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COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/419-PhD/11	**Course title:** Active participation at the domestic scientific events
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 4	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 342	

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/418-PhD/11	**Course title:** Active participation at the international scientific events
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 7	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 319

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/425-PhD/11	**Course title:** Activities other (eg. A member of the organizing committee of the conference)
Educational activities: **Type of activities:** **Number of hours:** **per week:** **per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 3	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 61

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

STATE EXAM DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/504-PhD/11	**Course title:** Analytical Chemistry
Number of credits: 0	
Educational level: III.	
Course requirements: Successful completion of the exam.	
Learning outcomes: After completing the course, the doctoral student will gain advanced theoretical knowledge in the use of modern instrumental analytical methods chromatographic, electromigration, electrochemical, spectral (MS, NMR, IR, UV-VIS, Fluorescent) and nuclear analytical as well as multidimensional techniques (SPE-HPLC, HPLC- HPLC, CE-CE, MS / MS and combinations thereof) in pharmaceutical and biomedical analysis. An integral part of the acquired knowledge are methods of preparation of pharmaceutical and biological samples as well as environmental samples by conventional (off-line) and advanced (on-line) techniques for the mentioned analytical methods. In connection with the synthesis and structural analysis of (i) new molecules as potential drugs or drug carriers for innovative dosage forms as well as (ii) innovative materials (nanostructures) as part of analytical systems and dosage forms, the doctoral student will gain knowledge and skills also for other specific approaches and techniques such as Raman spectroscopy on-line coupled with microwave synthesis, semi-preparative chromatography, electron microscopy, and light scattering-based structural analysis techniques.	
Class syllabus: Analysis of organic bioactive substances, levels of drugs and their metabolites, degradation products and biomarkers of diseases in biological materials (blood, urine, tissues, etc.). Analysis of new organic molecules (potential drugs and drug carriers for innovative dosage forms) in reaction mixtures from organic syntheses and isolated products. Inorganic analysis of biogenic and toxic elements in individual components of the environment (air, soil, herbal drugs, water). Bioinorganic analysis of new metal complexes in reaction mixtures from organic syntheses and isolated products. Use of modern instrumental techniques: • chromatographic (HPLC, GC) and electromigration separation methods (CZE, ITP, IEF, EKC) and their mutual combinations (2D HPLC, 2D / 3D CE) with integrated sample pretreatment for separation of complex (multicomponent) mixtures of substances • spectral methods UV-VIS, FS and LIF (for rapid quantitative evaluation of substances in simple matrices), MS, MS / MS, NMR, IR, Raman spectroscopy, EPR, XRC / XRD (for detailed structural analysis molecules and their complexes) • combined separation and spectral methods (LC-UV / MS, CE-UV / LIF / MS, etc.) to identify and determine trace levels of analytes in simple and complex (multicomponent) matrices (biological samples, dosage forms, synthetic reaction mixtures, isolated products from reaction mixtures) • electrochemical methods with conventional and advanced sensors (biosensors) for rapid determination of selected substances in simple and complex matrices	

• radioanalytical methods: radionuclide X-ray fluorescence analysis (RRFA) for direct determination of elements in solid materials
• methods of analysis of light scattering and electron microscopy for the analysis of nanostructures (shape, size/dimensions, distribution of nanoparticles)
• methods of (semi) preparative chromatography for separation and isolation of selected components from reaction mixtures
Instrumental analytical methods:
Principle of the method, experimental setup (instrumentation), methods of qualitative and quantitative evaluation, analytical and application potential. Optimization, validation and application of methods.
Electrochemical methods:
Potentiometry
Voltammetry (DPV, SWV, CV)
Ion selective electrodes
Biosensors
FIA
Separation chromatographic analytical methods:
Planar and column chromatography
High performance liquid chromatography.
Ion exchange chromatography.
Gas chromatography.
Multidimensional techniques (2D HPLC, SPE-HPLC)
Combining HPLC with advanced detection techniques (HPLC-MS, HPLC-MS / MS)
Separation analytical methods of electromigration:
Electrophoresis in planar arrangement, electromigration techniques in capillary arrangement.
Capillary zone electrophoresis (CZE).
Capillary isotachophoresis (ITP).
Isoelectric focusing (IEF).
Electrokinetic chromatography (EKC).
Capillary gel electrophoresis (CGE).
Capillary electrochromatography (CEC).
Multidimensional techniques (2D CE, 3D CE)
CE coupling with advanced detection techniques (CE-LIF, CE-MS, CE-MS / MS).
Separation preparative chromatographic and electromigration methods:
(semi) preparative liquid chromatography.
Preparative isotachophoresis.
Spectral analytical methods:
Emission spectral analysis
Fluorescence analysis
Atomic absorption spectrophotometry
Molecular absorption spectroscopy in the visible and ultraviolet region of the spectrum
Infrared spectroscopy
Raman spectroscopy.
Mass spectrometry.
Nuclear magnetic resonance.
Non-spectral optical methods:
Refractometry.
Polarimetry.
X-ray crystallographic and diffraction analysis (XRC, XRD).

