 % – 82,00 %; D: 66,01 % – 74,00 %; E: 60,01 % – 66,00 %; Fx: ≤ 60,00 %. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The aim of the course is to apply basic knowledge of bioinorganic and biocoordination chemistry in the field of pharmacy.	
Class syllabus: Metal ions under in vivo conditions. Brief basics of coordination chemistry of metal complexes. Stereochemistry of coordination compounds. Which metal ions react with which ligands (creation of complexes). Biologically significant complex compounds. The role and importance of transitional metals in biological systems. Bioinorganic chemistry of oxygen. Trace element in living organisms – their deficiency and excess. Trace element supplementation. Antitumor activity of some metal complexes and their stereochemical requirements. Bioinorganic chemistry and its essential pharmaceutical applications.	
Recommended literature: 1. W. Kaim, B. Schwederski, A. Klein: Bioinorganic Chemistry - Inorganic Elements in the Chemistry of Life. 4th Edition, Wiley 2013. 2. E. Crabb, E. A. Moore: Metals and Life. RSC Publishing 2010 3. E.-I. Ochiai: Bioinorganic Chemistry. Elsevier 2008 4. G. A. Lawrance: Introduction to Coordination Chemistry. Wiley 2009	
Languages necessary to complete the course: English language	
Notes: The course is held only in winter semester.	

Past grade distribution						
Total number of evaluated students: 60						
A	ABS	B	C	D	E	FX
43,33	0,0	35,0	10,0	1,67	0,0	10,0
Lecturers: Ing. Ladislav Habala, Dr.rer.nat, doc. Ing. Martin Pisárčik, CSc.						
Last change: 10.04.2025						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KChTL/08-Mgr-A/19	Course title: Selected Chapters in Organic Chemistry
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 2.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Examination in the form of a summary test. Successful completion of the test is conditional on obtaining more than 60% of the written test. A: 90,01 % – 100,00 %; B: 82,01 % – 90,00 %; C: 74,01 % – 82,00 %; D: 66,01 % – 74,00 %; E: 60,01 % – 66,00 %; Fx: ≤ 60,00 %. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The course provides a comprehensive preparation in the field of nomenclature, stereochemistry and chemical-physical properties of organic and pharmaceutical compounds with biological activity.	
Class syllabus: Nomenclature (common and IUPAC) of pharmaceutical organic compounds. Isomerism and stereochemistry of organic compounds (conformers, E, Z isomers). The relationship stereoisomers-biological activity. Chirality and symmetry of pharmaceutical compounds. Enantiomerism (S, R-enantiomers), diastereomerism, meso compounds. Biological activity of optically active drugs. Hybridization types in organic compounds. Single and multiple covalent bonds in organic molecules. Intermolecular interactions and their importance in pharmaceutical activity. Electronic effects of functional groups attached to organic compounds, resonance effects, and hyperconjugation phenomenon. Tautomerism of organic compounds. Aromaticity of organic molecules. Organic acids and bases and their importance in pharmacy. Classification of organic reactive intermediates and chemistry reactions (substitutions, eliminations, additions, molecular rearrangements).	
Recommended literature: Devínsky F. et al. Organic chemistry for pharmacy students, Comenius University 2010; McMurry J. E. Organic Chemistry; A.David Baker and R. Engel Organic Chemistry 1992.	
Languages necessary to complete the course: English language	

Notes:

The course is held only in summer semester.

Past grade distribution

Total number of evaluated students: 93

A	ABS	B	C	D	E	FX
7,53	0,0	18,28	13,98	30,11	13,98	16,13

Lecturers: RNDr. Roman Mikláš, PhD., doc. PharmDr. Miloš Lukáč, PhD., Ing. Patrícia Oláh Paračková, PhD., Mgr. Klára Stankovianska, PhD., PharmDr. Adrian Lengyel, PhD.

