CONTENT

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/IG/04	**Course name:** Acquirement of Internal Grant
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 10	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 192

abs	n
100.0	0.0

Provides:
Date of last modification: 16.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/ DPACH/13	**Course name:** Advanced Inorganic Chemistry

Course type, scope and the method:
Course type: Lecture
Recommended course-load (hours):
Per week: 4 **Per study period:** 56
Course method: present

Number of ECTS credits: 9

Recommended semester/trimester of the course: 1., 3.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, the student must demonstrate a sufficient understanding of all aspects of inorganic chemistry of non-metallic and metallic elements. The course is implemented in a combined form; the direct teaching (full-time form, distance form or combined form) contribution represnts of 10 % of the total hourly allowance, another 10 to 15% are individual consultations and the emphasis is put on self-study. The condition for successful completion of the course is the elaboration of a presentation on a selected problem of inorganic chemistry using monograph(s) and/ or scientific journal(s) and success in the oral theoretical examination.
The course represents the following student workload: self-study of recommended supplementary literature and direct teaching in the form of consultations - 3 credits, elaboration of a year project on a selected topic - 3 credits, preparation of a ppt presentation from the year project - 2 credits, exam - 1 credit. The final evaluation can be "passed" or "failed".

Learning outcomes:
After completing the course, the doctoral student will gain a thorough knowledge of the properties of elements and their compounds, knowledges about bonding and structure of elements and compounds, their application possibilities, their environmental aspects, as well as an overview of currently studies problems studied in inorganic chemistry. Theoretical mastery of the content of the course will help him in the successful preparation of the written part of the dissertation exam, subsequent dissertation work, as well as will be helpful in implementation of the scientific part of the doctoral study.

Brief outline of the course:

Recommended literature:
N. N. Greenwood, A. Earnshaw: Chemistry of the Elements, 2nd Ed., Elsevier, 1999.
J. C. Huheey, E. A. Keiter, R. L. Keiter: Inorganic Chemistry, Haper Collins, New York, 1993.
F. A. Cotton et al.: Advanced Inorganic Chemistry, 6th Ed., Wiley-Interscience, 1999.
Shriver a Atkins: Inorganic Chemistry, 5th Ed., Oxford University Press, 2006.
M. Weller, J. Rourke, T. Overton, F. Aemstrong, Inorganic Chemsitry, Oxford Unievrsoty Press, 6th Ed., Oxford, UK, 2014.
Monographies and currect papers in scientific journals.

Course language:
English language

Notes:
Direct teaching and consultations will be carried out in person or in a suitable form of online distance education, or using a combination of these methods. The form of teaching will be specified by the teacher at at the beginning of the semester, or according to the current situation.

Course assessment
Total number of assessed students: 22

N	P
0.0	100.0

Provides: prof. RNDr. Juraj Černák, DrSc.

Date of last modification: 21.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/ DBACH/13	**Course name:** Bioinorganic Chemistry

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 9

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
In order for a student to successfully pass the course, he/she must understand sufficient knowledge of the structure, properties and especially the function of biocoordination compounds and biominerals. Moreover, students must be able to explain the relationship between structural, chemical and biological properties of the above compounds and the use of knowledge from bioinorganic chemistry in practice, in medicine, pharmacy, industry and society. Within the subject, students confirm their knowledge by elaborating a annual project using current scientific literature on the assigned topic to the extent defined by the teacher. The credit evaluation of the subject takes into account the following student workload: self-study of recommended supplementary literature and direct teaching in the form of consultations - 3 credits, elaboration of an annual project on a selected topic - 3 credits, preparation of ppt presentations from the annual project - 2 credits, exam from the subject - 1 credit. The subject takes place in a combined form, while direct teaching (full - time, suitable distance form in the online space or in combination) contributes to the total hourly subsidy of 5%, another 45 % represent individual consultations and the focus is on self-study (50%). Minimum limit for obtaining the evaluation (passed) is the elaboration of an annual project on a selected topic, preparation of ppt presentations from the annual project and passing the exam from the subject in the assigned scope.

Learning outcomes:
After the lectures, consultations and self-study, the student will demonstrate adequate mastery of the course content standard, which is defined by the brief content of the course and the recommended literature. He will gain and deepen his knowledge of the structure, importance and function of biometals in living organisms, including biominerals and new biomaterials used in practice

Brief outline of the course:
Metal complexes in living systems - metalloproteins, metalloenzymes, metallophosphates,
Fe-S clusters, their function. Biometals, their transport. Ion channels, ionophores. Biological redox processes. Role of biometals in biophotochemical processes. Biominerals, biomaterials, biosenzors. Bioinorganic chemistry of toxic elements and compounds. Chemistry of elements in medicine, metal complexes in diagnostics. New trends in bioinorganic chemistry.