Electron paramagnetic resonance (EPR).
Detectors:
Optical spectrometric detectors - absorption, fluorescence, MS, non-spectrometric
Electrochemical detectors,
Radiometric detectors
Nuclear analytical methods:
Nuclear analytical indicator methods - radiochromatography, isotope dilution analysis, radioimmunoassay and their use.
Nuclear analytical methods based on natural radioactivity.
Activation analysis.
Nuclear analytical methods - non-activation interaction analysis.
Beta-dispersion analysis.
Radionuclide X-ray fluorescence analysis.
Identification of β and γ radiation.
Other analytical methods:
Methods based on light scattering analysis.
Electron microscopy.
Statistical processing of analytical results and validation of analytical methods and procedures:
Validation parameters (precision, accuracy, linearity, sensitivity, LOD, LLOQ, LOQ, selectivity, robustness, stability, recovery, matrix effect, sample throughput, carry over).
Testing statistical hypotheses.
Validation protocols (ICH, FDA).

State exam syllabus:

Recommended literature:

Mikuš, P., Piešťanský, J., Dokupilová, S.: Kvapalinová chromatografia, hmotnostná spektrometria a ich kombinácie vo farmaceutickej a biomedicínskej analýze, VEDA, Bratislava, 2018. 365s.
Mikuš, P., Piešťanský, J.: Kapilárna elektroforéza, hmotnostná spektrometria a ich kombinácie vo farmaceutickej a biomedicínskej analýze, VEDA, 2014. 310 s.
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, in preparation.
Mikuš, P., Mikušová, V.: Analytical chemistry: Chemical analysis. Bratislava : VEDA, 2022.
Tekeľ, J., Mikuš , P.: Vybrané kapitoly z analytickej chémie. Analýza látok v biologických systémoch. Bratislava : UK, 2004, 192 s
Světlík, J.: Molekulová spektroskopia a optické metódy. Bratislava : UK, 2006. 81 s.
Garaj, J., Bustin, D., Hladký, Z.: Analytická chémia. Bratislava, Alfa 1989. 740 s.
Havránek, E. a kol.: Laboratórne cvičenia z analytickej chémie III. Fyzikálno-chemické metódy. Bratislava : UK, 2007. 91 s.
Křenek, P.: Analýza organických látok. Bratislava : UK, 2007. 80 s.
Vybrané kapitoly budú poskytnuté v elektronickej forme.

Languages necessary to complete the course:
Slovak language

Notes:
Teacher: prof. RNDr. Peter Mikuš, PhD., prof. RNDr. Emil Havránek, CSc., PharmDr. Katarína Maráková, PhD., PharmDr. Juraj Piešťanský, PhD.

Last change: 03.04.2022
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/404-PhD/11	**Course title:** Authorship of teaching aids and texts
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 20	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements: completed the evaluation with a credit value after submitting the teaching aid or text (source cover, imprint letters with ISBN or ISSN) to the trainer.	
Learning outcomes: The doctoral student, led by the supervisor, demonstrated the ability to work in the preparation and writing of teaching aids and texts.	
Class syllabus: Doktorand po konzultácii so školiteľom spolupracuje na príprave a písaní učebných pomôcok textov so spoluautormi a s redakciou vydavateľa.	
Recommended literature: Current sources on the presented issues.	
Languages necessary to complete the course: Slovak language	
Notes:	
Past grade distribution Total number of evaluated students: 1	

ABS	NEABS
100,0	0,0

Lecturers:
Last change: 11.02.2022
Approved by:

STATE EXAM DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/506-PhD/11	**Course title:** Biochemistry
Number of credits: 0	
Educational level: III.	
Course requirements: Successful completion of the exam.	
Learning outcomes: After completing selected chapters in biochemistry, the PhD.-student can manage (i) basic biochemical and molecular-biological analyzes, (ii) methodical procedures related to protein analysis techniques, and (iii) enzymological studies on cellular and molecular levels. The student will obtain knowledge about metabolic pathways and their regulation at the level of (i) signaling molecules, (ii) localization at a subcellular level, and (iii) monitoring of gene expression, which creates the precondition for studying the drug mechanism of individual pharmacotherapeutic groups.	
Class syllabus: # Dynamic concept of properties and functions of the biological system. # DNA, RNA: composition, bonds and stability, biological significance. # Biomembranes, respiratory chain, generation of energy. # Metabolism of nutrients – interrelationship, thermodynamic aspect, energetical aspect, biological oxidations. # Enzymology of nutrient metabolism – catabolism and anabolism – carbohydrates, simple and complex lipids, amino acids, nucleotides, proteins. # Enzyme kinetics. # Basic issues of xenobiochemistry and its attributes. # Integration of metabolism in terms of physiological and pathological conditions of the organism. # Experimantal techniques with animal and plant cell cultures. # Plant biochemistry: nitrogen metabolism, enzymology of secondary metabolites, signalling cascades.	
State exam syllabus:	
Recommended literature: D. Voet, J. Voet: Biochemistry, 4th ed., John Wiley & Sons, 2010. D. Dobrota a kol.: Lekárska biochémia, Osveta, Martin, 2016. G. Litwack: Human Biochemistry, 1st ed., Elsevier, 2017. Selected chapters will be provided in electronic form.	
Languages necessary to complete the course: Slovak language	
Notes: Lecturers: doc. Mgr. Andrea Bilková, PhD.; doc. Mgr. Martina Hrčka Dubničková, PhD.; doc. PharmDr. Marek Obložinský, PhD.; RNDr. František Bilka, PhD.; Ing. Ľudmila Pašková, PhD.	