Last change: 10.04.2025

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KJ/05-Mgr-A/00			Course title: Slovak Language for International Students (1)			
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 2						
Recommended semester: 1.						
Educational level: I.II.						
Prerequisites:						
Course requirements: - active presence at seminars - final test with evaluation scale – A (100 – 91 %), B (90 – 81 %), C (80 – 73 %), D (72 – 66 %), E (65 – 60 %), FX (59 – 0 %) - To complete the course, the student must achieve at least 60%. Scale of assessment (preliminary/final): 100 %						
Learning outcomes: After completing the seminars a student obtains basic communication skills and grammar structures needed for everyday life in Slovakia.						
Class syllabus: The lessons concentrate on the following topics: slovak alphabet, social phrases, greetings and farewells, basic dialogues, interior (house, flat, office), countries.						
Recommended literature: Kližanová, D.: Slovenčina pre študentov farmácie. Slovak for Pharmacy Students. Bratislava: Univerzita Komenského, 2023						
Languages necessary to complete the course: Slovak and English languages						
Notes: Slovak Language for Foreign Students (1-4) within Master Study Programme is carried out in English study programme in four semesters. It is recommended to take the courses gradually from the 1st to the 4th semester of the study, i.e., Slovak Language for International Students (1) in the 1st (winter) semester of study.						
Past grade distribution Total number of evaluated students: 825						
A	ABS	B	C	D	E	FX
33,7	0,0	17,09	15,76	15,27	14,67	3,52

Lecturers: PhDr. Darina Kližanová, Mgr. Natália Kližanová
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Last change: 15.09.2023

Approved by: Mgr. Natália Kližanová
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COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KJ/06-Mgr-A/00		Course title: Slovak Language for International Students (2)				
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 2						
Recommended semester: 2.						
Educational level: I.II.						
Prerequisites:						
Course requirements: - active presence at seminars - final test with evaluation scale – A (100 – 91 %), B (90 – 81 %), C (80 – 73 %), D (72 – 66 %), E (65 – 60 %), FX (59 – 0 %) - To complete the course, the student must achieve at least 60%. Scale of assessment (preliminary/final): 100 %						
Learning outcomes: After completing the seminars a student obtains basic communication skills and grammar structures needed for the work in a pharmacy.						
Class syllabus: The lessons concentrate on the following topics: Bratislava - capital city of Slovakia, life in the town and the country, professions, shopping, pharmacy.						
Recommended literature: Kližanová, D.: Slovenčina pre študentov farmácie. Slovak for Pharmacy Students. Bratislava: Univerzita Komenského, 2023						
Languages necessary to complete the course: Slovak and English languages						
Notes: Slovak Language for Foreign Students (1-4) within Master Study Programme is carried out in English study programme in four semesters. It is recommended to take the courses gradually from the 1st to the 4th semester of the study, i.e., Slovak Language for International Students (2) in the 2nd (summer) semester of study.						
Past grade distribution Total number of evaluated students: 740						
A	ABS	B	C	D	E	FX
21,08	0,0	16,22	19,32	15,95	19,46	7,97

Lecturers: PhDr. Darina Kližanová, Mgr. Natália Kližanová
Last change: 15.09.2023
Approved by: Mgr. Natália Kližanová

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KJ/07-Mgr-A/20		Course title: Slovak Language for International Students (3)				
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 1., 3., 5., 7., 9.						
Educational level: I.II.						
Prerequisites:						
Course requirements: - active presence at seminars - final test with evaluation scale – A (100 – 91 %), B (90 – 81 %), C (80 – 73 %), D (72 – 66 %), E (65 – 60 %), FX (59 – 0 %) - To complete the course, the student must achieve at least 60%. Scale of assessment (preliminary/final): 100 %						
Learning outcomes: After completing the seminars a student obtains basic communication skills and grammar structures useful for formal oral and written communication.						
Class syllabus: The lessons concentrate on the following topics: foods, daily routines, telling the time, school system, study at the University, study of pharmacy.						
Recommended literature: Kližanová, D.: Slovenčina pre študentov farmácie. Slovak for Pharmacy Students. Bratislava: Univerzita Komenského, 2023						
Languages necessary to complete the course: Slovak and English languages						
Notes: Slovak Language for Foreign Students (1-4) within Master Study Programme is carried out in English study programme in four semesters. It is recommended to take the courses gradually from the 1st to the 4th semester of the study, i.e., Slovak Language for International Students (3) in the 3rd (winter) semester of study.						
Past grade distribution Total number of evaluated students: 51						
A	ABS	B	C	D	E	FX
70,59	0,0	7,84	5,88	3,92	0,0	11,76