Recommended literature:

1. D. F. Shriver, P. W. Atkins, T. L. Overton, J. P. Rourke, M. T. Weller, F. A. Amstrong: Inorganic Chemistry, kapitola 26. Oxford University Press, Oxford 2006.
2. C. E. Housecroft, A.G. Sharpe: Inorganic Chemistry, kapitola 28. Pearson Education, Harlow 2005.
3. C. M. Lukehart, R. A. Scott: Nanomaterials: Inorganic and Bioinorganic Perspectives, kapitoly 1-5. J. Wiley, Chichester 2008.
4. W. Kaim, B. Schvederski: Bioinorganic Chemistry, J. Wiley&Sons, New York 1994.
5. J. C. Dabrowiak: Metals in Medicine. J. Wiley&Sons, Chichester 2009.
Ivano Bertini, Harry B. Gray, Edward I. Stiefel, Joan Selverstone Valentine, Biological Inorganic Chemistry, University Science Books, Melville USA, 2007, ISBN 978-1-938787-96
current review of scientific journals

Course language:
english

Notes:
Direct teaching and consultations will be carried out in person or in a suitable form of online distance learning, or using a combination of these methods. The teaching form will be specified by the teacher at the beginning of the semester, or according to the current situation.

Course assessment
Total number of assessed students: 13

N	P
0.0	100.0

Provides: doc. RNDr. Zuzana Vargová, Ph.D.

Date of last modification: 18.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/ DCKOK/13	**Course name:** Chemistry of Coordination, Organometallic and Cluster Compounds

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 3 / 1 **Per study period:** 42 / 14
Course method: present

Number of ECTS credits: 9

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, the student have to demonstrate a sufficient understanding of all aspects of coordination chemistry, chemistry of organometallic and cluster compounds. The course is implemented in a combined form, while direct teaching (full-time, suitable distance form in the online space or combined) contributes to the total hourly allowance of 10 %, another 10 to 15 % represent individual consultations and the emphasis is put on self-study. The condition for successful completion of the course is the elaboration of a presentation on a selected problem of the acquired material using scientific books and/or journals and success in the oral theoretical exam.
The course represents the following student workload: self-study of recommended supplementary literature and direct teaching in the form of consultations - 3 credits, elaboration of a year project on a selected topic - 3 credits, preparation of a ppt presentation from the year project - 2 credits, exam - 1 credit. The final evaluation can be "passed" or "failed".

Learning outcomes:
After completing the course, the doctoral student will gain a general overview of coordination chemistry, chemistry of organometals and clusters as well as he becomes familiar with the latest advances and trends in these areas. Theoretical mastery of the content of the course allows him to succeed in preparing a written part of the dissertation exam and subsequent dissertation thesis, as well as facilitate the implementation of the scientific part of the doctoral study.

Brief outline of the course:
Coordination compounds, their components: central atoms and ligands, preparation, stereochemistry, isomerism, thermodynamic and kinetic stability and properties of coordination compounds. Bonding in coordination compounds. Methods of study of coordination compounds. Complex compounds with mixed valence states. Current trends in modern coordination chemistry. Organometallic compounds of transition metals, their importance. Transition metal clusters, metal-metal bonding.

Recommended literature:
J. Ribas: Coordination Chemistry, Wiley-VCH, Weinheim, 2008.
R. H. Crabtree: The Organometallic Chemistry of the Transition Metals, 5th Ed., J. Wiley, Hoboken, 2009.

King, R. B. Transition Metal Cluster Compounds, in Progress in Inorganic Chemistry, Volume 15, (ed. S. J. Lippard), J. Wiley & Sons, Hoboken, 2007.
J. C. Huheey, E. A. Keiter, R. L. Keiter: Inorganic Chemistry, Haper Collins, New York, 1993

Course language:
English language

Notes:
Direct teaching and consultations will be carried out carried out in person or in a suitable form of online distance learning, or using a combination of these methods. The teaching form will be specified by the teacher at the beginning of the semester, or according to the current situation.

Course assessment
Total number of assessed students: 10

N	P
0.0	100.0

Provides: prof. RNDr. Juraj Černák, DrSc., RNDr. Martin Vavra, PhD.