Last change: 11.04.2022
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/426-PhD/11	**Course title:** Citation SCI, SSCI
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 5	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 67	

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/427-PhD/11	**Course title:** Citation other
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 3	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 9

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

STATE EXAM DESCRIPTION

Academic year: 2021/2022

University: Comenius University Bratislava

Faculty: Faculty of Pharmacy

Course ID:	**Course title:**
FaF/702-PhD/11	Clinical Pharmacy

Number of credits: 0

Educational level: III.

Course requirements:
Passing of the exam.

Learning outcomes:
The PhD students will expand and deepen their expertise of the latest knowledge of clinical pharmacy in connection with the effects of medicines and with the reduction of pharmacotherapeutic risk, medication errors and pharmacotherapeutic problems. Students will learn how to apply the acquired knowledge in real-world practice at various levels related to pharmacotherapy in cooperation with physicians.

Class syllabus:
The focus is on one or more of the following areas of clinical pharmacy:
- pre-clinical and clinical evaluation of new medicines,
- regulatory measures in this area in relation to the registration of medicinal products,
- clinical pharmacokinetics,
- symptomatology and pharmacotherapy of acute and chronic diseases,
- the effect of the disease process on the effects of medicines,
- monitoring of pharmacotherapy and drug levels,
- interpretation of laboratory results with respect to pharmacotherapy,
- the most serious pharmacotherapeutic problems related to
- adverse drug reactions, including allergic drug reactions,
- drug interactions,
- medication errors,
- patient safety during treatment,
- pharmacovigilance,
- rational use of medicines in high-risk groups of patients,
- compliance, adherence to therapy and concordance,
- oral and parenteral nutrition,
- lifestyle medicines.

State exam syllabus:

Recommended literature:
Kuželová, M., Švec, A., Švec, P.: Kapitoly zo všeobecnej klinickej farmakológie pre farmaceutov. Bratislava : Famaceutická fakulta UK, 2011. 196 s.
Kuželová, M., Švec, A., Švec, P.: Vybrané kapitoly z klinickej farmakológie pre farmaceutov. Bratislava : Famaceutická fakulta UK, 2010. 152 s.
Nathan A: Managing symptoms in the pharmacy. Pharmaceutical Press. 2008. 257 p.
Walker R, Whittlesea C: Clinical Pharmacy and Therapeutics. Fifth edition. Churchill Livingstone. Elsevier. 2012. 983 p.

Bond Ch. Evidence-based pharmacy. Pharmaceutical Press. 2006. 226 p.
Barber N.,, Willson A: Clinical pharmacy. Churchill Livingstone,2007 - 502 s.
Wiffen P, Mitchell M, Snelling M, Stoner N: Oxford Handbook of Clinical Pharmacy (2 ed.) Oxford University Press, 2012, 704 p.
Kriška, M. a kol.: Memorix klinickej farmakológie. Bratislava : SAP, 2002. 879 s.
Kriška, M. a kol.: Riziko liekov v medicínskej praxi. Bratislava : SAP, 2000. 474 s.
Kuželová M., Kovácsová B., Švec P.: Farmakológia antiinfekčných liečiv. Osveta, 2010. 184s.
Katzung BG, Masters SB, Trevor AJ: Basic and clinical pharmacology. The McGraw-Hill Companies, Inc. 2012, 1245 p.
Ritter JM, Lewis LD, Mant TGK, Ferro M: A Textbook of Clinical Pharmacology and Therapeutics. Hodder Arnold Hachette Livre UK. 2008. 476 p

Languages necessary to complete the course:
Slovaka, English

Notes:
Teachers:
prof. PharmDr. Ján Klimas, PhD., MPH., prof. RNDr. Magdaléna Kuželová, CSc., doc. PharmDr. Anna Paul Hrabovská, PhD., PharmDr. Gabriel Dóka, PhD., PharmDr. Stanislava Kosírová, PhD.

Last change: 02.04.2022

Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022

University: Comenius University Bratislava

Faculty: Faculty of Pharmacy

Course ID:	**Course title:**
FaF/405-PhD/11	Co-authorship of teaching aids and texts

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning, distance learning

Number of credits: 10

Recommended semester:

Educational level: III.

Prerequisites:

Course requirements:
He / She completed the evaluation with a credit value after submitting the teaching aid or text (source cover, imprint letters with ISBN or ISSN) to the trainer.