Lecturers: PhDr. Darina Kližanová, Mgr. Natália Kližanová
Last change: 15.09.2023
Approved by: Mgr. Natália Kližanová

COURSE DESCRIPTION

Academic year: 2025/2026						
University: Comenius University Bratislava						
Faculty: Faculty of Pharmacy						
Course ID: FaF.KJ/08-Mgr-A/20			Course title: Slovak Language for International Students (4)			
Educational activities: Type of activities: seminar Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning						
Number of credits: 1						
Recommended semester: 2., 4., 6., 8., 10.						
Educational level: I.II.						
Prerequisites:						
Course requirements: - active presence at seminars - final test with evaluation scale – A (100 – 91 %), B (90 – 81 %), C (80 – 73 %), D (72 – 66 %), E (65 – 60 %), FX (59 – 0 %) - To complete the course, the student must achieve at least 60%. Scale of assessment (preliminary/final): 100 %						
Learning outcomes: After completing the seminars a student deepens communication skills specific grammar structures.						
Class syllabus: The lessons concentrate on the following topics: work place, correspondance and telephoning, reading newspaper articles.						
Recommended literature: Kližanová, D.: Slovenčina pre študentov farmácie. Slovak for Pharmacy Students. Bratislava: Univerzita Komenského, 2023						
Languages necessary to complete the course: Slovak and English languages						
Notes: Slovak Language for Foreign Students (1-4) within Master Study Programme is carried out in English study programme in four semesters. It is recommended to take the courses gradually from the 1st to the 4th semester of the study, i.e., Slovak Language for International Students (4) in the 4th (winter) semester of study.						
Past grade distribution Total number of evaluated students: 36						
A	ABS	B	C	D	E	FX
27,78	0,0	30,56	25,0	0,0	2,78	13,89
Lecturers: PhDr. Darina Kližanová, Mgr. Natália Kližanová						

Last change: 15.09.2023

Approved by: Mgr. Natália Kližanová

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KORF/12-Mgr-A/22	Course title: Social Pharmacy and Pharmacoeconomics
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 2 per level/semester: 28 / 28 Form of the course: on-site learning	
Number of credits: 5	
Recommended semester: 4.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Compulsory completion of teaching (lectures, seminars). During the semester, 2 credit tests are written. The final exam takes place in the form of a written test. The minimum success rate is 60%. Grading scale: A = 100-95%, B = 94-85%, C = 84-75%, D = 74-70%, E = 69-60%, FX = 59% and less.	
Learning outcomes: The Course aims on integration of medicines into broader perspective such as social, legal, ethical, economic and political aspects. It enables students to understand the basics of healthcare system/s, regulatory affairs - aiming research and development of medicines, marketing authorization, pharmacovigilance, life-cycle of medicines and their utilization in society. Students become familiar with pharmacoepidemiology, pharmacoeconomics and health technology assessment, and health informatics and medicinal databases. All in all, the Course in Social Pharmacy, as an applied multidisciplinary science, offers to study the role of medicines, patients and pharmacists within the health care sector and society at large.	
Class syllabus: 1. Role of social pharmacy in health care system and in a society. 2. Legal, economic, and political specifics of healthcare environment. . Health economy – financial management. Health insurance, cross-border health care. 3. Sociology, health psychology and ethics in social pharmacy. 4. Pharmacoepidemiology - characteristics, methods and applications. 5. Health and medicines informatics. Health literacy. 6. Research and development of medical products - R&D. Good Clinical Practice, Good Manufacturing Practice, Good Distribution Practice, Good Pharmacovigilance Practice. 7. Regulatory affairs in pharmacy (National, European) - medical product's quality - efficacy - patient's safety. Marketing Authorization. Pharmacovigilance. Falsified medicines. 8. National drug policy – categorization, reimbursement by payers and patient's co-payment. 9. Health Technology Assessment (HTA) and Pharmacoeconomy – characteristics and applications. 10. Utilization of medicine – value outcomes. Social pharmacy as a part of public health - going beyond prescription to improve health outcomes by serving the patient needs.	