Date of last modification: 21.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/ DCNM/13	**Course name:** Chemistry of nanomaterials

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 3 / 1 **Per study period:** 42 / 14
Course method: present

Number of ECTS credits: 9

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Successful completion of two written tests. Successful completion of each of the tests is in accordance with the UPJŠ Study Rules conditioned by obtaining at least 51% of the maximum possible points.
Active and mandatory participation in seminars, elaboration of seminar papers. Each student will prepare one seminar paper on a given topic.

Learning outcomes:
The doctoral student will gain detailed knowledge of nanochemistry, methods of synthesis of nanomaterials, techniques used in their study and the most important groups of nanomaterials and their properties.

Brief outline of the course:
The lecture provides a comprehensive view of synthesis methods, characterization of different types of nanomaterials (nanopowders, nanoporous materials, thin films), their unique physicochemical properties and areas of most promising applications (energy, magnetism, biotechnology, catalysis, separation, etc.).
1. Nanochemistry - definition, area of research, nature of bonds in nanoparticles and nanopowders, interactions between nanoparticles.
2. New methods of nanomaterials synthesis.
3. Unique physical properties of nanomaterials.
4. Nanostructured micro- and mesoporous materials.
5. Arranged two- and three-dimensional nanocrystals.
6. Nanotubes and nanowires.
7. Nanoparticles based on metal oxides.
8. Semiconductors nanoparticles and their importance.
9. Photochemistry of nanomaterials.
10. Nanomaterials for energy applications.
11. Nanostructured materials for hydrogen storage.
12. Nanocatalysis.
13. Nanolithography.
14. Biological and environmental aspects of nanomaterials.

Recommended literature:

Course language:

Notes:
The course is standardly realized in full-time form, in case of necessary circumstances by distance.

Course assessment
Total number of assessed students: 12

N	P
0.0	100.0

Provides: prof. RNDr. Vladimír Zeleňák, DrSc.

Date of last modification: 22.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ CZC/04	**Course name:** Citation in the International Scientific Journal
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 10	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 71	

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ CDC/04	**Course name:** Citation in the Local Scientific Journal
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 1	

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ CM/04	**Course name:** Citation in the Monograph
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 4	

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ SDPR/04	**Course name:** Co-worker of a Local Project
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 518	

abs	n
99.81	0.19

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/ SMPR/04	**Course name:** Co-worker of an International Project

Course type, scope and the method:
Course type:
Recommended course-load (hours):
Per week: Per study period:
Course method: present

Number of ECTS credits: 15

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Membership in the research team of an international project.

Learning outcomes:
Active involvement by solving a specific task within a team of international project solvers. The PhD student demonstrates the ability to work in a team, take responsibility for the assigned task, adhere to the time schedule and fulfill the project outputs. The PhD student gains personal experience from the implementation of an international project, participation in its key stages, creation of measurable outputs, grant funding of science.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 42

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/ ODZP/2014/15	**Course name:** Defence of Doctoral Thesis

Course type, scope and the method:
Course type:
Recommended course-load (hours):
Per week: Per study period:
Course method: present

Number of ECTS credits: 30

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
The Dissertation thesis is the result of the student's own scientific research. It must not show elements of academic fraud and must meet the criteria of correct research practice defined in the Rector's Decision no. 21/2021, which lays down the rules for assessing plagiarism at Pavel Jozef Šafárik University in Košice and its constituents. Fulfillment of the criteria is verified mainly in the process of supervising and in the process of the thesis defense. Failure to do so is grounds for disciplinary action.

Learning outcomes:
The Dissertation thesis has elements of a scientific work and the student demonstrates extensive mastery of the theory and professional terminology of the field of study, acquisition of knowledge, skills and competences in accordance with the declared profile of the graduate of the field of study, as well as the ability to apply them in an original way in solving selected problems of the field of study. The student demonstrates the ability of independent scientific work in terms of content, formal and ethical aspects. Further details of the Dissertation thesis are determined by Directive no. 1/2011 on the essential prerequisites of final theses and by the Study Rules of Procedure at UPJŠ in Košice for doctoral studies.
The doctoral student demonstrated the ability and readiness for independent scientific and creative activity in the field of study of philology in accordance with the expectations of the relevant qualification framework and the profile of the graduate.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 64

N	P
0.0	100.0

Provides:
Date of last modification: 08.11.2022
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/ DDM/13	**Course name:** Diffraction methods of study of inorganic compounds

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 4 **Per study period:** 28 / 56
Course method: present

Number of ECTS credits: 9

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
The course is implemented in a combined form, while direct teaching and consultations contribute to the total hourly allowance of 60%, the remaining 40% is the elaboration of an annual project.
The conditions for successful completion of the course are:
1. passing two theoretical written tests, of which the PhD. student must obtain at least 51%,
2. passing the oral exam from the studied theory in the form of a debate of at least 51%,
3. elaboration of an annual project, which consists in solving the crystal structure of an unknown substance and processing its results in the form of text, tables and a structural picture, at the level required for publication in a scientific journal.