Learning outcomes:
The doctoral student, led by the supervisor, demonstrated the ability to cooperate and co-participate in the preparation and writing of teaching aids and texts.

Class syllabus:
The doctoral student, in consultation with the supervisor, participates in the preparation and writing of teaching aids with the author and other co-authors.

Recommended literature:
Current sources on the presented issues.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 16

ABS	NEABS
100,0	0,0

Lecturers:

Last change: 11.02.2022

Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/410-PhD/11	**Course title:** Co-supervisor of the final work of bachelor study
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 10	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 25	

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022

University: Comenius University Bratislava

Faculty: Faculty of Pharmacy

Course ID:	**Course title:**
FaF/407-PhD/11	Co-supervisor of the work to attend to Student´s scientific conference

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning, distance learning

Number of credits: 10

Recommended semester:

Educational level: III.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 37

ABS	NEABS
100,0	0,0

Lecturers:

Last change:

Approved by:

COURSE DESCRIPTION

<table>
<tr><td colspan="2">Academic year: 2021/2022</td></tr>
<tr><td colspan="2">University: Comenius University Bratislava</td></tr>
<tr><td colspan="2">Faculty: Faculty of Pharmacy</td></tr>
<tr><td>Course ID:
FaF/429-PhD/11</td><td>Course title:
Completion of a defined stage of the scientific program of the PhD student</td></tr>
<tr><td colspan="2">Educational activities:
Type of activities:
Number of hours:
per week: per level/semester:
Form of the course: on-site learning, distance learning</td></tr>
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<tr><td colspan="2">Past grade distribution
Total number of evaluated students: 85</td></tr>
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<tr><td>98,82</td><td>1,18</td></tr>
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<tr><td colspan="2">Lecturers:</td></tr>
<tr><td colspan="2">Last change:</td></tr>
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</table>

STATE EXAM DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/300-PhD/11	**Course title:** Dissertation Work Thesis Defense
Number of credits: 0	
Educational level: III.	
State exam syllabus:	
Last change:	
Approved by:	

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/430-PhD/11	**Course title:** Dissertation writting, if was taken to the defense
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 30	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 110	

ABS	NEABS
99,09	0,91

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

<table>
<tr><td colspan="2">Academic year: 2021/2022</td></tr>
<tr><td colspan="2">University: Comenius University Bratislava</td></tr>
<tr><td colspan="2">Faculty: Faculty of Pharmacy</td></tr>
<tr><td>Course ID:
FaF/400-PhD/11</td><td>Course title:
Foreign language exam</td></tr>
<tr><td colspan="2">Educational activities:
Type of activities:
Number of hours:
per week: per level/semester:
Form of the course: on-site learning, distance learning</td></tr>
<tr><td colspan="2">Number of credits: 10</td></tr>
<tr><td colspan="2">Recommended semester:</td></tr>
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Total number of evaluated students: 210</td></tr>
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<tr><td>99,52</td><td>0,48</td></tr>
</table></td></tr>
<tr><td colspan="2">Lecturers: Mgr. Oľga Hollá, PhDr. Darina Kližanová, PaedDr. Viera Žufková, PhD., Ing. Mgr. Erika Jurišová, PhD.</td></tr>
<tr><td colspan="2">Last change:</td></tr>
<tr><td colspan="2">Approved by:</td></tr>
</table>

COURSE DESCRIPTION

Academic year: 2021/2022

University: Comenius University Bratislava

Faculty: Faculty of Pharmacy

Course ID:	**Course title:**
FaF/402-PhD/11	Individual study of the scientific literature

Educational activities:
Type of activities:
Number of hours:
per week: per level/semester:
Form of the course: on-site learning, distance learning

Number of credits: 5

Recommended semester:

Educational level: III.

Prerequisites:

Course requirements:
The doctoral student obtains the evaluation completed with a credit value after submitting a written version thematically corresponding to the topic of the dissertation, research, theoretical introduction or project to the supervisor, the doctoral student obtains the evaluation completed with a credit value. The supervisor will give the evaluation to the doctoral student in the AIS and in the study report.

Learning outcomes:
The doctoral student under the guidance of the supervisor will demonstrate the ability to develop a search, theoretical introduction or project that thematically corresponds to the topic of the dissertation.

Class syllabus:
1. The doctoral student prepares a research, theoretical introduction or project corresponding to the main topic of the dissertation under the guidance of the supervisor
2. The doctoral student presents a case study corresponding to the main topic of the dissertation in the presence of the supervisor

Recommended literature:
Current sources on the studied issues.