Recommended literature:

1. Kelly, W. N. Pharmacy. What It Is and How It Works. 2012, third edition. CRC Press, Taylor & Francis Group, LLC. 2012, 452p. ISBN 978-1-4398-5305-4.
2. Royal Pharmaceutical Society. Medicines, Ethics and Practice. The professional guide for pharmaceuticals. Edition 39, July 2015, 202p.
3. Desselle, S. P., Zgarrick, D P., Alston, G. L. Pharmacy Management. 2010, 3rd ed., American Society of Health-System Pharmacists, Med Graw Hill Inc. 2010, 715p, ISBN 978-0-07-177431-4.
4. Donyai, P. Social and Cognitive Pharmacy. Theory and Case Studies. 2012. PhP Pharm. Press, UK. 2012, 229p. ISBN-978-0-8536-9-899-9.
5. Carter, J., Slack M., Pharmacy in Public Health. Basics and Beyond. 2010. American Soc. Health-System Pharmacists, Inc. 2010, 390p. ISBN 978-1-58528-172-5.
6. Berger, M. L. et al. Health Care Cost, Quality, and Outcomes. 2003. International Society for Pharmacoeconomics and Outcomes Research. 2003, 264p. ISBN 0-9743289-0-1.

Languages necessary to complete the course:

English language

Notes:**Past grade distribution**

Total number of evaluated students: 78

A	ABS	B	C	D	E	FX
87,18	0,0	10,26	1,28	0,0	1,28	0,0

Lecturers: prof. PharmDr. Tomáš Tesař, PhD., MBA, PharmDr. Zuzana Koblišková, PhD.

Last change: 12.09.2024

Approved by: prof. PharmDr. Tomáš Tesař, PhD., MBA

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/900-Mgr-A/25	Course title: Social Pharmacy and Retail Pharmacy
Number of credits: 4	
Recommended semester: 7., 8..	
Educational level: I.II.	
Course requirements: The state exam can be taken by a student who has successfully completed the following subjects: Practice in Community Pharmacy (1), Practice in Community Pharmacy (2), Pharmacy, Legislation and Ethics, Social Pharmacy and Pharmacoeconomics, Public Health and Pharmaceutical Care.	
Learning outcomes: By passing the exam, the student demonstrates comprehensive knowledge of healthcare systems in the areas of legislative, economic, organizational and information. The graduate understands the connection of professional knowledge from various areas of social pharmacy and pharmacy and is able to analyze and apply theoretical knowledge in the provision of pharmacy healthcare and performing other professional activities of a pharmacist.	
Class syllabus: The state exam consists of an oral theoretical exam before a state examination committee. The student randomly selects one question from the designated categories.	
State exam syllabus:	
Last change: 03.04.2025	
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH	

