List of information sheets for the doctoral study program in applied analytical and bioanalytical chemistry

Study and pedagogical-educational activities:

1. Own Pedagogical Activity of Doctoral Student I-VII
2. Supervision of the Final Bachelor's Thesis
3. Elaboration of an Opinion for the Final Work of the Bachelor's Study
4. Co-authorship (or Authorship) of Created and Published Teaching Material
5. **Independent Study of Literature according to the Recommendation of the Supervisor I, II**

Compulsory subjects:

6. **Theoretical Principles of Analytical Chemistry**
7. Dissertation Defense
8. Dissertation Exam
9. Professional English for PhD Students

Compulsory optional subjects:

10. **Advanced Methods of Molecular Spectroscopy**
11. **Separation Methods**
12. Electroanalytical Methods
13. **Advances in Bioanalytical Chemistry**
14. **Nuclear Analytical Methods**
15. Chemometry and Experimental Methodology
16. **Magnetochemical methods**
17. **Bioanalytical Procedures in Clinical Laboratories**

Creative activity:

18. **Publication in a Scientific Journal Registered in the Web of Science Databases Included in Q1 or Q2 in JCF IF (1st or 2nd quarter of the impact factor value in the Journal Citation Report)**
19. **Publication in a Scientific Journal Registered in the Web of Science Databases Included in Q1-Q4 in JCF IF (1st-4th quarter of the impact factor value in the Journal Citation Report)**
20. Other Creative activity

- profile subjects are highlighted in bold

University of Ss. Cyril and Methodius in Trnava
Námestie Jozefa Herdu 2
917 01 Trnava

Study and pedagogical-educational activities

University of Ss. Cyril and Methodius in Trnava
Námestie Jozefa Herdu 2
917 01 Trnava

SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Own Pedagogical Activity of Doctoral Student I-VII**
Type, scope, and method of educational activities: Compulsory subject. **Subject type (C, CO, O): C** **Recommended scope of teaching (in hours): Generally 4 hours per week.** **Study method:** **Study form: full-time study**	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-7	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: Independent work under the direction of the course leader.	
Educational outcomes: • The student will gain teaching experience by conducting laboratory exercises under the direction of the subject supervisor. • Thanks to this activity, the student will also practice speaking in front of an audience, which should give him/her confidence for his/her future scientific career, so that he/she can actively participate (in the form of lectures) in scientific conferences.	
Brief content of the subject: The student will complete selected activities for which he/she will receive credit: • Own Pedagogical Activity of Doctoral Student I • Own Pedagogical Activity of Doctoral Student II • Own Pedagogical Activity of Doctoral Student III • Own Pedagogical Activity of Doctoral Student IV • Own Pedagogical Activity of Doctoral Student V • Own Pedagogical Activity of Doctoral Student VI • Own Pedagogical Activity of Doctoral Student VII	
Recommended literature:	
Language, knowledge of which is necessary to complete the subject: English	
Subject evaluation	

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:
Teacher: dissertation supervisor, subject supervisor
Date of last change: 15.4.2022
Approved: Prof. RNDr. Ján Titiš, PhD.

University of Ss. Cyril and Methodius in Trnava
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SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava			
Faculty/institute: Faculty of Natural Sciences			
Subject code:	**Subject name: Supervision of the Final Bachelor's Thesis**		
Type, scope, and method of educational activities: Optional subject. **Subject type (C, CO, O): O** **Recommended scope of teaching (in hours):** **Study method:** **Study form: full-time study**			
Number of credits: 5			
Recommended semester/trimester of study: semester 1-8			
Level of study: doctoral			
Prerequisite subjects: without prerequisites			
Conditions for completing the subject: Independent activity under the guidance of a supervisor - bachelor thesis consultant.			
Educational outcomes: • The student will gain teaching experience in advising and mentoring a bachelor's degree candidate in the context of resolving a bachelor's thesis.			
Brief content of the subject: The student will complete selected activity for which he/she will receive credit: • Supervision of the Final Bachelor's Thesis			
Recommended literature:			
Language, knowledge of which is necessary to complete the subject: English			
Subject evaluation			
	Passed	Failed	
	0.00	0.00	
Notes: - student time load:			
Teacher: dissertation supervisor			
Date of last change: 15.4.2022			
Approved: Prof. RNDr. Ján Titiš, PhD.			

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SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Elaboration of an Opinion for the Final Work of the Bachelor's Study**
Type, scope, and method of educational activities: Optional subject. **Subject type (C, CO, O): O** **Recommended scope of teaching (in hours):** **Study method:** **Study form: full-time study**	
Number of credits: 3	
Recommended semester/trimester of study: semester 1-8	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: Independent activity under the guidance of a supervisor.	
Educational outcomes: • The student will gain experience in evaluating theses on the basis of the criteria binding for writing qualification theses at the University of Ss. Cyril and Methodius in Trnava, which will help him/her to become more aware of the individual aspects of his/her own dissertation.	
Brief content of the subject: The student will complete selected activity for which he/she will receive credit: • Elaboration of an Opinion for the Final Work of the Bachelor's Study	
Recommended literature:	
Language, knowledge of which is necessary to complete the subject: English	
Subject evaluation	

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:
Teacher: dissertation supervisor
Date of last change: 15.4.2022
Approved: Prof. RNDr. Ján Titiš, PhD.

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SUBJECT INFORMATION SHEET

<table>
<tr><td colspan="4">University: University of Ss. Cyril and Methodius in Trnava</td></tr>
<tr><td colspan="4">Faculty/institute: Faculty of Natural Sciences</td></tr>
<tr><td colspan="2">Subject code:</td><td colspan="2">Subject name: Co-authorship (or Authorship) of Created and Published Teaching Material</td></tr>
<tr><td colspan="4">Type, scope, and method of educational activities: Optional subject.
Subject type (C, CO, O): O
Recommended scope of teaching (in hours):
Study method:
Study form: full-time study</td></tr>
<tr><td colspan="4">Number of credits: 5</td></tr>
<tr><td colspan="4">Recommended semester/trimester of study: semester 1-8</td></tr>
<tr><td colspan="4">Level of study: doctoral</td></tr>
<tr><td colspan="4">Prerequisite subjects: without prerequisites</td></tr>
<tr><td colspan="4">Conditions for completing the subject:
Independent activity under the guidance of the author of the published teaching material.</td></tr>
<tr><td colspan="4">Educational outcomes:
• The student will gain experience in processing a teaching text, selecting appropriate content and presenting it in a comprehensible text.</td></tr>
<tr><td colspan="4">Brief content of the subject:
The student will complete selected activity for which he/she will receive credit:
• Co-authorship (or Authorship) of Created and Published Teaching Material</td></tr>
<tr><td colspan="4">Recommended literature:</td></tr>
<tr><td colspan="4">Language, knowledge of which is necessary to complete the subject: English</td></tr>
<tr><td colspan="4">Subject evaluation</td></tr>
<tr><td></td><td>Passed</td><td>Failed</td><td></td></tr>
<tr><td></td><td>0.00</td><td>0.00</td><td></td></tr>
<tr><td colspan="4">Notes: - student time load:</td></tr>
<tr><td colspan="4">Teacher: subject supervisor</td></tr>
<tr><td colspan="4">Date of last change: 15.4.2022</td></tr>
<tr><td colspan="4">Approved: Prof. RNDr. Ján Titiš, PhD.</td></tr>
</table>