Languages necessary to complete the course:
Slovak language, English language

Notes:

Past grade distribution
Total number of evaluated students: 618

ABS	NEABS
99,51	0,49

Lecturers:

Last change: 11.02.2022
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/424-PhD/11	**Course title:** Involvement in the resolution of another research project
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 5	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 361	

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/423-PhD/11	**Course title:** Obtaining of "Grant FaF UK for young scientists" (Co-investigator of grant) 5)
Educational activities: **Type of activities:** **Number of hours:** **per week:** **per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 10	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 29

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/422-PhD/11	**Course title:** Obtaining of "Grant FaF UK for young scientists" (Principal Investigator) 5)
Educational activities: **Type of activities:** **Number of hours:** **per week:** **per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 15	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 243

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/421-PhD/11	**Course title:** Obtaining of "University Grant for Young Researchers" (Co - investigator of grant) 5)
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 10	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 24

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/420-PhD/11	**Course title:** Obtaining of "University Grant for Young Researchers" (Principal Investigator) 5)
Educational activities: **Type of activities:** **Number of hours:** **per week:** **per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 20	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 180

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/406-PhD/11	**Course title:** Participation in the management of the thesis in Master's degree
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 15	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements: The course is successfully completed if the trained graduate in AIS-2 is enrolled in the evaluation of the course: Preparation of Diploma Thesis 1 or Preparation of Diploma Thesis 2 or Preparation of Diploma Thesis 3.	
Learning outcomes: The doctoral student will gain experience and acquire the skills necessary for leading the final work of a selected professional issue in the academic space at the 2nd level of university study within the field of study.	
Class syllabus: 1. The doctoral student methodically and professionally guides the student from the choice of topic to the successful defense of the final (diploma) thesis under the supervision of the thesis supervisor. 2. During the entire supervision of the final (diploma) thesis, the doctoral student is responsible for the administration of all requisites related to the final (diploma) thesis in AIS under the supervision of the thesis supervisor. 3. The doctoral student will prepare a certificate of completion of the final (diploma) thesis, which can be confirmed by the head of the department. The evaluation must be accompanied by evaluation assessments of the works. The confirmation signed by the head of the department serves as proof of successful fulfillment of the conditions for completing the course for the supervisor, who on the basis of it will award the evaluation (graduated) to the doctoral student in AIS and in the study report.	
Recommended literature: Current sources on the studied issues.	
Languages necessary to complete the course: Slovak language	
Notes:	

Past grade distribution Total number of evaluated students: 440	
ABS	NEABS
100,0	0,0
Lecturers:	
Last change: 14.02.2022	
Approved by:	

COURSE DESCRIPTION

Academic year: 2021/2022

University: Comenius University Bratislava

Faculty: Faculty of Pharmacy

Course ID:	**Course title:**
FaF/403-PhD/11	Passing other subject of the offer 2) of other university faculties

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning, distance learning

Number of credits: 0

Recommended semester:

Educational level: III.

Prerequisites:

Course requirements:
Upon presentation of confirmation of completion of the course at another faculty of the university, the doctoral student is evaluated according to the specific credit evaluation of the course at the faculty.

Learning outcomes:
The doctoral student will gain knowledge of the subject at another faculty of the university.

Class syllabus:
The doctoral student is completing a designated subject at another faculty of the university at which he / she did not complete his / her second degree.

Recommended literature:
Current sources on the presented issues

Languages necessary to complete the course:
Slovak language

Notes:

Past grade distribution
Total number of evaluated students: 13

ABS	NEABS
100,0	0,0

Lecturers:

Last change: 11.02.2022

Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/401-PhD/11	**Course title:** Passing prescribed doctoral lectures and seminars 1)
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 10	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 569	

ABS	NEABS
99,3	0,7

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/411-PhD/11	**Course title:** Passing the Dissertation exam
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 20	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 203

ABS	NEABS
99,51	0,49

Lecturers:
Last change: 18.01.2022
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/409-PhD/11	**Course title:** Pedagogical activities - seminars
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 15	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 237	

ABS	NEABS
99,58	0,42

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022

University: Comenius University Bratislava

Faculty: Faculty of Pharmacy

Course ID:	**Course title:**
FaF/408-PhD/11	Pedagogical activity - exercises

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning, distance learning

Number of credits: 10

Recommended semester:

Educational level: III.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 471

ABS	NEABS
99,79	0,21

Lecturers:

Last change:

Approved by:

STATE EXAM DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/701-PhD/11	**Course title:** Pharmaceutical Botany
Number of credits: 0	
Educational level: III.	
Course requirements: Successful passing of the exam	
Learning outcomes: After successful completion of the course, the student should know the anatomical and morphological structure of plant organs with special emphasis to important medicinal plant species, know selected plant species with medicinal effects and classify them within the botanical system.	
Class syllabus: Plant systematics and taxonomy of pharmaceutically important plant species. Plant cytology - morphological and functional features of the cell, cell inclusions, Identification features of pharmaceutically important plants. Anatomical structure and tissue types according of developmental stage and function. Specific features of pharmaceutically important species.	
State exam syllabus:	
Recommended literature: Habán M, 2022: Farmaceutická botanika - prednášky v elektronickej forme (dostupné cez MS Teams). Habán M., Ďuriška O., Mistríková I., 2022: Vybrané kapitoly z laboratórnych cvičení v elektronickej forme (dostupné cez MS Teams). Siphunov A. 2020: Introduction to botany. Peciar M., Bielik M., Gajdoš M., 2019. Farmaceutická botanika. Nové Mesto n. Váhom , 369 s. ISBN 978-80-570-0762-3.	
Languages necessary to complete the course: Slovak language, English language	
Notes: Lecturer: doc. Ing. M. Habán, PhD.	
Last change: 11.04.2022	
Approved by:	