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFB/08-Mgr-A/22	Course title: Technology of Natural Drugs
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Course requirements: - a 100 % attendance at the course lectures is required; - students must prepare 2 seminar works. The first one should be submitted by 6th semestral week at the latest, the second one should be submitted by 12th semestral week at the latest; - successful evaluation of 2 seminar works is required for successful completion of the course seminars. Only the corrected and accepted version of seminar works will enable students to take part at the final examination of the subject. - The final exams will have the form of a written test. Grading rules: 100-92/A, 91-84/B, 83-76/C, 75-68/D, 67-60/E, 59-0/FX. Scale of assessment (preliminary/final): 1/1	
Learning outcomes: Upon successful completion of the educational process, the student should gain a comprehensive overview of the processes that precede the emergence of a particular plant-based product and should be able to evaluate drugs and medicinal plants as basic raw materials for the preparation of natural medicines. The acquired knowledge should help the student in the application, especially in the field of research and production of pharmaceutical preparations on a plant basis, but also in other industries, e. g. cosmetics, food industry.	
Class syllabus: The course Technology of Natural Drugs deals with plant raw materials used in the pharmaceutical industry. Their use is very common not only in the form of phytopharmaceuticals or isolated active substances in the form of drugs, but is also possible in the form of nutritional supplements. It focuses on the requirements concerning the quality of plant material and factors influencing the quality of the drug in the whole process of phytopharmaceutical production - from good cultivation practice to good manufacturing practice. Gradually acquaints students with the basic procedures of plant material processing but also with newer methods of active substances obtaining such as supercritical or subcritical fluid extraction, microwave-assisted extraction or ultrasound-assisted extraction. It explains the importance of fingerprint analysis of extracts and standardisation of the content of their active substances, which are important indicators of the quality and effectiveness of phytopharmaceuticals. Students will get acquainted with an important area of natural drugs	

technology – biotechnology, and the possibilities of their application in the process of obtaining active substances from plants.

Recommended literature:

Nagy – Mučaji: Pharmacognosy : Natural remedies. –1st Ed. -Bratislava : FPharm CU, 2002. –72 pp.

Mučaji – Nagy: Pharmacognosy: Analytical and chromatographic practice. – 2nd revised Ed. – Bratislava, FPharm CU, 2011. – 75 pp., ISBN 978-80-223-3108-1.

Current version of the European Pharmacopoeia.

Languages necessary to complete the course:

English

Notes:

The course is opened only in the winter semester if at least 10 students are enrolled for the course. The maximum number of students who can enrol in the course is 16.

Past grade distribution

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: PharmDr. Vladimír Forman, PhD., doc. PharmDr. Szilvia Czizle, PhD., RNDr. Veronika Brindza Lachová, PhD.

Last change: 27.02.2024

Approved by: prof. PharmDr. Pavel Mučaji, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/16-Mgr-A/22	Course title: Toxicology
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 7.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Compulsory attendance at lectures - at least 80%. During the semester, students take 2 tests with a required minimum success rate 60%. Upon successful completion of the interim tests, the student can register for the final (exam) test, which will take place by computer or in writing form. Final test evaluation: A 91-100%, B 81-90%, C 71-80%, D 66-70%, E 60-65%, FX <60%	
Learning outcomes: Toxicology is the study of the toxic effects of xenobiotics on a living organism. Knowledge of toxicology is essential for the preparation of pharmacists for clinical practice, whether for work in a pharmacy, at the department of clinical pharmacology and pharmacy, toxicology center, or in national or supranational regulatory authority agencies. The graduate of the course will be acquainted with the safety of the most common xenobiotics, including drugs, and the management of their possible toxic effects, as well as with the methodology and requirements for preclinical and clinical safety of drugs and assessment of their environmental risks.	
Class syllabus: After the general introduction, the course will address the basic toxicological principles, including toxicokinetics and toxicodynamics, teratogenicity, genotoxicity and carcinogenicity of xenobiotics. Subsequently, systemic and organ toxicity will be discussed, especially at the level of the liver, kidneys, respiratory system, nervous system and immune system. Within clinical toxicology, the student will get acquainted with the most common noxa, the way and manner of exposure to them, as well as the management of intoxication. Another important point of the study will be the regulatory aspects of drug safety assessment, including rules of good laboratory practice, clinical trial directives, safety with respect to selected population groups and specific products, as well as post-marketing drug safety assessment or environmental risk assessment. The study focuses on theoretical knowledge as well as practical experience in the analysis of the toxic effect of xenobiotics and in the assessment of drug safety.	
Recommended literature: Klaassen C.D.: Casarett & Doull's Essentials of Toxicology, Fourth Edition, McGraw-Hill, 2021	

