CONTENT

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ ALG2a/22	**Course name:** Algebra I

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

Number of ECTS credits: 6

Recommended semester/trimester of the course: 1.

Course level: I.

Prerequisities:

Conditions for course completion:
According to the results from the semester and in view of the results of the written and oral final exam..

Learning outcomes:
To acquire the methods of mathematical thinking and cognition. Gain basic knowledge of number theory related to divisibility, master the basic concepts of linear algebra and be able to apply them to specific problems and mathematical problems.

Brief outline of the course:
Divisibility in Z. Fields. Systems of linear equations, Gauss elimination. Maps, permutations. Computing with matrices. Determinants, Cramer rule.

Recommended literature:
T.S Blyth, E.F. Robertson: Basic linear algebra, Springer Verlag, 2001.
K. Jänich: Linear algebra, Springer Verlag, 1991.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 956

A	B	C	D	E	FX
10.98	12.97	19.25	18.31	28.03	10.46

Provides: RNDr. Lucia Kőszegyová, PhD., Mgr. Martin Vodička, Dr. rer. nat., Mgr. Radka Schwartzová

Date of last modification: 17.02.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ ALG2b/22	**Course name:** Algebra II

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

Number of ECTS credits: 6

Recommended semester/trimester of the course: 2.

Course level: I.

Prerequisities: ÚMV/ALG2a/22

Conditions for course completion:
According to tests and to the exam.

Learning outcomes:
To acquire the methods of mathematical thinking and cognition. To deepen and expand students' knowledge of systems of linear equations, to acquire basic knowledge about vector spaces, linear representations, polynomials and polynomial equations.

Brief outline of the course:
Linear spaces, bases. Rank of a matrix. Systems of homogeneous linear equations.
Linear transformations.
Ring, fields. Polynomials over a field. Factorization into irreducible factors, roots. Roots of complex numbers. Cubic equations.
Polynomials with several unknowns, symmetric polynomials.

Recommended literature:
T. Katriňák a kol.: Algebra a teoretická aritmetika 1, Alfa Bratislava, 1985.
A. Kurosh: Higher Algebra, Mir Publishers, 1975.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 272

A	B	C	D	E	FX
21.32	16.18	16.18	16.18	26.47	3.68

Provides: doc. RNDr. Miroslav Ploščica, CSc., RNDr. Lucia Kőszegyová, PhD.

Date of last modification: 16.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ ALG1c/24	**Course name:** Algebra III

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

Number of ECTS credits: 7

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities: ÚMV/ALG1b/24 or ÚMV/ALG2b/22

Conditions for course completion:
Awarded according to continual evaluation, written and oral examination.

Learning outcomes:
The students learn basic concepts, theorems and methods of linear algebra, at the level necessary for applications in geometry and other parts of mathematics. They obtain knowledge about the fundamentals of group theory and ring theory, and about properties of the polynomial integral domains.

Brief outline of the course:
- Affine spaces, subspaces and their positions.
- Convex sets, convex polyhedrons.
- Algebraic planes.
- Eigenvalues ans eigenvectors.
- Similarity of matrices, rational and Jordan canonical form.
. Bilinear and quadratic forms, Sylvester law.
- Groups, subgroups, cyclic groups.
- Normal subgroups, factorization, isomorphism theorems.

Recommended literature:
G. Birkhoff, S. MacLane: Prehľad modernej algebry, Alfa Bratislava, 1979
M. Hejný a kol.: Geometria 1, SNP, Bratislava 1985
M. Sekanina a kol.: Geometrie 1, SNP Praha 1986
T. Katriňák a kol.: Algebra a teoretická aritmetika 1, Alfa Bratislava, 1985
D.A.R. Wallace: Groups,rings and fields, Springer, 1998

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 5

A	B	C	D	E	FX
40.0	40.0	0.0	0.0	20.0	0.0

Provides: doc. RNDr. Miroslav Ploščica, CSc.

Date of last modification: 04.03.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ ATC/22	**Course name:** Algebra and number theory

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities: ÚMV/ALG2b/22

Conditions for course completion:
It is based on the results of written checks carried out during the semester. Final evaluation is based on the results of written checks carried out during the semester, of test, written and oral exam.

Learning outcomes:
Obtain basic knowledge about groups and from the elementary number theory.