STATE EXAM DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/500-PhD/11	**Course title:** Pharmaceutical Chemistry
Number of credits: 0	
Educational level: III.	
Course requirements: Successful passing of the exam	
Learning outcomes: Expansion and intensification of knowledge from pharmaceutical chemistry the can be used by the student to formulate scientific hypotheses to create a basis for the analytical part of the dissertation and to formulate conclusions following the obtained results.	
Class syllabus: Pharmaceutical/Medicinal Chemistry 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, stability), v) shape properties (geometric, conformational, topological, steric), vi) stereochemical properties (optical isomers, enantiomers, geometric isomers), estimation of binding affinities (in vitro ligand binding assays) and impact of the drugs - enantiomers and isomers to relevant biological targets), vii) electronic properties. Following that knowledge, structure–biological activity relationships and/or structure-pharmacokinetics relationships and/or structure-toxicity relationships are comprehensively investigated (SAR, STR, QSAR).	
State exam syllabus:	
Recommended literature: Chackalamannil, S., Rotella, D., & Ward, S. (2017). Comprehensive Medicinal Chemistry III, 3. Vyd. Elsevier, Amsterdam, Holandsko, 4536 s. Patrick, G.L. (2017). An Introduction to Medicinal Chemistry. 6. Vyd. Oxford University Press, New York, USA, 832 s. Remko, M. (2019). Základy medicínskej a farmaceutickej chémie, 3. Vyd. Remedika, Bratislava, SR, 480 s.	

Roche, V.F., Zito, S.V., Lemke, T.L., & Williams, D.A. (2019). Foye´s Principles of Medicinal Chemistry, 8. Vyd. Wolters Kluwer Health Adis (ESP), Baltimore, USA, 1168 s.
Silverman, R.B., & Holladay, M.W. (2015). The Organic Chemistry of Drug Design and Drug Action. 3. Vyd. Elsevier, Waltham, USA, 521 s.
Wermuth, C., Aldous, D., Raboisson, P., & Rognan, D. (2015). The Practice of Medicinal Chemistry. 4. Vyd. Academic Press (Elsevier), San Diego, CA, USA; Kidlington, Oxford, Veľká Británia, 903 s

Languages necessary to complete the course:
Slovak language

Notes:
Lecturers: prof. RNDr. Peter Mikuš, PhD, prof. Ing. Vladimír Frecer, DrSc., doc. PharmDr. Ivan Malík, PhD., doc. Mgr. Fils Andriamainty, PhD., Dr.h.c. prof. RNDr. Jozef Čižmárik, PhD., doc. PharmDr. Miroslava Sýkorová, PhD., PharmDr. Vladimír Garaj, PhD.

Last change: 11.04.2022

Approved by:

STATE EXAM DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/810-PhD/11	**Course title:** Pharmaceutical Technology
Number of credits: 0	
Educational level: III.	
Course requirements: final exam	
Learning outcomes: By passing the course, the PhD. student will have a complex theoretical knowledge of drugs as dispersion and application systems in terms of theoretical and practical preparation of innovative dosage forms.	
Class syllabus: Pharmaceutical preparations are of a dosage (application) form which depends on the means of administration and coexistence of relevant drugs and excipients. Pharmaceutical technology (galenics) deals with composition, formulation, production, evaluation, and quality assurance of individually prepared and manufactured pharmaceutical preparations. It studies conditions for formulation of drugs and excipients into pharm. preparations, rules governing these processes, relations of the preparation with the effect of contained drugs. The subject of the study are these areas: - Pharm. preparations as systems composed of drugs and excipients (constitutive, stabilizing, corrective, etc.), conditions for coexistence of components in pharm. preparation. - Procedures and devices for preparation and manufacturing of pharm. preparations - Evaluation and quality assurance of pharm. preparations in terms of composition, technology, structure - Relations between the pharm. preparation and bioavailability of administered drugs - Stability of pharm. preparations and its possible ensuring - Containers ‘materials, technique for pharm. preparations ‘containers, study of interactions between containers and drugs / excipients Current research is oriented to drug carriers (polymeric, lipid - liposomes) in the role of drug delivery systems as nanoparticles. It begins with the synthesis of the carrier, incorporation of the drug, continues with formulation of dosage form, stability studies of formulated particles and in vitro drug release study. At the end of this difficult process the biologic activity and in vivo bioavailability are evaluated in cooperation with other departments/institutions. Also, nanodispersion systems as e.g., micro- and nanoemulsions are studied, especially related to low soluble drugs (e.g., terbinafine, minoxidil, indomethacin, tretinoin) intended for topical application with local or systemic effect e.g., also using the mechanisms of transdermal passage. In the preparation of these systems, various types of polymers (e.g., chitosan, thermosensitive polymers) and specific excipients are used to create a specific structure of given formulation with improved properties (e.g., better bioadhesion, stability, capacity to release the low soluble drugs, improved permeation, and penetration to target tissues in required concentration).	
State exam syllabus:	