Nelson L et al.: Goldfrank's Toxicologic Emergencies, Eleventh Edition, McGraw-Hill, 2019
 Klaassen C.: Casarett & Doull's Toxicology: The Basic Science of Poisons, 9th Edition, 2018
 Mulder G.J. Pharmaceutical toxicology. Pharmaceutical Press 2006
 Carson R.H.: The toxicology handbook for clinicians. Mosby Elsevier, Philadelphia, 2006
 Hodgson E.: A textbook of modern toxicology, Wiley, 2010
 Friedman L.M. et al.: Fundamentals of Clinical Trials, Springer 2015
 Galin J.I. & Ognibene F.P.: Principles and Practice of Clinical Research, Academic Press 2007
 Presentation from lectures and seminars of the course.

Languages necessary to complete the course:

Notes:

Past grade distribution

Total number of evaluated students: 109

A	ABS	B	C	D	E	FX
2,75	0,0	22,02	29,36	25,69	16,51	3,67

Lecturers: Mgr. Ondrej Sprušanský, PhD., doc. PharmDr. Marek Máťuš, PhD., doc. Mgr. Peter Vavrinec, PhD., doc. PharmDr. Anna Paul Hrabovská, PhD., PharmDr. Zuzana Kiliánová, PhD., doc. PharmDr. Blažena Cagáňová, PhD., PharmDr. Silvia Plačková, PhD., MPH, PharmDr. Kristína Szmicseková, PhD., PharmDr. Katarína Hadová, PhD., PharmDr. Csaba Horváth, PhD.

Last change: 19.04.2024

Approved by: prof. PharmDr. Ján Klimas, PhD., MPH

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/999/Eplus/20	Course title: Trends in the European pharmaceutical education
Educational activities: Type of activities: Number of hours: per week: per level/semester: Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 7., 8..	
Educational level: I.II.	
Prerequisites:	
Course requirements: After the production of evidence about completing the course at the foreign university (Transcript of Records), a student graduating ERASMUS plus is graduated with the credit assessment of the imported subject to the faculty, according to academic results at the host university / institution (Table E) and to protocol of the recognition of studies by Faculty / University - recognition of the results at the home institution (Table F).	
Learning outcomes: The Erasmus plus student gets obtained knowledges from the selected course offered from the curriculum of the host university / institution that belongs to the so-called educational component of the study program student. The student by the studying abroad obtains the knowledges in the indispensable subjects that are not in the curriculum at the home university / institution.	
Class syllabus: The student of Erasmus plus graduate under the Learning Agreement for Studies intended subject at another faculty of a university on which has not be completed undergraduate courses of - according to the current curriculum of subject.	
Recommended literature: the recommended reading for the student to the subject at the host university / institution - the topical source for present problems	
Languages necessary to complete the course: the language or combination of languages, knowledge of which is necessary to pass the subject at the host university / institution	
Notes: subject is provided, according to interest, only students who are sent to the host university / institution participating in foreign ERASMUS mobility plus	