Brief outline of the course:
1. Congruences in the ring of integers
2. The field of complex numbers
3. Algebraic and transcendent numbers, minimal polynomial
4. Simple extensions of the field of rationals
5. The field of algebraic numbers
6. The concept of group
7. Symmetry groups
8. Orders of elements, Lagrange theorem
9. Normal subgroups, factorization
10. Homomorphism theorems

Recommended literature:
G.Birkoff, S. MacLane: A Survey of Modern Algebra, New York 1965
M. Harminc: Elementárna teória čísel (1.časť), PF UPJŠ Košice 2012
T. Katriňák a kol.: Algebra a teoretická aritmetika 1, Alfa Bratislava 1985
A. Legéň: Grupy, okruhy a zväzy, Alfa Bratislava 1980
I.R. Shafarevich: Basic Notions of Algebra, Springer, 2005

Course language:
Slovak

Notes:

Course assessment Total number of assessed students: 368					
A	B	C	D	E	FX
12.5	18.75	24.18	22.01	20.38	2.17
Provides: doc. RNDr. Miroslav Ploščica, CSc.					
Date of last modification: 23.08.2022					
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ ATA/24	**Course name:** Algebra and theoretical arithmetic

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: 4

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
During the term, each student receives marks for two written exams. Final marking is assigned based on the overall points for the work throughout the term, for homework and their presentation. Marking classification: A:91%-100%, B:81%-90%, C:71%-80%, D:61%-70%, E:51%-60%, FX:0%-50%

Learning outcomes:
Obtain knowledge about sets N, Z, Q and R, about their axiomatic building-up, the operations and the orderigs on them. The student will
1. familiarise themselves with mathematical culture, ways of thinking, self-expression and putting forward arguments,
2. gain a deeper understanding of the base terminology of real analysis, their properties and interconnections,
3. be able to define and interpret key terms, prove their basic properties and relationships,
4. know how to solve tasks focused on utilising the aforementioned concepts and interpret the obtained results.

Brief outline of the course:
Ordered Domains, Axioms for Rings, Construction for Rings,
Definition and Properties of the Integers,
Number-Theoretic Properties of the Integers,
The Rational Numbers, The Arithmetic of the Rational Numbers,
Integral Domains and Quotient Fields, The Arithmetic of Sequences,
Cantor Sequences, Null Sequences, The Real Numbers,
Ordered Fields, Relations between Ordered Fields and the Field of Rational Numbers,
the Completeness of the Real Numbers, more Theorems on Ordered and Complete, Ordered Fields,
the Isomorphism of Complete, Ordered Fields,
the Complex Numbers

Recommended literature:
T. Katriňák, M. Gavalec, E. Gedeonová, J. Smítal: Algebra a teoretická aritmetika (1), Alfa, Bratislava, 1985.

T. Šalát, A. Haviar, T. Hecht, T. Katriňák: Algebra a teoretická aritmetika (2), Alfa, Bratislava, 1986.
G. Birkhoff, S. Mac Lane: Prehľad modernej algebry, Alfa, Bratislava, 1979.
N. T. Hamilton, J. Landin: Set Theory. The Structure of Arithmetic, Dover Publications, Inc., 2018.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 69

A	B	C	D	E	FX
44.93	26.09	14.49	13.04	1.45	0.0

Provides: prof. RNDr. Jozef Doboš, CSc.

Date of last modification: 26.03.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/ ALP/06	**Course name:** Alternative Education

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: 4.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 362

A	B	C	D	E	FX
67.68	25.14	4.14	0.55	0.28	2.21

Provides: Mgr. Zuzana Vagaská, PhD.

Date of last modification: 12.03.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/EP/22	**Course name:** Applied Electronics

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: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
For successful take part of the subject, the student must demonstrate understanding of physical phenomena which are necessary for description of selected classical electronic elements and systems together with their technological implementation. The analysis of the properties and functions of these elements, electronic circuits, information transmission and processing systems are required. Student needs to become familiar with basic elements and components in Nanoelectronics, explain the methods of their production and principles of operation. This knowledge is needed for understanding basic concepts of modern electronics and its applications. The student must acquire the content of the subject during the semester and acquired knowledge can be active and creatively used in understanding the electronic circuits. Condition to obtain credits is the completion of the final test. Credit assessment of the subject takes into account the following student burden: participation in exercises (1 credit) and elaboration of protocols (1 credits). The minimum boundary for completing the subject is to obtain at least 50% of the total point evaluation, using the following evaluation scale: A (90-100%), B (80-89%), C (70-79%), D (60- 69%), E (50-59%), F (0-49%).

Learning outcomes:
Student will have sufficient physical knowledge to allow solutions and analysis of electronic circuits after completing the practice. At the same time, they will have an overview of modern electronic technologies on the nano-level scale.

Brief outline of the course:
1. Introduction to electronics: Basic components of electronic circuits, basic electrical laws 2. Passive components, basic properties of semiconductors 3. Semiconductors without PN junction, components with PN junction 4. Semiconductors with PN junction 5. Transistor phenomenon, transistor 6. Electronic circuit with transistor 7. Operational amplifiers 8. Sources and generators 9. Two-value logic algebra, combinational logic circuits 10. Digital memory circuits 11. Sequential logic circuits 12. Digital-analog converters, analog-digital converters

Recommended literature:
1. Brown P.B., Frantz G.N., Moraff H.: Electronics for the Modern Scientist. Elsevier, 1982.
2. Delaney C.F.G.: Electronics for the Physicist with Aplications. John Willey & Sons, 1980.

3. Wolt E. L.: Quantum Nanoelectronics, An introduction to electronic nanotechnology and quantum computing, Wiley-VCh, 2009

Course language:
1.Slovak 2. English

Notes:

Course assessment
Total number of assessed students: 24

A	B	C	D	E	FX
79.17	20.83	0.0	0.0	0.0	0.0

Provides: RNDr. Vladimír Tkáč, PhD.

Date of last modification: 12.05.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ BKP1/22	**Course name:** Bachelor 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: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
Submission of the bachelor project structure based on the assignments of the supervisor and acceptance of its content by the supervisor.

Learning outcomes:
The design of the bachelor's project structure for the elaboration of a bachelor's thesis, in which the student demonstrates that he is able to define, update the topic and structure of the bachelor's project, can study, process and correctly cite selected bibiographic resources, has an idea of formal and graphic aspects of the thesis.

Brief outline of the course:
The bachelor project is focused on a selected area of physics. Based on the goals of the bachelor's project, the student implements the first (preparatory phase) of the bachelor's thesis based on the following activities: clearly defines the topic, studies and updates bibiographic resources, creates a project structure in which formulates the working hypothesis, problem solving methods, works on the specified problem, prepares citations of bibliographic resources

Recommended literature:
1. Resources (literature, papers) based on the project assignments.
2. Regulations No. 1/2011 about final works (thesis for University of P.J. Safarik.

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 12

abs	n
100.0	0.0

Provides: doc. RNDr. Zuzana Ješková, PhD.

Date of last modification: 31.01.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ BKP2/14	**Course name:** Bachelor 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: 4

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities:

Conditions for course completion:
FInalization and submission of the bachelor project based on the assignments of the supervisor and acceptance of its content by the supervisor.

Learning outcomes:
Finished bachelor project prepared as a design of a bachelor thesis, as an evidence that student is able to process konwledge available in different resources, citate correctly and keep the layout correctly, prepare a presentation and share the results in front of experts.

Brief outline of the course:
Using the created structure and partial work on the bachelor project, the student implements the second (finalization) phase of elaboration of the bachelor thesis based on the following activities: finalizes the project into a thesis in required formal and technical forms with correct citations of bibliographic references, implements the principles of presentation and reporting the work and its results.

Recommended literature:
1. Resources (literature, papers) based on the project assignments.
2. Regulations No. 1/2011 about final works (thesis for University of P.J. Safarik.

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 16

abs	n
100.0	0.0

Provides: doc. RNDr. Zuzana Ješková, PhD.

Date of last modification: 31.01.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/BSSM/22	**Course name:** Bachelor State Exam Physics

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: I.

Prerequisities:

Conditions for course completion:
Answering questions concerning selected fields of the subjects of Bachelor state exam.

Learning outcomes:
Student has basic knowledge and overview of knowledge in the fields stated by the Bachelor state exam in line with the graduate profile.

Brief outline of the course:
Exam in the field of knowledge in physics consisting of an overview of the following fields:
- Mechanics and molecular physics
- Electricity and magnetism
- Oscillations and waves, optics
- Nuclear physics
- General biophysics
- Theoretical mechanics
- Theory of electromagnetic field
- Statistical physics

Recommended literature:

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 12

A	B	C	D	E	FX
33.33	33.33	8.33	25.0	0.0	0.0

Provides:

Date of last modification: 14.03.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/BPO/14	**Course name:** Bachelor Thesis and its 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: 4

Recommended semester/trimester of the course:

Course level: I.

Prerequisities:

Conditions for course completion:
Required number of credits gained basedon submitting the bachelor thesis.

Learning outcomes:

Brief outline of the course:
Oral presentation of the bachelor's thesis results before the examination committee.
Answering questions from the supervisor and members of the examination committee regarding the topic of the bachelor's thesis.

Recommended literature:

Course language:
Slovak or English

Notes:

Course assessment
Total number of assessed students: 74

A	B	C	D	E	FX
86.49	6.76	4.05	2.7	0.0	0.0

Provides:

Date of last modification: 17.03.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ BKPa/22	**Course name:** Bachelor project I

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

Number of ECTS credits: 1

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
To prepare and present a contribution related to thesis and its topic.

Learning outcomes:
To get students familiar with basic knowledge on the form and content of thesis and thesis presentation as well as with the support for its realisation.

Brief outline of the course:
Necessary elements and formal aspects of a thesis. WYSIWYG editors, LaTeX, drawing programs. Presentation software, Microsoft PowerPoint and its clones, Beamer. Suggestions for presentation and contribution making.

Recommended literature:
electronic information sources

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 134

abs	n
100.0	0.0

Provides: prof. RNDr. Ondrej Hutník, PhD.

Date of last modification: 24.08.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ BKPb/22	**Course name:** Bachelor project 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: 2	
Recommended semester/trimester of the course: 6.	
Course level: I.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 112

abs	n
100.0	0.0

Provides:
Date of last modification: 24.08.2022
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ BPO/14	**Course name:** Bachelor thesis and its 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: 4	
Recommended semester/trimester of the course:	
Course level: I.	
Prerequisities:	
Conditions for course completion: The bachelor thesis is the result of the student's own work. It must not show elements of academic fraud and must meet the criteria of good research practice defined in the Rector's Decision no. 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Šafárik University in Košice and its components. Fulfillment of the criteria is verified mainly in the supervision process and in the process of thesis defense. Failure to do so is reason for disciplinary action.	
Learning outcomes: Evaluation of student‘s competences with respect to the profile of the graduate.The bachelor's thesis demonstrates mastery of the basics of theory and professional terminology of the field of study, acquisition of knowledge, skills and competencies in accordance with the declared profile of the graduate of the study program, as well as the ability to apply them creatively in solving selected field problems. The bachelor thesis may have elements of compilation. The student demonstrates the ability of independent professional work in terms of content, formal and ethical. Further details on the bachelor thesis are determined by Directive no. 1/2011 on the basic requirements of final theses and the Study Regulations of UPJŠ in Košice.	
Brief outline of the course: 1. Elaboration of the bachelor thesis in accordance with the instructions of the supervisor. 2. Presentation of the results of the bachelor's thesis before the examination commission. 3. Answering questions related to the topic of the bachelor thesis within the discussion.	
Recommended literature: The recommended literature is determined individually in accordance with the topic of the bachelor's thesis.	
Course language: Slovak	
Notes:	

Course assessment
Total number of assessed students: 202

A	B	C	D	E	FX
66.83	18.81	8.42	3.47	1.98	0.5

Provides:

Date of last modification: 19.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ BDD/05	**Course name:** Biology of Children and Adolescents

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 0 **Per study period:** 28 / 0
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 4., 6.

Course level: I.

Prerequisities:

Conditions for course completion:
Written test

Learning outcomes:
Acquisition of basic morphological and physiological knowledge about individual organs and systems of the human body with a focus on the specifics of childhood and adolescence. Familiarity with developmental and growth characteristics and with the most common diseases in these stages of ontogenesis.

Brief outline of the course:
Human ontogenesis. Postnatal development. Age specific features of skeletal and muscalar, circulatory, respiratory, gastrointestinal and urinary systems. Reproductive system. Endocrine system. Nervous system. Age specifics of selected diseases and drug dependence arise. Human population and environment.

Recommended literature:
Drobný I., Drobná M.: Biológia dieťaťa pre špeciálnych pedagógov I. a II. Bratislava, PdF UK, 2000
Lipková V.: Somatický a fyziologický vývoj dieťaťa. Osveta Bratislava, 1980
Malá H., Klementa J.: Biológia detí a dorastu. Bratislava, SPN, 1989

Course language:

Notes:

Course assessment
Total number of assessed students: 1795

A	B	C	D	E	FX
31.36	23.96	18.27	16.66	9.14	0.61

Provides: doc. RNDr. Monika Kassayová, CSc.

Date of last modification: 20.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ ZBR/14	**Course name:** Bridge fundamentals

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: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
Active participation on exercises.

Learning outcomes:
A student gets acquainted with fundamentals of the contract bridge, develops his/her logical thinking and consolidates his/her habits of positive social behaviour.

Brief outline of the course:
Bridge rules.
Principles of the bidding system Standard American.
Basic techniques of declarer's play.
Basic techniques of the defence.
Lead conventions, signals.
Common bidding conventions.
Selected advanced techniques of the card play.
Partnership cooperation in the contract bridge.
Bridge ethics.

Recommended literature:
T. Menyhért: Kurz bridžu 2013, http://new.bridgekosice.sk/kurz-bridzu-2013/
R. Pavlicek: Learn To Play Bridge!, http://www.rpbridge.net/1a00.htm
ACBL SAYC System Booklet, http://ebookbrowsee.net/acbl-sayc-pdf-d201415187

Course language:
Slovak or English

Notes:
Minimum number of participants is 4.

Course assessment
Total number of assessed students: 41

abs	n
97.56	2.44

Provides: doc. RNDr. Miroslav Ploščica, CSc., Mgr. Martin Vodička, Dr. rer. nat.
Date of last modification: 08.02.2022
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/KOM/25	**Course name:** Communication

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: 4

Recommended semester/trimester of the course: 3., 5.

Course level: I., P

Prerequisities:

Conditions for course completion:
1. Active participation in teaching (absence allowed max. 90 min.),
2. Implementation of assignments and presentation of assignments focused on the application of knowledge, skills and competence in the field of communication with a particular focus on teacher communication in the school environment.
Detailed information in the electronic bulletin board of the subject in AIS2.

Learning outcomes:
The student will acquire knowledge and information about the basics of verbal and non-verbal communication, communication errors, assertive and non-violent communication. The content of the subject will be enriched with knowledge, skills and competencies necessary for the work of a teacher.
The student is able to apply the acquired communication skills in practice, is able to apply effective principles and principles of communication with others, is able to anticipate and thus prevent possible misunderstandings, which will contribute to the development of his social and professional skills.
The student will acquire the competencies to communicate effectively in work and personal life, especially in the school environment.

Brief outline of the course:
Basics of communication (Transmitter-receiver principle, "What is said is not equal to what is heard", "Internal dialogue", The concept of communication)
Active listening (The most important criteria for active listening)
Misunderstandings (How Misunderstandings Arise, How to Avoid Misunderstandings)
Body language (What is body language, Active / passive body language, Dress psychology)
Signs of Physical Expression, Disadvantages of Fake Physical Expression, Difference Between Active and Passive Body Expression
Personality development (Voices in us, "child in me" - identification of one's own personality)
Basics of assertive and non-violent communication. Specifics of communication in the school environment.

Recommended literature:
ROSENBERG, M. B. 2023. Nenásilná komunikácia. Aktuell. 234 s.

VÝROST, Jozef - SLAMĚNÍK, Ivan. Sociální psychologie. 2., přepr. a rozš. vyd. Praha : GRADA, 2008. 408 s.
VÝROST, Jozef - SLAMĚNÍK, Ivan. Aplikovaná sociální psychologie I : Člověk a sociální instituce. 1. vyd. Praha : Portál, 1998. 384 s. ISBN 80-7178-269-6.
KOMÁRKOVÁ, Růžena - SLAMĚNÍK, Ivan - VÝROST, Jozef. Aplikovaná sociální psychologie III : Sociálněpsychologický výcvik. 1. vyd. Praha : Grada Publishing, 2001. 224 s.
VÝROST, Jozef - SLAMĚNÍK, Ivan. Aplikovaná sociální psychologie II. 1. vyd. Praha : Grada Publishing, 2001. 260 s.