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SUBJECT INFORMATION SHEET

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<tr><td colspan="4">Faculty/institute: Faculty of Natural Sciences</td></tr>
<tr><td colspan="2">Subject code:</td><td colspan="2">Subject name: Independent Study of Literature according to the Recommendation of the Supervisor I, II</td></tr>
<tr><td colspan="4">Type, scope, and method of educational activities: Compulsory subject. Profile subject.
Subject type (C, CO, O): C
Recommended scope of teaching (in hours):
Study method:
Study form: full-time study</td></tr>
<tr><td colspan="4">Number of credits: 5</td></tr>
<tr><td colspan="4">Recommended semester/trimester of study: semester 1-4</td></tr>
<tr><td colspan="4">Level of study: doctoral</td></tr>
<tr><td colspan="4">Prerequisite subjects: without prerequisites</td></tr>
<tr><td colspan="4">Conditions for completing the subject:
Independent activity under the guidance of a dissertation supervisor.</td></tr>
<tr><td colspan="4">Educational outcomes:
The student will acquire the ability to search and process scientific literature on the topic of the dissertation.
The student will be able to use the studied literature sources in designing experiments and also in discussing results.</td></tr>
<tr><td colspan="4">Brief content of the subject:
The student will complete selected activities for which he/she will receive credit:
Independent Study of Literature according to the Recommendation of the Supervisor I
Independent Study of Literature according to the Recommendation of the Supervisor II</td></tr>
<tr><td colspan="4">Recommended literature:</td></tr>
<tr><td colspan="4">Language, knowledge of which is necessary to complete the subject: English</td></tr>
<tr><td colspan="4">Subject evaluation</td></tr>
<tr><td rowspan="2"></td><td>Passed</td><td>Failed</td><td rowspan="2"></td></tr>
<tr><td>0.00</td><td>0.00</td></tr>
<tr><td colspan="4">Notes: - student time load:</td></tr>
<tr><td colspan="4">Teacher: Prof. RNDr. Ján Titiš, PhD.</td></tr>
<tr><td colspan="4">Date of last change: 15.4.2022</td></tr>
<tr><td colspan="4">Approved: Prof. RNDr. Ján Titiš, PhD.</td></tr>
</table>

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Compulsory subjects (C)

University of Ss. Cyril and Methodius in Trnava
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SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Theoretical Principles of Analytical Chemistry**
Type, scope, and method of educational activities: Compulsory subject. Profile subject. **Subject type (C, CO, O):** C **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: During the semester, each student will prepare and present 4 seminar reports/ppt presentations from papers recently published in international scientific journals on specified topics in analytical chemistry. Each presentation is evaluated up to 20 points. The student needs to reach 60 points to get a "passed" evaluation.	
Educational outcomes: Upon successful completion of the course, the graduate: - gain an overview and knowledge of the basic principles of analytical chemistry methods. - will be able to characterize protolytic, complexing, precipitation, redox equilibria and their influence on analytical determinations in aqueous solutions. - will gain an overview and knowledge of sampling and treatment methods and will be able to apply them in practice. - will be able to competently estimate the key factors of chemical processes for the optimization of the analytical method. - will be competent to use the principles, procedures and techniques of analytical methods used in pharmaceutical, food and environmental analysis.	
Brief content of the subject: 1. Subject of analytical chemistry, basic concepts, division of analytical methods. 2. Process of chemical analysis, quality assurance in analytical chemistry. Sampling, transport, storage of samples. 3. Sample preparation; extraction and microextraction techniques. 4. Quantitative analysis: acid-base, redox, precipitation and complexing reactions. 5. Practical use of methods of quantitative analysis in practice. 6. Theoretical bases of chromatographic process. 7. Theoretical bases of electrochemical analyzes. 8. Interaction of electromagnetic radiation with the analyte. 9. Applications of analytical chemistry in pharmacy, food analysis, water, air, forensic analysis. 10. General procedure for analysis of an unknown sample. 11. Calibration and optimization in analytical chemistry. 12. Presentation of seminar papers. 13. Presentation of seminar papers.	
Recommended literature:	

University of Ss. Cyril and Methodius in Trnava
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Ján Labuda et al .: Analytical Chemistry, STU, Bratislava, 2019.
Klouda P .: Modern Analytical Methods, Pavel Klouda Publishing House, Ostrava 2003.
Mudge, S. M et al: Environmental Forensic. Royal Society of Chemistry, Cambridge, 2008.

Language, knowledge of which is necessary to complete the subject: English

Subject evaluation

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:

Teacher: Assoc. Prof. Ing. Jozef Sokol, CSc.; Assoc. Prof. Ing. Andrea Purdešová, PhD.

Date of last change: 15.4.2022

Approved: Prof. RNDr. Ján Titiš, PhD.

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SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Dissertation Defence**
Type, scope, and method of educational activities: Compulsory subject of the state examination **Subject type (C, CO, O):** C **Recommended scope of teaching (in hours):** **Study method:** on-site **Study form:** full-time study	
Number of credits: 30	
Recommended semester/trimester of study: semester 8	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: Elaboration of the dissertation. The course of the dissertation defence is evaluated by the committee comprehensively in terms of „passed“ or „failed“ in accordance with the study regulations of the University of Ss. Cyril and Methodius in Trnava.	
Educational outcomes: • The student has a deep theoretical knowledge of the subjects related to the topic of the dissertation and practical laboratory skills. • He/she has an overview of the current state of the field at home and abroad, which is related to the topic of the dissertation. • Can independently solve current scientific problems. • Is able to critically analyse, evaluate and synthesise new concepts. • He gained experience in presenting and defending his own results in a broader context.	
Brief content of the subject: Defend theoretical and practical results. Scientific discussion of the dissertation topic.	
Recommended literature:	
Language, knowledge of which is necessary to complete the subject: English	
Subject evaluation	

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:
Teacher: State Examination Committee
Date of last change: 15.4.2022
Approved: Prof. RNDr. Ján Titiš, PhD.