Past grade distribution						
Total number of evaluated students: 1						
A	ABS	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0	100,0
Lecturers: doc. PharmDr. Jindra Valentová, PhD.						
Last change: 06.08.2020						
Approved by: prof. PharmDr. Ján Klimas, PhD., MPH						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFANF/12-Mgr-A/20	Course title: Validation in Analytical and Pharmaceutical Practice
Educational activities: Type of activities: lecture / seminar Number of hours: per week: 1 / 1 per level/semester: 14 / 14 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 3.	
Educational level: I.II.	
Prerequisites:	
Course requirements: Presence on lectures and seminars. After completion of the lectures and seminars, students will have to prepare a validation report based on received model data. The course assessment will be based on the quality of individually prepared validation reports. The minimum grade requirement to pass the course is 60%. Scale of assessment (preliminary/final): 0/100	
Learning outcomes: Course objectives: <ul style="list-style-type: none"> • Purposefully develop and apply knowledge in the field of statistics in the process of validation of analytical instrumental methods. • Briefly acquaint with special statistical methods (eg. biostatistics, or biometrics, which is the application of statistics to biological problems; chemometrics, which is used in the processing of chemical data, etc.). • Familiarize with standard validation protocols for pharmaceutical and biomedical analysis (ICH, FDA, EMA) and principles of good laboratory practice (GLP). • Demonstrate applications in pharmaceutical and clinical practice. 	
Class syllabus: <ul style="list-style-type: none"> • Statistical parameters related to the validation of instrumental analytical methods. • Validation of laboratory methods, types of validation protocols. • Good laboratory practice. • Accreditation of chemical / biochemical laboratory. • Analytical control in practice. Quality control, quality assessments, quality assurance. • Case studies. 	
Recommended literature: <ul style="list-style-type: none"> • M. Otto: Chemometrics: Statistics and Computer Application in Analytical Chemistry, 3rd Edition. Wiley-VCH Verlag, Weinheim, 2016. ISBN: 978-3-527-34097-2 • J. Miller, J.C. Miller: Statistics and Chemometrics for Analytical Chemistry, 6th Edition. Pearson Education Canada, Newmarket, 2010. ISBN: 978-0273730422 	

<ul style="list-style-type: none"> • Mikuš, Peter; Maráková, Katarína: HYPHENATED ELECTROPHORETIC TECHNIQUES IN ADVANCED ANALYSIS, KARTPRINT, Bratislava, 2012 • web pages with appropriate key words and relevant information. 						
Languages necessary to complete the course: english language						
Notes:						
Past grade distribution Total number of evaluated students: 20						
A	ABS	B	C	D	E	FX
50,0	0,0	10,0	15,0	5,0	5,0	15,0
Lecturers: Mgr. Jana Havlíková						
Last change: 02.04.2022						
Approved by: prof. RNDr. Peter Mikuš, PhD.						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KFT/17-Mgr-A/00	Course title: Veterinary Pharmacology
Educational activities: Type of activities: lecture Number of hours: per week: 2 per level/semester: 28 Form of the course: on-site learning	
Number of credits: 2	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Course requirements: To be admitted to the exam, student is required to attend all lectures and seminars. The condition for passing the course is passing the final exam test and the oral exam. The test and the oral exam contribute equally to the overall result of the exam and the student must demonstrate mastery of at least 60% of the required knowledge. The exam test result is evaluated on a scale: A (at least 92%), B (at least 83%), C (at least 76%), D (at least 68%), E (at least 60%) and Fx (less than 60% of the maximum number points). Scale of assessment (preliminary/final): 0/100	
Learning outcomes: By completing the course, the student will gain an overview of the specifics of veterinary medicine and veterinary pharmacology. Student will be familiar with veterinary drugs, which are an important part of pharmaceutical practice.	
Class syllabus: The course pays attention to the specifics of the use of drugs in animals - routes of administration, drug forms, the properties of veterinary drugs, the use of drugs in veterinary practice (medical, biotechnological). Particular attention is paid to drug residues in animal products intended for human consumption and protection periods in animals. The scope of the course in the form of lectures and seminars is focused on individual specific groups of veterinary drugs: Specifics of veterinary pharmacology - differences from human pharmacology. Legislative regulation of veterinary health care. Veterinary drug forms and routes of administration. Zoonoses, the most common animal diseases. Pharmacology of selected groups of veterinary drugs: - Drugs used in infectious and invasive diseases. - Drugs affecting the central and peripheral nervous system. - Medicines that affect the blood circulation. - Medicinal products acting on the gastrointestinal tract. - Medicinal products that affect the reproductive organs. Insemination.	