Learning outcomes:
PhD. student handles both theoretical and practical aspects of single crystal structural analysis, and powder diffraction. He is able to solve independently crystal structures by a method of single crystal structural analysis and to evaluate powder diffraction records and use the results of these methods in his work.

Brief outline of the course:
Macrostructure and microstructure symmetry, individual work with space groups. Theoretical basis of the diffraction experiment. Practical aspects of crystal structure solution. Processing the results of structural analysis. Theoretical basis, practical aspects and possibilities of X-ray powder diffraction analysis, its use at work of an inorganic chemist.

Recommended literature:
Massa, W.: Crystal structure determination. Springer 2000.
Clegg, W. et al.: Crystal structure analysis. Principles and practice. Oxford University Press 2009.
Stout, G.H. & Jensen, L.H.: X-ray Structure Determination, 2nd Ed.. John Wiley & Sons 1989.
Klug, H.P. & Alexander, L.E.: X-Ray diffraction procedures for polycrystalline and amorphous materials. John Wiley & Sons, Inc. 1970.
Hahn, T.: International tables for crystallography, Vol. A. Kluwer Academic Publishers 2002.
Manuals for programs.

Course language:
Slovak, English

Notes:
Teaching is carried out in person or online using the MS Teams tool. The form of teaching is specified by the teacher at the beginning of the semester, updated continuously.

Course assessment
Total number of assessed students: 20

N	P	abs	neabs
0.0	65.0	35.0	0.0

Provides: doc. RNDr. Ivan Potočňák, PhD.

Date of last modification: 18.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ DZS/15	**Course name:** Dissertation examination
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course: 3., 4..	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 63	

N	P
0.0	100.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: CJP/ AJD1/07	**Course name:** English Language for PhD Students 1

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
Completion of e-course English for PhD Students (lms.upjs.sk), consultations (1-3).
Written assignments - Professional/Academic CV, Short Academic Biography.

Learning outcomes:
The development of students´ language skills - reading, writing, listening, speaking, improvement of their linguistic competence - students acquire knowledge of selected phonological, lexical and syntactic aspects, development of pragmatic competence - students can efectively use the language for a given purpose, with focus on Academic English and English for specific/professional purposes, level B2.

Brief outline of the course:
Specific aspects of academic and professional English with focus on correct pronunciation, vocabulary development (noun and verb collocations, phrasal verbs, prepositional phrases, word-formation, formal/informal language, etc.), selected aspects of English grammar (prepositions, grammar tenses, passive voice, etc.), academic writing (professional/academic CV, Short Academic Biography).

Recommended literature:
Moore, J.: Oxford Academic Vocabulary Practice. OUP, 2017.
Kolaříková, Z., Petruňová, H., Timková, R.: Angličtina v akademickom prostredí – cvičebnica. Košice, Vydavateľstvo ŠafárikPress, 2021.
Tomaščíková, S., Rozenfeld, J. Developing Academic English in Speaking and Writing. Vydavateľstvo ŠafárikPress, 2021.
McCarthy, M., O´Dell, F.: Academic Vocabulary in Use. CUP, 2008.
Štepánek, L., J. De Haff a kol.: Academic English-Akademická angličtina. Grada Publishing, a.s., 2011.
Armer, T.: Cambridge English for Scientists. CUP, 2011.
lms.upjs.sk

Course language:
English, level B2 according to CEFR

Notes:

Course assessment
Total number of assessed students: 738

N	Ne	P	Pr	abs	neabs
0.0	0.0	48.1	0.0	51.9	0.0

Provides: PhDr. Helena Petruňová, CSc., Mgr. Zuzana Kolaříková, PhD.

Date of last modification: 16.09.2022

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: CJP/AJD2/07	**Course name:** English Language for PhD Students 2

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
Test, oral exam in accordance with the exam requirements (https://www.upjs.sk/filozoficka-fakulta/cjp/doktorandi-upjs/)

Learning outcomes:
The development of students´ language skills - reading, writing, listening, speaking, improvement of their linguistic competence - students acquire knowledge of selected phonological, lexical and syntactic aspects, development of pragmatic competence - students can efectively use the language for a given purpose, with focus on Academic English and English for specific/professional purposes, level B2.

Brief outline of the course:
Academic communication (self-presentation, presenting at scientific meetings and conferences). Specific aspects of academic and professional English with focus on vocabulary development (formality, academic word-list), English grammar (passive voice, nominalisatio), language functions (expressing opinion, cause/effect, presenting arguments, giving examples, describing graphs/charts/schemes, etc.). Cross-language interference.

Recommended literature:
Moore, J.: Oxford Academic Vocabulary Practice. OUP, 2017.
Kolaříková, Z., Petruňová, H., Timková, R.: Angličtina v akademickom prostredí (cvičebnica). UPJŠ Košice, 2021.
Tomaščíková, S., Rozenfeld, J. Developing Academic English in Speaking and Writing. Vydavateľstvo ŠafárikPress, 2021.
McCarthy, M., O´Dell, F.: Academic Vocabulary in Use. CUP, 2008.
Štepánek, L., J. De Haff a kol.: Academic English-Akademická angličtina. Grada Publishing, a.s., 2011.
Armer, T.: Cambridge English for Scientists. CUP, 2011.

Course language:
B2 level according to CEFR

Notes:

Course assessment
Total number of assessed students: 729

N	Ne	P	Pr	abs	neabs
0.27	0.0	93.83	1.1	4.8	0.0

Provides: PhDr. Helena Petruňová, CSc., Mgr. Zuzana Kolaříková, PhD.

Date of last modification: 10.03.2022

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/SSOL/04	**Course name:** Individual Study of Scientific Literature

Course type, scope and the method:
Course type:
Recommended course-load (hours):
Per week: Per study period:
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Independent work of a doctoral student with books, monographies, databases and source documents, obtaining informations for elaboration of the thesis, for preparation of experiments or preparation of publication, respectively.

Brief outline of the course:
Independent study of literature following the suggestions of the tutor.

Recommended literature:
Books, monographs,
Web of Science,
SCOPUS,
original papers

Course language:
English language.

Notes:

Course assessment
Total number of assessed students: 211

abs	n
100.0	0.0

Provides:

Date of last modification: 05.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ MK/04	**Course name:** International Conference
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 6	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 227

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ ZKC/04	**Course name:** International Currented Journal
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Publication od the paper in journal registered in CC database.	
Learning outcomes:	
Brief outline of the course: Authorship or co-authorship of doctoral student on a paper published in a foreign journal registered in the Current Contents Connect database.	
Recommended literature:	
Course language: English language.	
Notes:	
Course assessment Total number of assessed students: 342	

abs	n
99.71	0.29

Provides:
Date of last modification: 05.11.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ ZNC/04	**Course name:** International Non-Currented Jounal
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 28

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/DK/04	**Course name:** Local Conference

Course type, scope and the method:
Course type:
Recommended course-load (hours):
Per week: Per study period:
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Active participation in the home conference.

Learning outcomes:
By actively participating in the national scientific conference, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology in his scientific field. He demonstrates the ability to reflect on a specific scientific problem by using the latest approaches and applying them critically. Demonstrates competence in using existing theories and concepts in an innovative way, as well as generating new original scientific knowledge and communicating research results to a wider audience using adequate means and through the Slovak language.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 126

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ DKZU/04	**Course name:** Local Conference with Foreign Participation
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 256

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ DKC/04	**Course name:** Local Currented Journal
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 15	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 10

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ DNC/04	**Course name:** Local Non-Currented Journal
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 18

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/ DMAL/13	**Course name:** Magnetochemistry of Inorganic Compounds

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 3 / 1 **Per study period:** 42 / 14
Course method: present

Number of ECTS credits: 9

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Continuous active acquisition of the subject is required during the course of Magnetochemistry of Inorganic Compounds, which is necessary for independent mastery of individual tasks in self-study and in solving specific homework assignments. During the semester, the student will get a theoretical project based on the study of foreign journal literature (understanding of a specific scientific article and based on it the elaboration and presentation). Another condition for completing the course is active participation in lectures and seminars. In the exercises, the student will get a concrete idea of how the experimental data are analyzed. Subsequently, the student independently analyzes the experimental data of the selected magnetic compound in the frame of two to three home projects and presents the results of the analysis at a joint meeting. Another condition for obtaining credits is successful completion of the exam from the theoretical part in the form of an extensive oral discussion, where the student demonstrates understanding of basic concepts and relationships between them, finding connections and understanding the course as a coherent whole logically built on the basis of gradual incorporation of individual interactions. The minimum threshold for passing the course is successful completion of self-study projects and individual assignments during the semester and mastering the final oral exam by more than 50 percent.
Credit evaluation takes into account the scope of direct teaching (4 credits), self-study of recommended literature and preparation of presentation (2 credits) elaboration of home assignments (2 credits), consultations and evaluation (1 credit)

Learning outcomes:
After completing the course, the students will gain a basic perspective, which will allow them to sufficiently orient themselves in the current scientific literature focused on quantum magnetism. Based on the acquired theoretical knowledge and practical experience, they will be able to independently study magneto-structural correlations in electrically non-conductive materials and identify their magnetic state, which is important especially for quantum technologies but also for practical applications such as magnetic cooling especially at low temperatures. Based on the acquired knowledge, discussions and the creation of individual projects, they will also learn the basics of critical thinking in this field.

Brief outline of the course:

Electronic states in hydrogen atom, electronic configuration, term, multiplet. Paramagnetic and diamagnetic atoms. Atom in magnetic field: specific heat, susceptibility, magnetization and electron paramagnetic resonance (EPR). Atom in the crystal field. Freezing of angular momentum. Spin Hamiltonian. Termodynamics and EPR of paramagnetic atoms in the crystal field. Exchange and dipole interaction.Heisenberg Hamiltonian. Magnetic dimer. Long-range and short- range order. Low-dimensional magnets. Spatial anisotropy of exchange coupling. Exchange anisotropy. Heisenberg, Ising and XY model.

Recommended literature:

R. L. C. Carlin: Magnetochemistry, Springer-Verlag Berlin, Heidelberg, New York, 1986.
J-P.Launay, M. Verdaguer, Electrons in Molecules, Oxford 2018.
A. Abragam, B. Bleaney, Electron Paramagnetic Resonance of Transition Ions, Oxford, 2012.

Course language:

English Language

Notes:

The course Magnetochemistry of Inorganic Compounds is realized in the attendance form. In some special cases (as was pandemics of Covid) the teaching is realized online using software MS Teams, which enables to keep the contact with students and to keep the level and quality of the course.

Course assessment

Total number of assessed students: 6

N	P
0.0	100.0

Provides: doc. RNDr. Alžbeta Orendáčová, DrSc.

Date of last modification: 19.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚCHV/ DMIZ/13	**Course name:** Molecular inclusion compounds

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 9

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, the student must demonstrate an overview of different types of molecular inclusion compounds, their structures and properties. The course is implemented in a combined form; the direct teaching (full-time form, distance form based on MS Teams/Big Blue Button (BBB) application or combined form) contribution represents 10 % of the total hourly allowance, another 15% are individual consultations and the emphasis is put on self-study. The condition for successful completion of the course is the written elaboration of 4 assignments from the area of the subject and the success on the final test (gain of at least 51 % points).
The final evaluation can be "passed" or "failed".

Learning outcomes:
After completing the course, the doctoral student will gain an overview of different types of inclusion compounds, their structures and properties, interactions in this type of compounds, as well as on the importance of supramolecular chemistry in general. Theoretical mastery of the content of the course will help him in the successful preparation of the written part of the dissertation exam, subsequent dissertation work, as well as will be helpful in implementation of the experimental part of the doctoral study.

Brief outline of the course:
Basic terms. Classification of inclusive compounds (host - gest compounds). Types of interactions in inclusion compounds, physicochemical properties. Inclusion of neutral molecules, anion binding, cation binding. Clathrates, clathrates of hydrates, Hoffman-type inclusion compounds, intercalates, zeolites, cyclodextrins, cyclic ethers, cryptands, calixarenes, ionophores. Materials based on inclusion compounds and their use in various fields of industry, agriculture, in the environment, its use as sorbents, carriers of biochemically, pharmaceutically and agrochemically active substances. Supramolecular electrochemistry, photochemical, photochromic cells. Optical materials. Molecular recognition.

Recommended literature:
1. J. W. Steed, J. L. Atwood: Supramolecular Chemistry, J. Wiley, Chichester 2002.
2. J. L. Atwood, J. E. Davies: Inclusion compounds, Oxford University Press, Oxford 1984.
3. D. Cram, J. M. Cram: Container molecules and their guests, RSC, Cambridge 1994.

4. J. W. Steed, D. R.Turner, K. J. Wallace: Core Concepts in Supramolecular Chemistry and Nanochemistry. Wiley, Chichester 2007.
5. Jacob N. Israelachvili: Intermolecular and Surface Forces. Academic Press, 3rd edition, 2010. ISBN-10: 0123751829, ISBN-10: 0123751829.
6. Brain D. Wagner: Host–Guest Chemistry: Supramolecular Inclusion in Solution. De Gruyter; 1st edition, 2020.

Course language:
English language

Notes:
Direct teaching and consultations will be carried out in person or in a suitable form of online education (MS Teams or Big Blue Button (BBB)), or using a combination of these methods. The form of teaching will be specified by the teacher at at the beginning of the semester, or according to the current situation.

Course assessment
Total number of assessed students: 8

N	P
0.0	100.0

Provides: prof. RNDr. Juraj Černák, DrSc., RNDr. Miroslava Matiková Maľarová, PhD.

Date of last modification: 19.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/NZ/04	**Course name:** Not-Reviewed International or Local Proceedings
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 195

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ PVS/04	**Course name:** Patents, Inventions, Software
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Patent filed, invention, software product created.	
Learning outcomes: The PhD student demonstrates the ability to create an innovative product in a given scientific field, or with impact on an interdisciplinary scale or in technical practice.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	

abs	n
0.0	0.0

Provides:
Date of last modification: 08.11.2022
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ VYS/04	**Course name:** Presentation in Seminar
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 191

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/RZ/04	**Course name:** Reviewed International or Local Proceedings
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 367

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ SCI/04	**Course name:** SCI Citation
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 298

abs	n
100.0	0.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ DSRM/13	**Course name:** Spectral & Resenance Methods of Study Inorganic Compounds

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 9

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, the student must prove sufficient after completing the course knowledge of the spectral properties of inorganic, coordination and biocoordination compounds. At the same time, they must be able to demonstrate the relationship between the structural and spectral properties of the above compounds and the use of the subject matter in practice, in medicine, pharmacy, industry and society. Within the subject, students confirm their knowledge by elaborating a annual project using current scientific literature on the assigned topic to the extent defined by the teacher. The credit evaluation of the subject takes into account the following student workload: self-study of recommended supplementary literature and direct teaching in the form of consultations - 3 credits, elaboration of an annual project on a selected topic - 3 credits, preparation of ppt presentations from the annual project - 2 credits, exam from the subject - 1 credit. The subject takes place in a combined form, while direct teaching (full - time, suitable distance form in the online space or in combination) contributes to the total hourly subsidy of 5%, another 45 % represent individual consultations and the focus is on self-study (50%). Minimum limit for obtaining the evaluation (passed) is the elaboration of an annual project on a selected topic, preparation of ppt presentations from the annual project and passing the exam from the subject in the assigned scope.

Learning outcomes:
After the lectures, consultations and self-study, the student will demonstrate adequate mastery of the course content standard, which is defined by the brief content of the course and the recommended literature. To inform the students with the principles, possibilities and use of selected spectroscopic and resonance methods in the characterization of studied substances in inorganic and coordination chemistry.

Brief outline of the course:
1. Symmetry of compounds as a criterion of spectroscopic properties.
2. Vector model of atom and spectroscopic terms.
3. Electron spectroscopy.
4. Vibrational (infrared and Raman) spectroscopy.
5. Resonance study methods - EPR and Mössbauer spectroscopy.
6. Practical application of spectroscopic methods.

7. Combined application of spectroscopic and resonance methods in the study of coordination compounds.

Recommended literature:

A. B. P. Lever: Inorganic Spektroscopy, 2nd Ed., Elsevier, N.Y. 1984.
R. S. Drago: Physical Method in Chemistry, W.B.Saunders Comp., London 1977.
E. I. Solomon, A.B.P.Lever: Inorganic electronic structure and spectroscopy, John Wiley & Sons, New Jersey, 2006.
K. Nakamoto: Infrared and Raman Spectra of Inorganic and Coordination Compounds, John Wiley & Sons, New Jersey, 2009,
Shriver & Atkins: Inorganic Chemistry, Ed. P. Atkins, Oxford University Press, 2006.

Course language:

Slovak language, English language.

Notes:

Course assessment

Total number of assessed students: 16

N	P
0.0	100.0

Provides: doc. RNDr. Juraj Kuchár, PhD.

Date of last modification: 21.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: Dek. PF UPJŠ/JSD/14	**Course name:** Spring School for PhD Students

Course type, scope and the method:
Course type: Lecture
Recommended course-load (hours):
Per week: Per study period: 4d
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Active participation in the Spring School of PhD students of UPJŠ.

Learning outcomes:
By actively participating in the Spring School of PhD Students of UPJŠ, the PhD student demonstrates a high level of ability to process the issues of his dissertation for a multidisciplinary audience with an emphasis on clarifying the motivation, scientific problem, processing methodology and own contribution to the solution of the selected topic. The PhD student demonstrates the ability to professionally discuss various research topics, present his own positions and accept a plurality of opinions. Demonstrates the ability to communicate research results to a wider professional audience with adequate means and through the Slovak language.

Brief outline of the course:
1. Interdisciplinary lectures from the fields of medicine, natural sciences, law, public affairs, humanities. Lecturers - top foreign or national experts from the mentioned fields.
2. Scientific lectures in sections created within related disciplines. Lecturers - top experts from UPJŠ from the mentioned fields.
3. Scientific contributions of PhD students in sections of related fields.
4. Panel discussions on the issue of PhD studies and current trends in the development of scientific disciplines at UPJŠ.

Recommended literature:
Proceedings of the Spring School of Doctoral Students.

Course language:

Notes:

Course assessment
Total number of assessed students: 187

abs	n
100.0	0.0

Provides: doc. RNDr. Marián Kireš, PhD.

Date of last modification: 08.11.2022
Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ DTA/13	**Course name:** Thermal and mechanical properties of inorganic compounds

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 3 / 1 **Per study period:** 42 / 14
Course method: present

Number of ECTS credits: 9

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Successful completion of a written test. In accordance with the UPJŠ Study Regulations, successful completion is conditioned by obtaining at least 51% of the maximum possible points.
Active and mandatory participation in seminars, elaboration of seminar papers. Each student will prepare one seminar paper on a given topic.

Learning outcomes:
The student will gain information about the methods of thermal analysis used to study and characterize the physical and chemical properties of inorganic and organic compounds as well as solid materials during heating, the equipment used to study thermal properties and the reaction kinetics of decomposition processes.
Mastering the basic principles and methods of thermal analysis and its use to characterize changes in the physical and chemical properties of the substance during heating (inorganic compounds and materials, organic substances and pharmaceuticals).

Brief outline of the course:
1. Introduction, history, definition and development of thermal analysis methods. Terminology of thermal analysis.
2. Classification of thermal analysis methods. Overview of individual thermoanalytical techniques and measured parameters. Description of thermoanalytical curves. Isothermal and non-isothermal methods of thermal analysis.
3.) Equipment and instruments used in thermal analysis.
4.) Thermocouples, their construction and division. Temperature measurement method, thermocouples, resistance thermometers, thermistors.
5.) Classification of processes monitored by thermal analysis (solid-solid reaction, solid-liquid, solid-gas, melt reactions).
6.) Thermogravimetry methods (TG / DTG). Principle, methods, thermal scales, types of scales, temperature measurement.
7.) DSC and DTA method (principle, method of connecting thermocouples, sample carriers, registration devices).
8.) Other methods of thermal analysis - emanation thermal analysis, thermodilatometry, thermomechanical analysis, thermomagnetometry.

9.) Analysis of released gases and coupled techniques in thermal analysis (IČ, MS)
10.) Basics of kinetics.
11.) Methods for determining the kinetics of processes from thermoanalytical measurements (ASTM, OFW, Friedman analysis, model-free methods)
12. Presentation and publication of results of thermoanalytical measurements. Application of TA methods to inorganic, organic materials and minerals.

Recommended literature:

1. M. E. Brown, P. K. Gallagher: Handbook of Thermal Analysis and Calorimetry, Elsevier, Amsterdam, 2008.
2. P. Gabbott: Principles and Applications of Thermal Analysis, Blackwell Publ., Oxford, 2008.
3. K. Györyová: Termická analýza, Edičné stredisko PF UPJŠ, Košice, 1992.
4. F. Paulik: Special Trends in Thermal Analysis, J. Wiley&Sons, New York, 1995.
5. V. Zeleňák, Termická analýza, Interný učebný text, PF UPJŠ, 2020.

Course language:
Slovak language, English language.

Notes:
The course is standardly realized in full-time form, in case of necessary circumstances by distance.

Course assessment
Total number of assessed students: 14

N	P
0.0	100.0

Provides: prof. RNDr. Vladimír Zeleňák, DrSc.

Date of last modification: 22.11.2021

Approved: prof. RNDr. Juraj Černák, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚCHV/ PDS/18	**Course name:** Writing Dissertation Work
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 0	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 6	

N	P
0.0	100.0

Provides:
Date of last modification: 15.09.2021
Approved: prof. RNDr. Juraj Černák, DrSc.