University of Ss. Cyril and Methodius in Trnava
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SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Dissertation Exam**
Type, scope, and method of educational activities: Compulsory subject of the state examination **Subject type (C, CO, O):** C **Recommended scope of teaching (in hours):** **Study method:** on-site **Study form:** full-time study	
Number of credits: 30	
Recommended semester/trimester of study: semester 4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: The student will prepare a thesis for the dissertation exam. The student will present the objectives of the dissertation and defend them. The student takes an exam - answers questions related to the dissertation topic. The course of the dissertation exam is evaluated by the committee by a comprehensive "passed" or "failed" in accordance with the study regulations of the University of Ss. Cyril and Methodius in Trnava.	
Educational outcomes: • The student has a deep theoretical knowledge of subjects related to the topic of the dissertation. • He/she has a good overview of the current state of the issues addressed in the dissertation. • The student is capable of thorough literature research, understands professional texts in English. • The student is able to apply the knowledge acquired during his/her studies. • The student is able to formulate the objectives of the dissertation. • The student is able to prepare a written thesis for the dissertation examination.	
Brief content of the subject: Literature research and preparation of an overview of the current state of the issue at home and abroad. Formulation of dissertation objectives. Choice of a theoretical approach to address the dissertation objectives. Preparation of a written thesis for the dissertation examination and its defence. Dissertation examination.	
Recommended literature:	
Language, knowledge of which is necessary to complete the subject: English	
Subject evaluation	

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:
Teacher: State Examination Committee
Date of last change: 15.4.2022
Approved: Prof. RNDr. Ján Titiš, PhD.

University of Ss. Cyril and Methodius in Trnava
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SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Professional English for PhD Students**
Type, scope, and method of educational activities: Compulsory subject **Subject type (C, CO, O):** C **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	

Conditions for completing the subject:

Students are evaluated on the basis of the portfolio they create from the outputs during the semester, and defend at the final colloquium. They develop, submit and defend:

- Extended abstract for a scientific conference at the proceedings of abstracts.
- Reaserch paper from the field of studies usually related to the topic of the dissertation project in the IMRAD international standard structure within the range of three to five pages. (It can be an already published article in co-authorship, partial information about the research in the diploma thesis given in the form of a scientific article, an extended article from the student research conference, etc.).
- Scientific poster in PDF format. It can be thematically identical to the scientific paper.
- Multimedia PowerPoint presentation or video-presentation (according to the methodological topic) in the range of 8-10 minutes (it can also be thematically identical to the paper and the poster). In the case of contact teaching, an oral presentation with PowerPoint support.
- Academic curriculum vitae in Europass and alternative format, and cover letter such as a simulated internship (grant, job, etc.) application.

Written outputs make a part of the final evaluation in the range - 60%, Oral presentation of a scientific topic with PowerPoint support - 40%.

Educational outcomes:

Upon successful completion of this course, students gain:

Knowledge:

- can define and distinguish genres of scientific communication (research paper, poster, presentation, research report, etc.),
- knows grammatical, syntactic, phraseological peculiarities of genres, lexicon of the scientific-research environment,
- know general and professional vocabulary, synonyms, homonyms, antonyms, neologisms, internationalisms, multiword terms, composites, etc., which they use in making own speeches,
- know the morphematic structure of the word and the principles of word formation in English and can apply them when translating from and into English,
- knows and are able to apply academic discourse and the specifics of academic English.

Skills:

- can handle different types of multilingual dictionaries and professional glossaries,
- acquire specific language means and speech skills necessary for the development of advanced communication competences and cultural and social habits in the preparation for an international scientific event,
- are able to work with professional literature sorces, manage work with digital media and can select relevant information sources,

- have skills in creating effective PowerPoint slides to support the presentation of research results,
- can and graphically and grammatically correctly develop a scientific poster, use several software applications for its creation,
- can interpret graphs, diagrams, schemes, tables, pictograms and symbols, and apply them in scientific texts,
- practically elaborate an academic CV and cover letter.

Professional competencies:

- can flexibly apply the acquired language and communication skills and competencies in the target professional environment,
- can effectively use specialized monoôingual and bilingual dictionaries in practice,
- can work with authentic English professional text,
- master the language portfolio of phraseologisms for communication in the target professional environment.

Transferable competencies:

- know the specifics of the multicultural international academic environment and intercultural differences,
- acquire strong communication competencies for the international academic and scientific environment,
- are able to present the results of reaserch work at home and abroad.
- can work with information and communication technologies, apply software solutions for the creation of academic texts and outputs,
  handle verbal and nonverbal academic discourse.

Brief content of the subject:

Lectures:

1. Introduction to the subject. Instruction on access to databases and study literature. Characteristics of the scientific field and study discipline, glossary of academic terms. English - the language of science.
2. Working with professional English text, reading comprehension, horizontal and vertical division of the text (skimming, scanning, reading for information), making notes from the heard content.
3. Work with professional English text, translation strategies. Characteristics of the monolingual and bilingual printed, electronic and online dictionaries. Principles of work with and effective use of dictionaries.
4. Academic writing. Abstract, types of abstracts, principles of abstract writing.
5. Academic writing. Research paper, structure of a research paper according to international standards (IMRAD).
6. Academic writing. Stylistic and morphological-syntactic characteristics of research paper writing (title, keywords, abstract, introduction, material and methods, discussion, conclusion). Citation standards.
7. Scientific poster and poster presentation. Principles of design, the most common styles and structure of a scientific poster.
8. Presentation - principles of effective scientific presentation. Structure and language of the presentation. Communication models, verbal and nonverbal communication, interaction with the audience.
9. Presentation - principles of creating effective PowerPoint slides. Technical, graphic, language and content principles of creating PPT images.
10. Graphical expression of research data - graphs, diagrams, schemes, tables. Reading information from graphs and tables. Their inclusion in the text of a scientific article and in a poster.
11. Academic CV and cover letter. Characteristics of genres and their specifics in the academic environment.
12. Written and oral communication in the academic environment. Communication via electronic media (e-mail, internet). Language specifics of writing an e-mail message. Email label. Communication in a multicultural academic environment, intercultural differences. Conference environment and conference etiquette.