Recommended literature:

Chalabala, M. a kol.: Technologie léků. 3. vyd. Praha: Galén, 2006. 399 s.
Žabka, M. a kol: Moderné lieky vo farmaceutickej technológii. Bratislava: SAP, 1999. s.487
European Pharmacopoeia 10 th Ed. Strasbourg: EDQM, 2022
Aulton, M. E.: Aulton´s Pharmaceutics: the design and manufacture of medicines - Edinburgh: Churchill Livingstone, 2018
Mikušová, V.; Mikuš, P.: Advances in Chitosan-Based Nanoparticles for Drug Delivery. Int. J. Mol. Sci. 2021, 22, 9652. https://doi.org/10.3390/ijms22179652

Languages necessary to complete the course:
Slovak language

Last change: 18.02.2022

Approved by:

STATE EXAM DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/700-PhD/11	**Course title:** Pharmacognosy
Number of credits: 0	
Educational level: III.	
Course requirements: Successful completion of the exam.	
Learning outcomes: Graduates of Pharmacognosy will acquire the advanced knowledge necessary for their application not only in the professional discipline, but also in other areas of pharmacy in connection with the use of natural resources and individual content substances for therapeutic practice. The student has a broad overview of the biological and chemical processes leading to the formation of secondary metabolites of therapeutic relevance, and is able to use the chemical and biological properties of isolates in their practical use in pharmacy. He can search for new natural sources based on broad chemical, biological screening and also has a broad theoretical knowledge of pharmacognosy and phytochemistry.	
Class syllabus: The PhD student receives information related to the classification of drugs according to their effect on the human their use in prevention and therapy, including basic information on adverse effects and interactions involving individual active ingredients of natural origin. Emphasis is placed on drugs and their active substances that are part of registered phytopharmaceuticals in EU countries or are registered in the current edition of the European Pharmacopoeia. The main topics of the core knowledge of the course are: Biogenesis of natural substances and their classification according to given systems. Relationships of metabolic transformations of natural substances. Search for new sources of biologically active substances based on chemotaxonomic data. Methods of isolation of biologically active metabolites. Physico-chemical methods for determining the structure of natural substances. Evaluation of biological activities of natural isolates by in vivo and in vitro methods. Use of natural substances in therapy and prevention, especially of human diseases.	
State exam syllabus:	
Recommended literature: Nagy - Grančai - Mučaji: Farmakognózia : Biogenéza prírodných látok. - 1. slovenské vydanie. 2011. Liekové interakcie. Mechanizmy a manažment klinicky významných interakcií. (vybrané kapitoly, autori: Czigle, Tóth) Williamson E., Driver S., Baxter K. Stockleys Herbal Medicines Interactions. 2009. Benzie I., Wachtel-Galor S. eds. Herbal medicine. Biomolecular and clinical aspects. 2011. Polya G. Biochemical Targets of Plant Bioactive Compounds. A Pharmacological Reference Guide to Sites of Action and Biological Effects . 2003. Ebadi M. Pharmacodynamic Basis of Herbal Medicine, Second Edition 2006.	

Berger S., Sicker D. Classics in Spectroscopy Isolation and Structure Elucidation of Natural Products. 2009.
Katzung B.G. Basic and Clinical Pharmacology 14th Edn. 2018.
Huang L-Q. Molecular Pharmacognosy. 2nd Edn. 2019.
Carlton R.A. Pharmaceutical Microscopy. 2011.
Európský liekopis. (aktuálne vydanie + jeho doplnky)

Languages necessary to complete the course:
Slovak language, English language

Notes:
Lectures: prof. PharmDr. Pavel Mučaji, PhD., prof. Ing. Milan Nagy, CSc., doc. PharmDr. Szilvia Czigle, PhD.

Last change: 26.03.2022

Approved by:

STATE EXAM DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/800-PhD/11	**Course title:** Pharmacology
Number of credits: 0	
Educational level: III.	
Course requirements: Successful passing of the exam	
Learning outcomes: Expansion and intensification of knowledge from pharmacology the can be used by the student to formulate scientific hypotheses to create a basis for the analytical part of the dissertation and to formulate conclusions following the obtained results.	
Class syllabus: The focus is on one or more of the following areas of pharmacology: - pharmacodynamics with respect to the mechanism of action of drugs - pharmacokinetics - pharmacogenomics - adverse effects of drugs - drug overdose - therapeutic use of drugs Special pharmacology - pharmacology of drugs with effect on the central nervous system - pharmacology of drugs with effect on the autonomous nervous system - pharmacology of drugs with effect on the smooth muscles - pharmacology of drugs with effect on the cardiovascular system and kidneys - pharmacology of blood, inflammation - pharmacology of drugs with effect on the respiratory system - pharmacology of drugs with effect on the gastrointestinal system - pharmacology of drugs with effect on the endocrine system - pharmacology of anti-infective drugs - pharmacology of anticancer drugs - new directions of therapy of diseases using biological drugs	
State exam syllabus:	
Recommended literature: Brunton LL, Hilal-Dandan R, Knollmann BC et al. Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 13e, McGraw-Hill Education 2018 Golan D. E., Tashjian Jr A. H.., Armstrong E. J., Armstrong A. Wet al. .: Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy, 3rd 4th Edition. Lippincott Williams&Wilkins, 20172 Katzung BG, Vanderah TW et al. : Basic & Clinical Pharmacology, 15e, McGraw Hill 2021 Rang, H.P., Dale, M.M. a kol.: Rang and Dale´s Pharmacology, 7th ed. London, Churchill Livingstone, Elsevier, 2012	