<ul style="list-style-type: none"> - Drugs affecting metabolism. - Euthanasia, slaughter of livestock. 						
<p>Recommended literature: Riviere, J.E. and Papich, M.G. (2009): Veterinary Pharmacology and Therapeutics. 9th Edition, 1524 p. Cunningham, F., Elliott, J., Lees. P. (2012): Comparative and Veterinary Pharmacology. 348 p.</p>						
<p>Languages necessary to complete the course: English</p>						
<p>Notes: To be open only if at least 6 students enroll into the course.</p>						
<p>Past grade distribution Total number of evaluated students: 47</p>						
A	ABS	B	C	D	E	FX
21,28	0,0	17,02	25,53	14,89	12,77	8,51
<p>Lecturers: doc. PharmDr. Marek Máťuš, PhD., doc. Mgr. Peter Vavrinec, PhD.</p>						
<p>Last change: 19.04.2022</p>						
<p>Approved by: doc. PharmDr. Marek Máťuš, PhD.</p>						

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF.KBMBL/14-Mgr-A/22	Course title: Xenobiochemistry
Educational activities: Type of activities: lecture / laboratory practicals Number of hours: per week: 2 / 1 per level/semester: 28 / 14 Form of the course: on-site learning	
Number of credits: 3	
Recommended semester: 6.	
Educational level: I.II.	
Prerequisites:	
Course requirements: The course ends with a written exam. The student will be admitted to the written exam after achieving the following requirements: 1. 100% participation in laboratory exercises 2. submission of seminar work Scale of assessment (preliminary/final): Written exam. Evaluation A corresponds to obtaining min. 92% of the maximum number of points, B – 84%, C – 76%, D – 68%, E – 60%, Fx less than 60%.	
Learning outcomes: Students after completion of the Xenobiochemistry course should identify and outline the main biotransformation way of the production of the metabolites according to the structure of drugs. Moreover, graduates should gain good knowledge about biotransformation enzymes, their isoforms, properties and interactions on the cellular level as well as specifics of human organisms on genotypic and phenotypic levels.	
Class syllabus: <ul style="list-style-type: none"> - Principle of xenobiotic (drug) metabolism and phases of biotransformation reactions based on chemical structure. - Characterization and function of biotransformation enzymes, mechanism of the 1st phase reaction on CYP-450 level. - CYPs isoenzymes – substrate specificity, tissue and subcellular distribution. - Meaning of the second biotransformation phase, drug transporters. - The impact of enzyme induction or inhibition on the pharmacotherapeutic effect of drugs, possible interactions or side effects. - Intra- and interindividual variability in biotransformation enzyme activity. - Epigenetic factors affecting the biotransformation of xenobiotics. - Effect of circadian rhythms on the gene expression of biotransformation enzymes. - Application of xenobiochemistry knowledge to evaluate safe and efficient pharmacotherapy and drug toxicity. 	
Recommended literature:	

A Handbook of Bioanalysis and Drug Metabolism, Ed. Gary Evans, CRC Press, London, New York, 2004
Metabolism of Drugs and Other Xenobiotics. 1st edition, Ed. P. Anzenbacher, U.M. Zanger, Wiley-VCH 2012

Languages necessary to complete the course:

English language.

Notes:

Past grade distribution

Total number of evaluated students: 26

A	ABS	B	C	D	E	FX
11,54	0,0	23,08	23,08	23,08	7,69	11,54

Lecturers: PharmDr. Andrea Balažová, PhD.

Last change: 10.04.2025

Approved by: PharmDr. Andrea Balažová, PhD.