Seminars:

1. Panel discussion and assignment of parameters to written and oral presentations (abstract, research paper and scientific poster, CV and cover letter, professional presentation with the support of PPT). Specifics of English academic terminology, differences between Slovak and English, academic degrees in English.
2. Practical application of reading comprehension skills and recording spoken / listened information.
3. Practical examples in the translation of a selected professional text. The most common mistakes when translating from and into English. Short text translation and translation analysis - group work.
4. Work with authentic materials from the academic and scientific environment (scientific proceedings, scientific journals), study and comparison of compliance with international standards. Practical exercises on the topic.
5. Practical demonstrations and exercises: Title writing, choice of keywords, the difference between abstract, introduction and summary. Writing active and passive sentence constructions. Analysis of linguistic errors in sentences in individual parts of a scientific article.
6. Demonstrations and work with software applications in designing a scientific poster, graphic design, work with templates. Stylistic and linguistic differences between the poster text and the research paper.
7. Panel discussion about presentations, practical language exercises for the development of the language of presentation (signposting language).
8. Practical application of theoretical principles in the creation of effective PPT images in the presentation of the research report.
9. Verbal interpretation of graphs - expressing development, trends, changes and proportions. Practical application of professional lexicon.
10. Online academic CV writing in Europass CV format.
11. Practical experience from the use of electronic communication media in academic communication. Samples of correct and incorrect communication etiquette. Discussion of multiculturalism and intercultural differences in the academic and conference environment.
12. Final colloquium, defense and evaluation of student portfolio.

Recommended literature:

ARMER, T. 2011. Cambridge English for Scientists. Cambridge University Press, 2011. ISBN: 9780521154093

BRISCOE, MARY H. 1996. Preparing Scientific Illustrations: A Guide to Better Posters, Presentations, and Publications. Springer-Verlag New York. ISBN: 978-0-387-94581-1

DAVIS, M.- KAARON, J.D. - DUNAGAN, M. 2012. Scientific Papers and Presentations. Academic Press; 3rd edition. ISBN: 0123847273. Dostupné na: https://www.sciencedirect.com/book/9780123847270/scientific-papers-and-presentations

MCCARTHY, M. - O'DELL, F. 2016. Academic Vocabulary in Use Edition with Answers. Cambridge University Press; 2nd edition, 2016. ISBN: 9781107591660

ŠTEPÁNEK, L., J. - DE HAFF a kol. 2011. Academic English - Akademická angličtina. Průvodce anglickým jazykem pro studenty, akademiky a vědce. Grada Publishing, a.s., 2011. ISBN: 9788024735771

WALLWORK, A. 2016. English for Presentations at International Conferences. Springer International Publishing, 2016. ISBN: 978-3-319-26328-1.

Language, knowledge of which is necessary to complete the subject: English

Subject evaluation

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:

Teacher: Assoc. Prof. PaedDr. Juraj Miština, PhD.; Mgr. Gabriela Chmelíková, PhD.

Date of last change: 15.4.2022

Approved: Prof. RNDr. Ján Titiš, PhD.

University of Ss. Cyril and Methodius in Trnava
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Compulsory optional subjects (CO)

University of Ss. Cyril and Methodius in Trnava
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SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Advanced Methods of Molecular Spectroscopy**
Type, scope, and method of educational activities: compulsory optional subject. Profile subject. **Subject type (C, CO, O):** CO **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: Elaboration and presentation of work on a given topic, answering questions testing knowledge related to individual areas of the course syllabus.	
Educational outcomes: By completing the course the student will gain: - knowledge of theoretical and experimental foundations of spectral methods; - knowledge of the relationships between the structure and spectral properties of compounds; - practical knowledge in the field of measurement, interpretation of measured spectra and use of acquired knowledge in solving the structure of organic, inorganic, organometallic and coordination compounds; - overview and knowledge of modern methods of quantum chemistry, which can be used to model the spectral properties of molecules.	
Brief content of the subject: 1. Introduction, division of spectral methods and basic concepts. 2. Nature of electromagnetic radiation, classical description, Maxwell's equations, radiation polarization, interactions with matter, quantum-mechanical aspects. 3. Absorption, emission and scattering of radiation, Einstein coefficients, spontaneous and stimulated emission, width of spectral lines, energy levels in atoms and molecules. 4. Experimental bases of spectral methods, spectral instruments, radiation sources, detectors. 5. Basic principles of quantum chemistry and theoretical modeling of spectral properties. 6. Rotary and vibrational spectroscopy. 7. Circular dichroism and magnetic circular dichroism. 8. Raman and resonant Raman spectroscopy. 9. Electron spectroscopy. 10. X-ray fluorescence spectroscopy. 11. NMR and mass spectrometry. 12. Electron spin resonance. 13. Final evaluation.	
Recommended literature: *M. Čakrt et al .: Practicum in Analytical Chemistry, ALFA, Bratislava, 1989.* *J. Garaj, D. Bustin, Z.Hladký: Analytical Chemistry, SNTL / ALFA, Bratislava, 1987.* *Miertuš et al .: Atomic and Molecular Spectroscopy. ALFA, Bratislava, 1991.* *Kellner E, ed .: Analytical Chemistry, Wiley, VCH, Weinheim, 2003.* *Mason, W., R .: Magnetic Circular Dichroism Spectroscopy, Wiley, 2007.*	

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Language, knowledge of which is necessary to complete the subject: English			
Subject evaluation			
	Passed	Failed	
	0.00	0.00	
Notes: - student time load:			
Teacher: Prof. RNDr. Ján Titiš, PhD.			
Date of last change: 15.4.2022			
Approved: Prof. RNDr. Ján Titiš, PhD.			

University of Ss. Cyril and Methodius in Trnava
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917 01 Trnava

SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Separation Methods**
Type, scope, and method of educational activities: compulsory optional subject. Profile subject. **Subject type (C, CO, O):** CO **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: During the semester, each student will prepare and present 4 seminar papers based on assignments from world professional journals of the latest developments in the field. Each presentation is evaluated by 10 points. 25 points are required to obtain a "pass" rating.	
Educational outcomes: By completing the course the student will gain: - an extended overview of separation techniques as well as modern instrumental techniques and their use in practice; - knowledge of the theory of techniques based on the use of physico-chemical properties of substances; - knowledge of the nature of the relevant technique, its instrumentation, the use of the relevant technique in qualitative as well as quantitative analysis; - knowledge necessary for the development of the analytical procedure for the analysis of selected substances and will master the methods of optimization of analytical determinations; - knowledge of the issue, which will be used in experimental work in the study as well as in practice.	
Brief content of the subject: 1. Theory of analytical separations, transfer of substances between phases. Single-stage and multi-stage separation. Extraction methods, 2. Solid-liquid extraction, microextraction techniques. 3. Theoretical principles of chromatography. Kinetics and thermodynamics of the separation process. 4. Theory of gas chromatography, technique, columns. Detectors. 5. Column chromatography, liquid chromatography, principle, instrumentation, partition and adsorption chromatography. 6. Ion exchange, gel, affinity and chiral chromatography. Thin layer chromatography. 7. Optimization of methods in liquid chromatography. 8. Optimization of methods in gas chromatography. 9. Electromigration methods, principles, electrophoresis. Capillary electrophoresis and isotachophoresis. 10. Mass spectrometry, theory, mass analyzers, record evaluation 11. Combined GC / M techniques, principles, selectivity, sensitivity, GC / MS applications. 12. Combined LC / MS techniques, principles, selectivity, sensitivity, LC / MS applications. 13. Final evaluation.	

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Recommended literature:
Ján Labuda et al .: Analytical Chemistry, STU, Bratislava, 2014, ISBN 978-80-227-4249-9.
Karel Štulík et al. Analytical Separation Methods, Charles University, 2005, ISBN80-246-0852-9.
Professional literature according to the recommendation.

Language, knowledge of which is necessary to complete the subject: English

Subject evaluation

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:

Teacher: Assoc. Prof. Ing. Jozef Sokol, CSc.

Date of last change: 15.4.2022

Approved: Prof. RNDr. Ján Titiš, PhD.

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917 01 Trnava

SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Electroanalytical Methods**
Type, scope, and method of educational activities: compulsory optional subject **Subject type (C, CO, O):** CO **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: During the semester, each student will prepare and present 4 seminar papers in the form of ppt from world professional journals on specific topics in electroanalytical chemistry and at the same time sufficiently answer the questions that will be asked. Each presentation is evaluated with 20 points. It is necessary to obtain 60 points for the evaluation "passed".	
Educational outcomes: Upon successful completion of the subject of electroanalytical methods, the graduate: - acquire theoretical knowledge of the basic principles of electroanalytical chemistry methods and get acquainted with the basics of electrochemical processes in analytical chemistry with emphasis on modern electroanalytical methods. - will be able to competently estimate the key factors of chemical processes for the optimization of selected electroanalytical methods. - will gain an overview and knowledge of methods of complex use in pharmaceutical, food and environmental chemistry in general and on a specific, selected example and will be competent to use the acquired principles, procedures and techniques in practice	
Brief content of the subject: 1. Basics of electrochemical processes: Ions, electrolytes, electrochemical and galvanic cells. Electrolysis and Faraday's laws. Conductivity of solutions, electrode and membrane potential. 2. Electroanalytical methods: Polarography, voltammetry and chronopotentiometry. 3. Coulometry and electrogravimetry. 4. Electroanalytical methods: Potentiometry, ionselective electrodes, potentiometric titration. Conductometry, conductometric titrations. 5. Electrochemical sensors for liquid solutions and gases. 6. Process applications of electroanalytical methods for monitoring water composition. 7. Applications of electroanalytical methods in pharmaceutical analysis. 8. Applications of electroanalytical methods in food analysis. 9. Galvanic cells: Properties, construction and characteristics of galvanic cells. Galvanic plating and corrosion protection. 10. Industrial electrochemical processes: Electrochemical production of chlorine and sodium hydroxide. Electrochemical separation and purification of metals. 11. Production of inorganic chemicals and electrochemical synthesis of organic compounds. 12. Presentation of seminar papers, discussion. 13. Presentation of seminar papers, discussion.	
Recommended literature: *Ján Labuda et al .: Analytical Chemistry, STU, Bratislava, 2019.* *E. Beinrohr: Flow electroanalytical methods in practice. 2theta, Český Těšín, 2013.*	

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Language, knowledge of which is necessary to complete the subject: English			
Subject evaluation			
	Passed	Failed	
	0.00	0.00	
Notes: - student time load:			
Teacher: Assoc. Prof. Ing. Andrea Purdesova, PhD.			
Date of last change: 15.4.2022			
Approved: Prof. RNDr. Ján Titiš, PhD.			

University of Ss. Cyril and Methodius in Trnava
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917 01 Trnava

SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Advances in Bioanalytical Chemistry**
Type, scope, and method of educational activities: compulsory optional subject. Profile subject. **Subject type (C, CO, O):** CO **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: During the semester, each student will prepare and present 2 seminar papers based on assignments from world professional journals of the latest developments in the field. Each presentation is evaluated by 10 points. To obtain 12 points are required to obtain a "pass".	
Educational outcomes: By completing the course student: - acquire knowledge of modern methods of analysis of biochemical and biological samples in various application areas in practice, as well as advanced methods using biomolecules and biosystems as researchers; - acquire knowledge of the theoretical principles of biosensors and other biochemical as well as biological methods, probes and detection systems and their applications in clinical biochemistry and medicine, food analysis, environmental monitoring and other areas; - masters the theoretical principles of modern bioanalytical methods will be able to evaluate the applicability of individual bioanalytical methods and gain the competence to work in various areas of applications.	
Brief content of the subject: 1. Theory of biomolecules, amino acids, peptides, nucleic acids and analysis. 2. Theoretical principles of sample preparation. Biological sample, sample preparation before analysis, deproteination of biological material, isolation of analyte from biological matrix. 3. Extraction methods, membrane techniques, isolation of components from tissues, isolation of information molecules. 4. Use of instrumental analytical methods in the analysis of biological samples, analyte derivatization, 5. Detection of substances and detectors in chromatography, gas and liquid chromatography. 6. Chiral drug separations. Bioaffinity chromatography,, 7. Electromigration methods, electrophoresis (drugs). 8. Use of mass spectrometry in substance identification, Qvadrupol, Maldi TOF. 9. Biochemical methods of analysis, enzyme analysis. 10. Immunochemical methods, immunoassay and enzyme immunoassay. 11. Biosensors, principles, building components, methods of biosensor signal detection, biosensors based on biological systems. Applications of biosensors in environmental analysis, food and control 12.PCR analysis, sequencing methods. 13. Final evaluation.	
Recommended literature: *Vratislav Chromý, Bioanalytics, Brno 2011, ISBN: 978-80-904539-3-7.* *Andreas Meinz, Bioanalytical chemistry, Imperial College Press 2015, ISBN: 978178326671.* *Karel Štulík et al. Analytical Separation Methods, Charles University, 2005, ISBN80-246-0852-9.* *Professional literature as recommended.*	
Language, knowledge of which is necessary to complete the subject: English	

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917 01 Trnava

Subject evaluation			
	Passed	Failed	
	0.00	0.00	
Notes: - student time load:			
Teacher: Assoc. Prof. Ing. Jozef Sokol, CSc.			
Date of last change: 15.4.2022			
Approved: Prof. RNDr. Ján Titiš, PhD.			

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917 01 Trnava

SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Nuclear Analytical Methods**
Type, scope, and method of educational activities: compulsory optional subject. Profile subject. **Subject type (C, CO, O):** CO **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: During the semester, each student prepares and presents 4 seminar papers / ppt presentations from articles recently published in relevant international scientific journals on specific topics mapping the latest developments in the field of Nuclear Analytical Methods and Environmental Analytical Chemistry. Each presentation is evaluated max. 20 points. The student must achieve 60 points to obtain the grade "passed".	
Educational outcomes: Upon successful completion of this course, students will receive: - theoretical but also application view of Nuclear Analytical Methods and Analytical Chemistry of the Environment, as well as their instrumental principles. - an overview of the most important techniques used in qualitative and quantitative nuclear analysis, including the application of nuclear methods in medicine and the analysis of environmental samples. - information and competences in the field of function, methods and possibilities of environmental assessment by (nuclear) analytical methods. - competence and skill in the design of the optimal analysis process to solve environmental problems.	
Brief content of the subject: 1. Components of the environment. Specifics of environmental sample analysis. Legislative aspects. 2. Sampling and storage of environmental samples. Sample preparation: Use of separation techniques (extraction, sorption, precipitation), decomposition of samples for inorganic analysis. 3. Current classification of nuclear chemical analysis methods. Ionizing radiation detectors. 4. Nuclear radiation spectrometry. Analysis based on radioactivity measurement. Principles and radioindication restrictions. 5. Specifics of work with trace concentrations of radioactive substances. Breakdown of isotope dilution analysis and its application with emphasis on environmental samples. 6. Principles and applications of radioimmunoassay methods. Radiochemical methods for determining the biological activity of enzymes. 7. Activation analysis, its current possibilities and applications. Methods of non-activation interaction analysis. 8. Use of chemical, physico-chemical and physical methods of analysis of environmental samples. 9. Use of separation methods (chromatographic and electromigration methods). 10. Use of combined methods of analysis (GC-MS, HPLC-MS, MS-MS). 11. Remote sensing. 12. Presentations of students on assigned topics. 13. Final evaluation.	

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Recommended literature:

MÁTEL, Ľ. 2011. Radiochemical analyzes of environmental samples and radioactive waste. Kartprint, Bratislava. 204 s. ISBN 978-80-88870-99-9.
VERMA, H. R. 2007. Atomic and Nuclear Analytical Methods. Springer, Heidelberg. 376 s. ISBN 978-3-540-30277-3.
LABUDA, J. et al. 2014. Analytical chemistry. Bratislava: Vydavateľstvo STU, 2014. 671 s. ISBN 978-80-2274-242-9.
KOPRDA, V. - PIATRIK, M. 1998. Evaluation of technology impacts on the environment and environmental legislation. 1st edition. Bratislava: Vydavateľstvo STU, 1998. 253 s. ISBN 978-80-227-1152-7.

Language, knowledge of which is necessary to complete the subject: English

Subject evaluation

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:

Teacher: Assoc. Prof. RNDr. Miroslav Horník, PhD.

Date of last change: 15.4.2022

Approved: Prof. RNDr. Ján Titiš, PhD.

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SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Chemometry and Experimental Methodology**
Type, scope, and method of educational activities: compulsory optional subject **Subject type (C, CO, O):** CO **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: During the semester, each student will develop and present 1 project from a professional journal on a selected topic from the application of modern statistical and chemometric methods to current analytical and bioanalytical problems. At the end of the semester, the student proposes in the form of a project the procedure of chemometric processing of the prepared results of their dissertation topic, research questions, design of experiments and their evaluation. Individual projects are evaluated with 40 points, while to obtain the evaluation "passed" it is necessary to obtain 60 points.	
Educational outcomes: - The student masters the basic principles of chemometric methods, integrates knowledge of chemistry, biochemistry, mathematics and computer science in order to create or select optimal methods and methods of experiments, as well as provide maximum information in the research system by analyzing and processing experimental data from analytical measurements. - Applies the principles of chemometry in the concept of intelligent analytical resp. bioanalytical laboratory to obtain user-oriented final information, which in the decision-making process will allow a clear and objective response.	
Brief content of the subject: 1. Current state in chemometry. Analysis of one-dimensional data, use of descriptive statistics. 2. Robust statistics, survey data analysis, statistical mortgage tests, analysis of variance (ANOVA). 3. Linear, nonlinear and multiple regression. Linear and nonlinear calibration. Advanced regression analysis techniques. Comparison of laboratory methods using regression. 4. Optimization techniques, gradient methods and direct search methods. 5. Chemometric methods of instrumental signal processing and its transformation. 6. Basic assumptions, distribution and techniques of multidimensional data analysis. 7. Overview of imaging and classification techniques. Artificial neural networks. 8. Case studies: food analysis, air pollution, clinical laboratory tests. 9. Quantitative structure-properties relationships (QSAR). Molecular descriptors and biological activity. 10. PivotTables. Sensitivity rate, specificity rate, critical value. ROC curves. 11. Presentations of projects prepared from scientific articles. 12. Presentations of projects proposing the procedure of chemometric processing. 13. Final evaluation.	
Recommended literature: *Kružlicová, D. (2015). Chemometry. Faculty of Natural Sciences, UCM.* *Brown, S. D .; Tauler, R .; Walczak, B., eds. (2009). Comprehensive Chemometrics: Chemical and Biochemical Data Analysis. 4 volume set. Elsevier* *Brereton, R. G. (2007). Applied Chemometrics for Scientists. Wiley* *Otto, M. (2007). Chemometrics: Statistics and Computer Application in Analytical Chemistry (2nd ed.). Wiley-VCH.* *Miller, J .; Miller, J. C. (2005). Statistics and Chemometrics for Analytical Chemistry. (5th ed.) Pearson Education Canada.*	

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Language, knowledge of which is necessary to complete the subject: English			
Subject evaluation			
	Passed	Failed	
	0.00	0.00	
Notes: - student time load:			
Teacher: Assoc. Prof. Ing. Andrea Purdešová, PhD., Mgr. Peter Nemeček, PhD.			
Date of last change: 15.4.2022			
Approved: Prof. RNDr. Ján Titiš, PhD.			

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SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Magnetochemical Methods**
Type, scope, and method of educational activities: compulsory optional subject. Profile subject. **Subject type (C, CO, O):** CO **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: During the semester, each student prepares and presents 4 seminar papers / ppt presentations from articles recently published in relevant international scientific journals on specific topics mapping the latest developments in magnetochemistry. Each presentation is evaluated max. 20 points. The student must achieve 60 points to obtain the grade "passed".	
Educational outcomes: Upon successful completion of this course, students will receive: - theoretical knowledge in the field of magnetochemistry and magnetometry; - knowledge and skills in measuring the magnetic properties of compounds and evaluating the measured data; - knowledge of the relationships between the structure and magnetic properties of molecular systems; - knowledge and skills in the field of theoretical modeling of magnetic properties.	
Brief content of the subject: 1. Introduction to the theory of electromagnetism. 2. Magnetic properties of substances and magnetic quantities. 3. Classes of magnetic materials, paramagnets, ferromagnets, antiferromagnets. 4. Magnetism of mononuclear and polynuclear complexes. 5. Molecular magnetism. 6. Theoretical description of molecular paramagnets and single-molecule magnets. 7. Systems with spin transition. 8. Magneto-optical and magnetoelectric phenomena. 9. Magnetocaloric phenomenon. 10. AC and SQUID magnetometry. 11. Evaluation of magnetic data. 12. Theoretical modeling of magnetic parameters. 13. Final evaluation.	
Recommended literature: *R. Boča, Magnetic and electrical properties of substances. STU Bratislava Publishing House, 2010. ISBN 978-80-227-3414-1.* *O. Kahn, Molecular Magnetism. VCH, Weinheim, 1993.* *D. Gatteschi, R. Sessoli, J. Villain, Molecular Nanomagnets. Oxford University Press, Oxford, 2006. ISBN 978-0-19-856753-0.*	
Language, knowledge of which is necessary to complete the subject: English	
Subject evaluation	

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:

University of Ss. Cyril and Methodius in Trnava
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SUBJECT INFORMATION SHEET

Teacher: Assoc. Prof. RNDr. Cyril Rajnák, PhD.
Date of last change: 15.4.2022
Approved: Prof. RNDr. Ján Titiš, PhD.

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917 01 Trnava

SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Bioanalytical Procedures in Clinical Laboratories**
Type, scope, and method of educational activities: compulsory optional subject. Profile subject. **Subject type (C, CO, O):** CO **Recommended scope of teaching (in hours):** 2 hours of lectures and 2 hours of seminars **Study method:** on-site **Study form:** full-time study	
Number of credits: 10	
Recommended semester/trimester of study: semester 1-4	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	
Conditions for completing the subject: During the semester, the student prepares at least 3 presentations on a specified topic (specified scientific article, specified methodology, methodology used in their own work), according to the instructions of the lecturer. At the same time, he will answer enough questions that will be asked to him.	
Educational outcomes: Upon successful completion of the course, the student: - are familiar with the principles of methods used in clinical laboratories but also in biological research; - acquire the ability to communicate these aspects clearly to the scientific and lay public; - acquire the ability to learn to interpret the results correctly, to recognize the limitations of the methods and to communicate the results correctly to the scientific and lay public; - will be able to independently choose the appropriate method, if necessary, optimize it and adapt it to their own needs; - will be able to evaluate the obtained results and interpret them correctly.	
Brief content of the subject: 1. Introduction to the issue, the need for the correct choice and suitability of the method, the division of methods according to the requirements of determination, sampling and processing 2. Chromatographic methods with a focus on column chromatography 3. Other chromatographic methods 4. Electrophoretic methods, blotting techniques 5. Other methods for DNA, RNA determination 6. Special techniques for gene detection 7. Proteomic assays based on the use of antibodies 8. Microscopic determinations - their advantages and limitations 9. Other techniques based on fluorescence signal detection 10. Determination of enzyme activity 11. Special biological methods 12. Correct evaluation and interpretation of results, recognition of scientific artifacts 13. Final evaluation	

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Recommended literature:
Alfred Pingoud, Claus Urbanke, Jim Hoggett, Albert Jeltsch. Biochemical Methods: A Concise Guide for Students and Researchers. Publisher Wiley-VCH Verlag GmbH.2002, ISBN 9783527302994.

Language, knowledge of which is necessary to complete the subject: English

Subject evaluation

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:

Teacher: Prof. Ing. Oľga Križanová, DrSc.

Date of last change: 15.4.2022

Approved: Prof. RNDr. Ján Titiš, PhD.

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917 01 Trnava

Creative activity

University of Ss. Cyril and Methodius in Trnava
Námestie Jozefa Herdu 2
917 01 Trnava

SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name:** Publication in a Scientific Journal Registered in the Web of Science Databases Included in Q1 or Q2 in JCF IF (1st or 2nd quarter of the impact factor value in the Journal Citation Report)
Type, scope, and method of educational activities: compulsory subject/optional subject. Profile subject. **Subject type (C, CO, O):** C/O **Recommended scope of teaching (in hours):** **Study method:** on-site **Study form:** full-time study	
Number of credits: 35-50	
Recommended semester/trimester of study: semester 1-8	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	

Conditions for completing the subject:

Independent scientific activity under the supervision of the dissertation supervisor. The student joins the research team of the supervisor within the framework of a domestic or foreign project and plans and implements initial experiments during the semester. Based on the achievement of publishable results, the student will receive a grade in accordance with the study regulations of the University of Ss. Cyril and Methodius in Trnava. In the scientific part, the student is obliged to publish at least one experimental output in a scientific journal registered in the Web of Science databases and ranked in quartiles of at least Q1 or Q2 in the JCF IF. In these published outputs, registered in the Web of Science and Scopus databases, the doctoral student has an appropriate author's share according to the conventions of the respective study programme, which is evidenced by an extract from the publication activity register from the On-line Catalogue of the UCM University Library or the Central Register of Publication Activity Register.

Educational outcomes:

- The student has knowledge and overview of the basic scientific methods, knows the problems and tendencies of the development of science in the field of the dissertation topic.
- The student is able to define specific problems and methods of their solution and is ready to solve them.
- The student acquires the competence to decide on the form and manner of presentation of the results of his/her work in the form of scientific publications. The student is able to assess the quality of his/her results and correctly identify appropriate and sufficiently high-quality scientific journals for their publication.
- The student will be competent to participate in a scientific team of a training or other workplace, or in a team applying the results of biotechnological research in practice, not only by manual work, but also by correct presentation of the results of experiments.

Brief content of the subject:

As part of the scientific part, the student will complete selected activities for which he/she will receive credits:

- Publication in a Scientific Journal Registered in the Web of Science Databases Included in Q1 in JCF IF (1st quarter of the impact factor value in the Journal Citation Report)
- Publication I in a Scientific Journal Registered in the Web of Science Databases Included in Q2 in JCF IF (2nd quarter of the impact factor value in the Journal Citation Report)
- Publication II in a Scientific Journal Registered in the Web of Science Databases Included in Q2 in JCF IF (2nd quarter of the impact factor value in the Journal Citation Report)

Recommended literature:

Language, knowledge of which is necessary to complete the subject: English

Subject evaluation

	Passed	Failed	
	0.00	0.00	
Notes: - student time load:			
Teacher: Prof. RNDr. Ján Titiš, PhD.			
Date of last change: 15:4.2022			
Approved: Prof. RNDr. Ján Titiš, PhD.			

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917 01 Trnava

SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name:** Publication in a Scientific Journal Registered in the Web of Science Databases Included in Q1-Q4 in JCF IF (1st-4th quarter of the impact factor value in the Journal Citation Report)
Type, scope, and method of educational activities: compulsory subject/optional subject. Profile subject. **Subject type (C, CO, O):** C/O **Recommended scope of teaching (in hours):** **Study method:** on-site **Study form:** full-time study	
Number of credits: 10-50	
Recommended semester/trimester of study: semester 1-8	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	

Conditions for completing the subject:

Independent scientific activity under the supervision of the dissertation supervisor. The student joins the research team of the supervisor within the framework of a domestic or foreign project and plans and implements initial experiments during the semester. Based on the achievement of publishable results, the student will receive a grade in accordance with the study regulations of the University of Ss. Cyril and Methodius in Trnava. In the scientific part, the student is obliged to publish at least one experimental output in a scientific journal registered in the Web of Science databases and ranked in quartiles of Q1-Q4 in the JCF IF. In these published outputs, registered in the Web of Science and Scopus databases, the doctoral student has an appropriate author's share according to the conventions of the respective study programme, which is evidenced by an extract from the publication activity register from the On-line Catalogue of the UCM University Library or the Central Register of Publication Activity Register.

Educational outcomes:

- The student has knowledge and overview of the basic scientific methods, knows the problems and tendencies of the development of science in the field of the dissertation topic.
- The student is able to define specific problems and methods of their solution and is ready to solve them.
- The student acquires the competence to decide on the form and manner of presentation of the results of his/her work in the form of scientific publications. The student is able to assess the quality of his/her results and correctly identify appropriate and sufficiently high-quality scientific journals for their publication.
- The student will be competent to participate in a scientific team of a training or other workplace, or in a team applying the results of biotechnological research in practice, not only by manual work, but also by correct presentation of the results of experiments.

Brief content of the subject:

As part of the scientific part, the student will complete selected activities for which he/she will receive credits:

- Publication in a Scientific Journal Registered in the Web of Science Databases Included in Q1 in JCF IF (1st quarter of the impact factor value in the Journal Citation Report)
- Publication I in a Scientific Journal Registered in the Web of Science Databases Included in Q2 in JCF IF (2nd quarter of the impact factor value in the Journal Citation Report)
- Publication II in a Scientific Journal Registered in the Web of Science Databases Included in Q2 in JCF IF (2nd quarter of the impact factor value in the Journal Citation Report)
- Publication I in a Scientific Journal Registered in the Web of Science Databases Included in Q3 in JCF IF (3rd quarter of the impact factor value in the Journal Citation Report)
- Publication II in a Scientific Journal Registered in the Web of Science Databases Included in Q3 in JCF IF (3rd quarter of the impact factor value in the Journal Citation Report)

- Publication I in a Scientific Journal Registered in the Web of Science Databases Included in Q4 in JCF IF (4th quarter of the impact factor value in the Journal Citation Report)
- Publication II in a Scientific Journal Registered in the Web of Science Databases Included in Q4 in JCF IF (4th quarter of the impact factor value in the Journal Citation Report)

Recommended literature:

Language, knowledge of which is necessary to complete the subject: English

Subject evaluation

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:

Teacher: Prof. RNDr. Ján Titiš, PhD.

Date of last change: 15.4.2022

Approved: Prof. RNDr. Ján Titiš, PhD.

University of Ss. Cyril and Methodius in Trnava
Námestie Jozefa Herdu 2
917 01 Trnava

SUBJECT INFORMATION SHEET

University: University of Ss. Cyril and Methodius in Trnava	
Faculty/institute: Faculty of Natural Sciences	
Subject code:	**Subject name: Other Creative Activity**
Type, scope, and method of educational activities: compulsory subject/optional subject **Subject type (C, CO, O):** C/O **Recommended scope of teaching (in hours):** **Study method:** on-site **Study form:** full-time study	
Number of credits: 5-10	
Recommended semester/trimester of study: semester 1-8	
Level of study: doctoral	
Prerequisite subjects: without prerequisites	

Conditions for completing the subject:

Independent scientific activity under the supervision of the dissertation supervisor. The student joins the supervisor's research team in a national or international project and plans and implements initial experiments during the semester. During this part of the dissertation, the student may receive credit for learning a new experimental methodology. He/she may also receive credit for obtaining an internal grant. In collaboration with other members of the team, he/she will present preliminary results that can be used in further scientific work at a departmental seminar, at a national or international conference or in a publication in a journal registered in the Web of Science or Scopus databases without a Q1-Q4 classification in the JCF IF. Credit may also be earned in this section for citation of a scientific publication. On the basis of the achievement of publishable results, the student will receive a grade in accordance with the study regulations of the University of Ss. Cyril and Methodius in Trnava.

Educational outcomes:

- The student has knowledge and overview of the basic scientific methods, knows the problems and tendencies of the development of science in the field of the dissertation topic.
- The student is able to define specific problems and methods of their solution and is ready to solve them.
- The student acquires the competence to decide on the form and manner of presentation of the results of his/her work in the form of scientific publications. The student is able to assess the quality of his/her results and correctly identify appropriate and sufficiently high-quality scientific journals for their publication.
- The student will be competent to participate in a scientific team of a training or other workplace, or in a team applying the results of biotechnological research in practice, not only by manualwork, but also by correct presentation of the results of experiments.

Brief content of the subject:

As part of the scientific part, the student will complete selected activities for which he/she will receive credits:

- Publication in a Scientific Journal Registered in the Web of Science or Scopus Databases without Inclusion in Q1-Q4 in JCF IF
- Publication in a Peer-Reviewed Proceedings
- Active Participation in a Foreign Scientific Conference (declared by a published contribution in the proceedings)
- Active Participation in a National Scientific Conference (declared by a published contribution in the proceedings)
- Member of the Research Team on a Foreign Scientific Project, Registered at UCM
- Member of the Research Team on a National Scientific Project (eg APVV, VEGA, KEGA, OPVaI), Registered at UCM
- Citation to the Publication Output Registered in the Web of Science or Scopus Databases (it must not be an autocitation, it must be an affiliation of DB FNS UCM)
- Obtaining an internal grant

- Adoption of a New Experimental Methodology I
- Adoption of a New Experimental Methodology II
- Presentation at the Seminar

Recommended literature:

Language, knowledge of which is necessary to complete the subject: English

Subject evaluation

	Passed	Failed	
	0.00	0.00	

Notes: - student time load:

Teacher: Prof. RNDr. Ján Titiš, PhD.

Date of last change: 15.4.2022

Approved: Prof. RNDr. Ján Titiš, PhD.