Ritter JM. et al.: Rang and Dale's Pharmacology E-Book, Elsevier, 9th ed., 2018

Languages necessary to complete the course:
Slovak language, English language

Notes:
Lecturers: prof. PharmDr. Adriana Ďuriš Adameová, PhD.; prof. PharmDr. Ján Klimas, PhD., MPH.; doc. Peter Křenek, PhD.; doc. PharmDr. Anna Paul Hrabovská, PhD.; doc. PharmDr. Marek Máťuš, PhD.; Mgr. Peter Vavrinec, PhD.; Mgr. Diana Vavrincová, PhD

Last change: 11.04.2022

Approved by:

STATE EXAM DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/703-PhD/11	**Course title:** Plant Molecular Biology
Number of credits: 0	
Educational level: III.	

Learning outcomes:

After completing the course, the PhD. student will gain deeper and comprehensive knowledge about the flow of genetic information and the possibilities of its influence, as well as about the cell signaling systems with respect to the mechanisms of drugs action that have plant origin. The student will obtain informations about the possibilities of preparing of new drugs by modern biotechnological procedures based on techniques using recombinant DNA. The student will get acquainted with different types of cloning and expression vectors and their application in the production of specific biopharmaceuticals produced by plants or by plants cell cultures.

Class syllabus:

Flow of genetic information in plant cells – possibilities of drug influence: replication, transcription, translation and post-translational modifications. Mutations and repair mechanisms.
Intracellular compartments in plant cells and protein transport.
Principles of plant cell communication. Protein kinase networks and signal processing integration.
Transport processes in the plant cell.
Fundamentals of recombinant DNA technology. Principles of gene manipulation.
Use of biotechnological processes in the production of secondary metabolites.
Preparation of recombinant DNA, cloning and expression vectors, plasmids and bacteriophages, DNA and cDNA libraries, hybridization.
Preparation and use of transgenic plants, biopharmaceuticals produced by transgenic plants and cell cultures, GMO plants.

State exam syllabus:

Recommended literature:

Odporúčaná literatúra:
Obložinský M. a kol.: Molekulárna biológia účinku liečiv a biotechnológia pre farmaceutov. Bratislava: Univerzita Komenského, 2010.
Bahadur B., Rajam M.V., Sahijram L., Krishnamurthy K.V.: Plant Biology and Biotechnology. Springer 2015, 764 s.
Bowsher C., Tobin A.: Plant Biochemistry. Taylor & Francis 2021, 454 s.

Languages necessary to complete the course:

Slovak language, English language

Notes:

Lecturer: doc. PharmDr. Marek Obložinský, PhD

Last change: 12.04.2022

Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/428-PhD/11	**Course title:** Presentation at the conference of young scientists
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 5	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 132	

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/417-PhD/11	**Course title:** Professional publications in domestic journal
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 4	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 71

ABS	NEABS
98,59	1,41

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/416-PhD/11	**Course title:** Professional publications in international journals
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 7	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 15	

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/415-PhD/11	**Course title:** The original publication in non current contents domestic journals or conference proceedings
Educational activities: **Type of activities:** **Number of hours:** **per week:** **per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 7	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 147

ABS	NEABS
99,32	0,68

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/414-PhD/11	**Course title:** The original publication in non current contents international journals or conference proceedings
Educational activities: **Type of activities:** **Number of hours:** **per week:** **per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 15	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 77

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/413-PhD/11	**Course title:** The original publication in peer-reviewed domestic journals
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 30	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 11	

ABS	NEABS
100,0	0,0

Lecturers:
Last change:
Approved by:

COURSE DESCRIPTION

Academic year: 2021/2022	
University: Comenius University Bratislava	
Faculty: Faculty of Pharmacy	
Course ID: FaF/412-PhD/11	**Course title:** The original publication in peer-reviewed international journals
Educational activities: **Type of activities:** **Number of hours:** **per week: per level/semester:** **Form of the course:** on-site learning, distance learning	
Number of credits: 35	
Recommended semester:	
Educational level: III.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	
Past grade distribution Total number of evaluated students: 226	

ABS	NEABS
99,12	0,88

Lecturers:
Last change:
Approved by: