CONTENT

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dCDC/12	**Course name:** Citation in a Slovak 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: 0	

abs	n
0.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dCMG/12	**Course name:** Citation in a 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: 0	

abs	n
0.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dCZC/12	**Course name:** Citation in an 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: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification:	
Approved: prof. RNDr. Tomáš Madaras, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dSVP/14	**Course name:** Co-researcher of an APVV or VEGA 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: 83

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dSVG/12	**Course name:** Co-researcher of an 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: 87	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dSMP/14	**Course name:** Co-researcher 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: 3	
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: 13

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dKOA/10	**Course name:** Combinatorial algorithms

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

Number of ECTS credits: 5

Recommended semester/trimester of the course: 2., 4.

Course level: III.

Prerequisities:

Conditions for course completion:
The evaluation consists of a project (30 points) and an oral exam (70 points). The semester project consists of the elaboration of a computer program that returns the optimal solution or a acceptable approximation of the optimal solution, respectively, of a selected graph problem given by a suitable representation.

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 1

N	P
0.0	100.0

Provides: RNDr. Mária Maceková, PhD.

Date of last modification: 20.09.2021

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dKOM/10	**Course name:** Combinatorics

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

Number of ECTS credits: 5

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

Conditions for course completion:
Oral exam

Learning outcomes:

Brief outline of the course:
Finite combinatorics. Generating functions. Incidence structures. Distributive latices. Basis of infinite combinatorics. Almost disjoint set systems. Independence set systems. Infinite trees, their propertiesand a question of their existence. Some cardinal characteristics of the set of real numbers.

Recommended literature:
1. M. Aigner: Combinatorial Theory, Springer-Verlag, Berlin, 1997
2. B. Balcar a P. Štěpánek, Teorie množin, Academia, Praha 2000
3. B. Bollobás, Combinatorics, Cambridge University Press, Cambridge 1986
4. T. Jech, Set Theory, Springr-Verlag, Berlin 2002
5. Journal literatura

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides:

Date of last modification: 03.05.2015

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚINF/VYMD/15	**Course name:** Computational complexity and models

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

Number of ECTS credits: 9

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

Conditions for course completion:
Written test combined with an oral examination.

Learning outcomes:
Providing an extended backgroung in the area of efficient computations, computational complexity of algorithms, fundamental time and space complexity classes, hardest complete problems, and about reducibility among problems.

Brief outline of the course:
1. Measuring time and space complexity, basic computational models: single- and multi-tape Turing machines, RAM and RASP models, unit and logarithmic costs.
2. Basic complexity classes: L, NL, P, NP, PSPACE, NPSPACE, EXPTIME, NEXPTIME, EXPSPACE.
3. P versus NP, L versus NL. Examples of complete problems in these classes.
4. Polynomial time and logarithmic space reducibilities, definition and basic properties of complete problems.
5. NP-completenss of the Boolean formula satisfiability (SAT).
6. Variants of SAT, problems related to graph coloring.
7. Other NP-complete problems: vertex cover, Hamiltionian paths, subset sum, balancing, traveling salesman problem.
8. Subexponential deterministic solutions for selected NP-complete problems: planar 3-colorability, balancing. Restricted variants with more efficient solutions.
9. Space complexity classes: Savitch theorem, inductive counting.
10. Problems complete for NL, P, and PSPACE: graph accessibily (GAP), circuit-value, quantified Boolean formulas (QBF).
11. Hierarchy and translation theorems for time and space.
12. Relativized complexity classes.
13. Alternating complexity classes.
14. Polynomial time hierarchy.
15. Alternating logarithmic space hierarchy.

Recommended literature:

J.E. Hopcroft, R.Motwani, J.D. Ullman: Introduction to automata theory, languages, and computation, Addison-Wesley, 2007.
M. Sipser: Introduction to the Theory of Computation, Thomson, 2nd edition, 2006.
S. Arora, B. Barak: Computational Complexity: A Modern Approach, Cambridge Univ. Pess, 2009.
C. Calude and J. Hromkovič: Complexity: A Language-Theoretic Point of View, in G. Rozenberg and A. Salomaa, Handbook of Formal Languages II, Springer, 1997.
G.Brassard, P.Bradley: Fundamentals of algorithmics, Prentice Hall, 1996.
Ch. H. Papadimitriou: Computational Complexity, Addison-Wesley, 1994.
D.P.Bovet, P.Crescenzi: Introduction to the theory of complexity, Prentice Hall, 1994.

Course language:
Slovak or english

Notes:
Content prerequisity: Basic knowlegde in the area of formal languages, automata theory, and programming.

Course assessment
Total number of assessed students: 28

N	P
0.0	100.0

Provides: prof. RNDr. Viliam Geffert, DrSc.

Date of last modification: 23.11.2021

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dPOV/12	**Course name:** Conference organising commiittee membership
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: 5

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dDZS/14	**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:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Acquiring the required number of credits in the structure defined by the study plan.	
Learning outcomes: Evaluation of student‘s competences with respect to the profile of the graduate.	
Brief outline of the course: The summary doctoral exam is organised as a discourse focusing on 3 courses serving as credit sources for a PhD student (the course is chosen by the supervisor of the student after consulting with the guarantee of the study programme).	
Recommended literature:	
Course language: slovak	
Notes:	
Course assessment Total number of assessed students: 29	

N	P
0.0	100.0

Provides:
Date of last modification: 03.05.2015
Approved: prof. RNDr. Tomáš Madaras, PhD.

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. Tomáš Madaras, PhD.

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. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dEKO/10	**Course name:** Enumeration of combinatorial objects

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: 7

Recommended semester/trimester of the course: 2., 4.

Course level: III.

Prerequisities:

Conditions for course completion:
A student is evaluated according to an oral examination.

Learning outcomes:
Student gets acquainted with Pólya's enumeration theory and on special examples sees how to use it when determining the number of some mathematical objects.

Brief outline of the course:
Cycle index of a permutation group. Burnside's Lemma. Pólya's Enumeration Theorem. Enumeration of injective functions. Enumeration of trees. Enumeration of graphs of given order and size. Enumeration of oriented graphs. Generalisations of Pólya's Enumeration Theorem.

Recommended literature:
F. Harary, E. M. Palmer: Graphical Enumeration, Academic Press, 1973

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 1

N	P
0.0	100.0

Provides: prof. RNDr. Mirko Horňák, CSc.

Date of last modification: 17.03.2022

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dTGF/10	**Course name:** Graph theory

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

Number of ECTS credits: 5

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
To complete the course, it is necessary to demonstrate the ability to formulate definitions and theorems from the lectured material together with their proofs, and to present an understanding of the connections between particular concepts and results.
The evaluation of the subject is based on the results of an oral exam (consisting of two theoretical questions).

Learning outcomes:
After completing the course, the student is acquainted with other advanced topics of graph theory, which are not covered by basic courses in discrete mathematics during the bachelor or master degree study.

Brief outline of the course:
Domination in graphs (2 weeks)
Minors and forbidden subgraphs (2 weeks)
Automorphism groups of graphs (2 weeks)
Additive and hereditary properties (3 weeks)
Graph decompositions (2 weeks)
Nowhere-zero flows (2 weeks)

Recommended literature:
J. A. Bondy and U.S.R. Murty, Graph Theory, Springer-Verlag, 2008
J.Bang-Jensen and G. Gutin: Digraphs: Theory, Algorithms and Applications, Springer-Verlag London, 2001
R. Diestel: Graph Theory, Springer-Verlag, New York, 1997
scientific journal publications

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 21

N	P
0.0	100.0

Provides: doc. RNDr. Roman Soták, PhD., prof. RNDr. Mirko Horňák, CSc., prof. RNDr. Tomáš Madaras, PhD., RNDr. Igor Fabrici, Dr. rer. nat.

Date of last modification: 20.09.2021

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dTGR/10	**Course name:** Group theory

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: 7

Recommended semester/trimester of the course: 4.

Course level: III.

Prerequisities:

Conditions for course completion:
written and oral exam

Learning outcomes:
The students learn basic concepts and methods of group theory and their applications in various parts of mathematics.

Brief outline of the course:
Groups of symmetries, abstract groups. Subgroups, orders of elements, cyclic groups. Normal subgroups, factorization. Classification of finitely generated Abelian groups. Groups of permutations, cyclic index, Burnside´s lemma, Pólya´s theorem. Sylow´s subgroups, p-groups. Groups in linear algebra.

Recommended literature:
S. MacLane, G. Birkhoff: Algebra, Alfa Bratislava, 1973
L. Beran: Grupy a svazy, SNTL Praha, 1974
D.A.R. Wallace: Groups,rings and fields, Springer 1998
J. J. Rotman: Advanced Modern Algebra, Amer. Math. Soc., Providence 2010

Course language:
Slovak or English

Notes:

Course assessment
Total number of assessed students: 21

N	P
0.0	100.0

Provides: doc. RNDr. Miroslav Ploščica, CSc.

Date of last modification: 08.02.2022

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dISLa/14	**Course name:** Individual study of scientific literature I
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 12	
Recommended semester/trimester of the course: 1., 2..	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 33	

abs	n
100.0	0.0

Provides:
Date of last modification: 03.05.2015
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dISLb/14	**Course name:** Individual study of scientific literature II
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 12	
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: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 31	

abs	n
100.0	0.0

Provides:
Date of last modification: 03.05.2015
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dTZV/10	**Course name:** Lattice theory

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

Number of ECTS credits: 5

Recommended semester/trimester of the course: 2., 4.

Course level: III.

Prerequisities:

Conditions for course completion:
Awarded according to written and oral exam.

Learning outcomes:
The students learn basic concepts and methods of Lattice theory and gain the ability to apply them in various parts of mathematics.

Brief outline of the course:
Distributive and modular lattices, Boolean algebras. Ideals, reprezentation of distibutive lattices and Boolean algebras. Completeness and completions. Algebraic properties of lattices, congruence relations. Formal concept analysis.

Recommended literature:
G.Grätzer: General Lattice Theory (2nd edition), Birkhäuser, 1998
B. A. Davey, H. A. Priestley: Introduction to lattices and order, Cambridge University Press 1990
M. Kolibiar: Algebra a príbuzné disciplíny, Alfa Bratislava, 1991

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 6

N	P
0.0	100.0

Provides: doc. RNDr. Miroslav Ploščica, CSc.

Date of last modification: 08.02.2022

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dTMT/10	**Course name:** Matroid theory

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: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
A student is evaluated according to an oral examination.

Learning outcomes:
A student gets acquainted with special parts of matroid theory and with possibilities how to use them in various disciplines of discrete mathematics.

Brief outline of the course:
Restriction, contraction, minor of a matroid. Connected matroids. Whitney's Theorem. Graph homeomorphisms versus matroid minors. Planar graphs and their duals. Representation of a matroid in a vector space. Binary matroids. Block designs versus matroids. Extremal problems in matroids. Greedy algorithm versus matroids.

Recommended literature:
D. J. A. Welsh: Matroid Theory, Academic Press, 1976.
J. G. Oxley, Matroid Theory, Oxford University Press, 2010.

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 1

N	P
0.0	100.0

Provides: prof. RNDr. Mirko Horňák, CSc.

Date of last modification: 17.03.2022

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dZMG/14	**Course name:** Obtaining of a mobility 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: 2	
abs	n
100.0	0.0
Provides:	
Date of last modification:	
Approved: prof. RNDr. Tomáš Madaras, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dUAS/10	**Course name:** Ordered algebraic structures

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

Number of ECTS credits: 5

Recommended semester/trimester of the course: 2., 4.

Course level: III.

Prerequisities:

Conditions for course completion:
examination

Learning outcomes:
To gain a basic orientation in the methods of modern algebra. Acquire the basics of the theory of ordered algebraic structures, which to combine with the acquired knowledge of algebra, extend them and generalize; knowledge to apply to specific problems and mathematical problems. The aim is to have sufficient mathematical knowledge and apparatus to enable the independent solution of various problems related to scientific research and the publication of these results.

Brief outline of the course:
Partially ordered, linearly ordered, lattice ordered groups. Convex subgroups, absolute value and orthogonality, order of factor classes. Archimedean ordered structures. Partially ordered and linearly ordered rings, fields, lattice ordered rings.

Recommended literature:
L.Fuchs: Partially ordered algebraic systems, Pergamon Press, 1963.
T.S.Blyth: Lattices and Ordered Algebraic Structures, Springer Verlag, London, 2005.
E.Harsheim: Ordered sets, Springer Verlag, 2005.
G.Grätzer: Universal algebra, Second Edition, Springer 2008.

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 4

N	P
0.0	100.0

Provides: prof. RNDr. Danica Studenovská, CSc.

Date of last modification: 24.11.2021

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/ PgVU/17	**Course name:** Pedagogy for University Teachers

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
1. Development of a teaching diary—100%
2. Compulsory active participation and attendance in accordance with the Study Regulations.

Learning outcomes:
Students will be able to:
Apply didactic principles, methods, forms, and tools in the teaching of a specialised subject. Specify the educational procedures of a university teacher in subject teaching, pedagogical diagnostics, evaluation of learning outcomes, and self-reflection. Present rationalisation and streamlining possibilities in the teaching of specialised subjects. Apply educational competencies of university teachers taking into account the peculiarities of educating university students.

Brief outline of the course:
The personality of a university teacher. Teaching styles. Student in university education. Student learning styles. Possibilities of adapting teaching styles and student learning styles. University teacher–student interaction and communication in the teaching process. Pedagogical competencies of a university teacher. Didactic analysis of the curriculum; teaching materials and textbooks. Forms of university teaching. Methods of university teaching. Verification methods and student assessment. Creation of a didactic test. Designing university teaching process. University teacher self-reflection.

Recommended literature:
Čapek, R. (2015). Moderní didaktika. Lexikon výukových a hodnoticích metod. Praha, Grada Publishing, a.s.
Danek, J. (2014). Pedagogická komunikácia na vysokej škole. Trnava, Univerzita sv.Cyrila a Metoda v Trnave.
Dargová, J. (2001). Tvorivé kompetencie učiteľa. Prešov, Privat Press.
Dvořáček, J. (2014). Základy pedagogiky. Praha, Oeconomica.
Hupková, M., Petlák, E. (2004). Sebareflexia a kompetencie v práci učiteľa. Bratislava, IRIS.
Kyriacou, CH. (1996). Klíčové dovednosti učitele. Praha, Portál.
Mertin, V. a kol. (2012). Metody a postupy poznávaní žáka: pedagogická diagnostika. Praha, Wolters Kluwer.
Petty,G. (2013). Moderní vyučování. Praha, Portál.

Prucha, J. (2013). Moderní pedagogika. Praha, Portál.
Sirotová, M. (2014). Vysokoškolský učiteľ v edukačnom procese. Trnava, Univerzita sv.Cyrila a Metoda v Trnave.
Slávik, M. a kol. (2012). Vysokoškolská pedagogika. Praha, Grada.
Šebeň Zaťková, T. (2014). Úvod do vysokoškolskej pedagogiky. Trnava, Univerzita sv.Cyrila a Metoda v Trnave.
Turek, I. (2014). Didaktika. Bratislava, Wolters Kluwer, s.r.o.
Zormanová, L. (2014). Obecná didaktika. Praha, Grada.

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 78

abs	n	neabs
98.72	0.0	1.28

Provides: doc. PaedDr. Renáta Orosová, PhD.

Date of last modification: 07.09.2022

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ ODP/14	**Course name:** PhD thesis defence
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:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 27	

N	P
0.0	100.0

Provides:
Date of last modification: 07.12.2021
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dPLT/10	**Course name:** Polyhedral theory

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: 7

Recommended semester/trimester of the course: 4.

Course level: III.

Prerequisities:

Conditions for course completion:
To complete the course, it is necessary to demonstrate the ability to formulate definitions and theorems from the lectured material together with their proofs, and to present an understanding of the relationships between particular concepts and results.
The evaluation of the subject is based on the results of an oral exam (consisting of two theoretical questions).

Learning outcomes:
After completing the course, the student will be acquainted with basic overview of the theory of convex polyhedra and polyhedral maps.

Brief outline of the course:
Week 1: Polyhedra, complexes, maps, planar graphs.
Week 2: Basic properties of three-dimensional convex polyhedra (operations with polyhedra, Euler's formula and its consequences).
Week 3: Platonic, Archimedean and related polyhedra.
Weeks 4 - 6: Characterization of graphs of convex polyhedra, Steinitz's theorem.
Week 7: Hamiltonian polyhedra.
Week 8: The longest cycles in convex polyhedra.
Week 9: Face vectors of polyhedra, Eberhard's theorem.
Weeks 10 - 11: Local structure of polyhedra.
Week 12: Sphere inscribability and circumscribability of polyhedra.
Week 13: Applications of polyhedra in sciences.

Recommended literature:
E. Jucovič: Konvexné mnohosteny, Veda Bratislava 1981
B. Grunbaum: Convex polytopes (2nd edition), Springer New York, 2003
G.M. Ziegler: Lectures on Polytopes, Springer-Verlag, New York, 1996
S. Jendrol', H.-J. Voss: Light subgraphs of graphs embedded in the plane - a survey, Discrete Math. 313 (2013), 406-421

Course language:
Slovak and English

Notes:
Basic knowledge of geometry and advanced knowledge of graph theory are assumed.

Course assessment
Total number of assessed students: 4

N	P
0.0	100.0

Provides: prof. RNDr. Tomáš Madaras, PhD.

Date of last modification: 14.09.2021

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dPDK/12	**Course name:** Presentation of results at a 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:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 21	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dPDZ/12	**Course name:** Presentation of results at a local conference with international 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: 99	
abs	n
100.0	0.0
Provides:	
Date of last modification:	
Approved: prof. RNDr. Tomáš Madaras, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dVMK/14	**Course name:** Presentation of results at an 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: 104	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dPSM/12	**Course name:** Presentation of results in a 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: 200

abs	n
100.0	0.0

Provides:

Date of last modification:

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dPMK/10	**Course name:** Probability method in combinatorics

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: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
In the covered areas of the probabilistic method, the ability to formulate definitions and statements, to present proofs of statements, to explain the individual steps in proofs and to mention possibilities of application is required.
The evaluation is based on an oral exam.

Learning outcomes:
Introduction to the randomness in graph theory and applications of the probabilistic method in combinatorics and graph theory. The obtained overview of the ways of using basic results of probability in proving the existence of objects with the required properties, understanding of various forms of this method and knowledge of possible applications.

Brief outline of the course:
1. Probability Theory (probability space, event, probability, random variable, expectation, random graph)
2. Probabilistic Method - First Moment Principle (Ramsey numbers, hypergraph coloring, intersecting sets system/Kneser graph, pairs of sets)
3. Linearity of Expectation (Hamiltonian graphs, splitting graphs)
4. Alterations (Markov's inequality, independent sets, high girth and high chromatic number)
5. The Second Moment (Chebyshev’s inequality, threshold functions, the clique number)
6. The Lovász Local Lemma (hypergraph coloring again, directed cycles)
7. Chernoff bound

Recommended literature:
1. N. Alon, J. Spencer: The Probabilistic Method, John Wiley, 1991
2. M. Molloy, B. Reed: Graph Colourings and the Probabilistic Method, Springer, 2002
3. J. Matoušek, J. Vondrák: The Probabilistic Method, Lecture Notes, 2002

Course language:
Slovak

Notes:

Course assessment Total number of assessed students: 12	
N	P
0.0	100.0
Provides: RNDr. Igor Fabrici, Dr. rer. nat.	
Date of last modification: 19.10.2021	
Approved: prof. RNDr. Tomáš Madaras, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/PsVU/17	**Course name:** Psychology for University Lecturers

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Case study, micro-output, its analysis
Current modifications of the course are listed in the electronic bulletin board of the course.

Learning outcomes:
After completing the course, students can:
and Understand, summarize and explain selected psychological knowledge from cognitive psychology, emotion and motivation psychology, personality psychology, developmental, social, educational psychology and health psychology.
b) apply the above psychological knowledge necessary for the professional, competent performance of university teaching practice of doctoral students
c) to create and implement the teaching of a professional topic with applied psychological knowledge
d) evaluate their performance and the performance of their classmates, provide feedback

Brief outline of the course:
The content of the course is based on selected psychological knowledge of cognitive psychology, psychology of emotions and motivation, personality psychology, developmental, social, educational psychology and health psychology. Teaching is realized by a combination of lectures with interactive, experiential methods, discussion, open communication with mutual respect, support of independence, activity and motivation of students. Syllabus: University teacher and his work in the teaching process with a focus on: teachers in relation to themselves (cognitive, personal, social and competencies in the use of methods), in relation to students and as part of the teacher-student relationship on the basis of selected areas of cognitive psychology, psychology of emotions and motivation, developmental psychology, social psychology, educational psychology and health psychology with application to the university environment

Recommended literature:
Alexitch, L. R. (2005). Applying social psychology to education. Social Psychology.–Ed.: Schneider F., Gruman J., Coutts L.–Sage Publications, Inc, 205-228.
Fry, H., Ketteridge, S., & Marshall, S. (2008). A handbook for teaching and learning in higher education: Enhancing academic practice. Routledge.
Mareš, J.: Pedagogická psychologie. Portál, 2013.

Kniha psychologie. Universum, 2014
Čáp, J., Mareš, J.: Psychologie pro učitele. Praha: Portál 2007.
Vágnerová, M.: Školní poradenská psychológie pro pedagogy. Praha: Karolínum 2005.

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 70

abs	n	neabs
100.0	0.0	0.0

Provides: PhDr. Anna Janovská, PhD.

Date of last modification: 24.06.2022

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dVOP/12	**Course name:** Reviewer report
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: 1

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dCSC/12	**Course name:** SCI or SCOPUS 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: 14

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dPRZ/12	**Course name:** Scientific publication in peer-reviewed 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: 31	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dPCR/12	**Course name:** Scientific publication registered in the database Math. Reviews or Zentralblatt MATH
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: 9

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dPCW/12	**Course name:** Scientific publication registered in the database Web of Science or Scopus
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: 69

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dVTGa/10	**Course name:** Selected topics in graph theory I

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

Number of ECTS credits: 7

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
To complete the course, it is necessary to demonstrate the ability to formulate definitions and theorems from the lectured material together with their proofs, and to present an understanding of the relationships between particular concepts and results.
The evaluation of the subject is based on the results of an oral exam (consisting of two theoretical questions).

Learning outcomes:
After completing the course, the student is acquainted with specific topics of graph theory which are not covered by basic or advanced courses in discrete mathematics during the bachelor or master degree study, and which are the subject of research of teams, whose members contribute to supervision of the doctoral program Discrete Mathematics.

Brief outline of the course:
Discharging method in graph theory (5 weeks)
3-colourability of graphs (4 weeks)
Graph colourings with constraints on colour neighbourhoods of vertices (4 weeks)

Recommended literature:
Recent publications from international scientific journals.

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 20

N	P
0.0	100.0

Provides: doc. RNDr. Roman Soták, PhD., prof. RNDr. Mirko Horňák, CSc., prof. RNDr. Tomáš Madaras, PhD., RNDr. Igor Fabrici, Dr. rer. nat.

Date of last modification: 20.09.2021

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dVTGb/10	**Course name:** Selected topics in graph theory II

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

Number of ECTS credits: 7

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

Conditions for course completion:
To complete the course, it is necessary to demonstrate the ability to formulate definitions and theorems from the lectured material together with their proofs, and to present an understanding of the relationships between particular concepts and results.
The evaluation of the subject is based on the results of an oral exam (consisting of two theoretical questions).

Learning outcomes:
After completing the course, the student is acquainted with specific topics of graph theory which are not covered by basic or advanced courses in discrete mathematics during the bachelor or master degree study, and which are the subject of research of teams, whose members contribute to supervision of the doctoral program Discrete Mathematics.

Brief outline of the course:
Facial colourings of plane graphs (4 weeks)
Fractional and circular graph colourings (4 weeks)
Monounary algebras (3 weeks)
Chemical graph theory (3 weeks)

Recommended literature:
Recent literature from international scientific journals.

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 25

N	P
0.0	100.0

Provides: doc. RNDr. Roman Soták, PhD., prof. RNDr. Mirko Horňák, CSc., prof. RNDr. Tomáš Madaras, PhD., prof. RNDr. Danica Studenovská, CSc.

Date of last modification: 20.09.2021
Approved: prof. RNDr. Tomáš Madaras, PhD.

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. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dZSP/12	**Course name:** Study stay abroad
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: 14

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dVBP/12	**Course name:** Supervising a bachelor 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: 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: 7	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dVPS/12	**Course name:** Supervising a student's scientific 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: 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: 3

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dTPG/14	**Course name:** Theory of planar graphs

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: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
To complete the course, it is necessary to demonstrate the ability to formulate definitions and theorems from the lectured material together with their proofs, and to present an understanding of the relationships between particular concepts and results.
The evaluation of the subject is based on the results of an oral exam (consisting of two theoretical questions).

Learning outcomes:
After completing the course, the student will be acquainted with basic and advanced topics related to planar and plane graphs.

Brief outline of the course:
Week 1: Fundamentals of topology of the plane.
Week 2: Planar and planar graphs, outerplanar graphs.
Weeks 3 - 5: Characterization theorems for planarity.
Week 6: Euler's formula and its consequences.
Weeks 7 - 10: Local structure of planar and plane graphs, the discharging method method.
Week 11 - 12: Separators in planar graphs.

Recommended literature:
T. Nishizeki, N. Chiba: Planar graphs: Theory and Algorithms, Dover Publications, 2008.
S. Jendroľ, H-J. Voss: Light subgraphs of graphs embedded in the plane - A survey, Discrete Mathematics Vol. 313, no. 4 (2013) 406-421.

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: prof. RNDr. Tomáš Madaras, PhD.
Date of last modification: 14.04.2022
Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ dTTG/10	**Course name:** Topological graph theory

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: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
Skúška

Learning outcomes:
Oboznámiť sa so základnými metódami a poznatkami Topologickej teórie grafov.

Brief outline of the course:
Planárne grafy. Plochy. Vnorenia. Napäťové grafy a pokrývajúce priestory. Rod grafov. Rody grúp. Farbenia grafov na plochách. Neodstraniteľné konfigurácie. Reprezentativita grafov na plochách. Stromová šírka grafov. Minory. Zakázané konfigurácie pre plochy.

Recommended literature:
1. G. Gross, T.W. Tucker: Topological Graph Theory, John Wiley and Sons, New York, 1987
2. B. Mohar, C., Thomassen: Graphs on Surfaces,The Johns Hopkins University Press, Baltimore, 2001
3. G. Ringel: Map Color Theorem, Springer-Verlag, Berlin, 1974
4. Journal articles

Course language:
Slovak or English

Notes:

Course assessment
Total number of assessed students: 17

N	P
0.0	100.0

Provides: doc. RNDr. Roman Soták, PhD.

Date of last modification: 26.01.2022

Approved: prof. RNDr. Tomáš Madaras, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ dUAL/10	**Course name:** Universal algebra
Course type, scope and the method: **Course type:** Lecture **Recommended course-load (hours):** **Per week:** 3 **Per study period:** 42 **Course method:** present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course: 1., 3.	
Course level: III.	
Prerequisities:	
Conditions for course completion: Exam consisting of a written test and of a oral examination.	
Learning outcomes: To achieve a basic orientation in the methods of modern algebra. Follow up on the acquired knowledge of algebra, expand it and generalize; gain additional knowledge of universal algebra and be able to apply it to specific situations. The aim is to have sufficient mathematical knowledge and apparatus to enable the independent solution of various problems related to scientific research and the publication of these results.	
Brief outline of the course: Relations, operations, algebraic structures. Congruences, homomorphism and isomorphism theorems. Application to abstract automata and other structures. Automorphism groups and endomorphism monoids of algebraic structures, abstract and concrete representation problem. Subalgebras. Direct and subdirest product. Direct and inverse limit of algebras. Terms. Free algebras. Birkhoff theorems about varieties. Structures and 1st order logic.	
Recommended literature: G. Grätzer: Universal Algebra, 2nd Edition, Springer Verlag, Berlin - New York, 2008. S.Burris, H.P.Sankappanavar: A Course in Universal Algebra. Springer-Verlag, 1981; online http://orion.math.iastate.edu/cliff/BurrisSanka.pdf. V.P.Snaith: Groups, Rings and Galois Theory, Word Scientific Publ. Co.,New Jersey-London-Singapore, 2003. M. Kolibiar a kol.: Algebra a príbuzné disciplíny, Bratislava, 1992. B. Jónsson: Topics in Universal Algebra, Springer-Verlag, 1972.	
Course language: Slovak and English	
Notes:	

Course assessment Total number of assessed students: 4	
N	P
0.0	100.0
Provides: prof. RNDr. Danica Studenovská, CSc.	
Date of last modification: 24.11.2021	
Approved: prof. RNDr. Tomáš Madaras, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ 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: 2

N	P
0.0	100.0

Provides:
Date of last modification:
Approved: prof. RNDr. Tomáš Madaras, PhD.