Course language:
slovak

Notes:
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Course assessment
Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: PhDr. Anna Janovská, PhD., PhDr. Mojmír Trebuňák

Date of last modification: 04.02.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PPFM/15	**Course name:** Computer-Based Physical Measurement

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: 4.

Course level: I.

Prerequisities:

Conditions for course completion:
Terms and conditions of assessment during the semester
-participation in laboratory exercises in accordance with study regulations and teacher´s instructions
-active participation at laboratory exercises
-submitting all the laboratory reports in accordance with teacher´s instruction
Final assessment:
-based on assessment during the semester
Conditions for successful completion of the course:
-participation in lessons in accordance with the study regulations and teacher's instructions
-achieving the level higher than 50 % in assessment during the semester and in final assessment

Learning outcomes:
By the end of the course student is able to measure physical quantities, process and analyze data with the help of computer. He is able to interpret results, draw conclusions and elaborate formal report about the gained resuls. He is able to explain the physical principles of conducted laboratory exercises to demostrate his conceptual understanding.

Brief outline of the course:
The content of the course involves labworks in physics aimed at selected problems of General Physics I,II,III.
1. Motion in the Earth´s homogenous gravitational field
2. Bungee jumper
3. Ideal gas behaviour
4.Molar mass of gas
5.Thermal expansion of water
6.Electrical resistance and temperature
7.Ohm´s law for closed electric circuit
8.Bulbs´ behaviour in dc electric circuit
9.Planck constant
10. Transient phenomena in RC ana RL circuit
11.Alternating current electric circuit
12. Forced oscillations and resonance

Recommended literature:
CUMMINGS, Karen, LAWS, Priscilla, REDISH, Edward, COONEY, Patrick: Understanding Physics, John Wiley & Sons, 2004

Course language:
English

Notes:

Course assessment
Total number of assessed students: 51

A	B	C	D	E	FX
70.59	13.73	15.69	0.0	0.0	0.0

Provides: doc. RNDr. Zuzana Ješková, PhD.

Date of last modification: 15.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/ MANAG/25	**Course name:** Conflict Management

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: 4

Recommended semester/trimester of the course: 3., 5.

Course level: I., P

Prerequisities:

Conditions for course completion:
The conditions for passing the course are as follows:
1. Active participation in exercises. Max. the missed range is 90 min.
2. Submission of the reflection on the selected topic within the specified time. Reflection topic: My strengths and weaknesses in conflict management. In a short presentation of their reflection, in the form of deconstruction, students will describe their strengths and weaknesses in the management of conflict situations with a focus on the application of knowledge, skills and competences needed in conflict situations in the work environment and the school environment.
The evaluation of the course and its subsequent completion will be based on clearly and objectively set requirements, which will be set in advance and will not change. The aim of the assessment is to ensure an objective and fair mapping of the student's knowledge while adhering to all ethical and moral standards. There is no tolerance for students' fraudulent behavior, whether in the teaching process or in the assessment process.

Learning outcomes:
Successful mastery and demonstration of knowledge in the field of conflict management and control of basic rules.
The method of teaching the subject will be oriented to the student. Lecturers will be interested in students' needs, expectations and opinions so as to encourage them to think critically by expressing respect and feedback on their opinions and needs.
The content of the curriculum will be based on primary and high-quality sources that will reflect the topicality of the topics so as to ensure the connection of the curriculum with other subjects and also the connection of the curriculum with practice. Students will be expected to take an active approach in lectures and seminars with an emphasis on their independence and responsibility.
The student is able to demonstrate an understanding of an individual's behavior in various conflict situations. The student is able to describe, explain and evaluate their own internal resources, competencies as well as limitations and weaknesses that are directly related to conflict management. The student is able to apply theoretical knowledge and principles of conflict resolution to everyday situations.
After completing the course, students will be able to: a) express and summarize basic knowledge related to conflict management; b) understand the basic rules and dynamics of the origin, course

and termination of the conflict; c) apply knowledge in practice, e.g. in the school environment; d) apply key competencies that increase the possibilities of their application in all areas of practice with a special focus on the work of a teacher. They will acquire knowledge from the theory of conflict management as well as capabilities and competences for solving them, e.g. in the context of school teams.

Brief outline of the course:
Disputes and their causes (Types of disputes, External influences, Be able to reveal the causes of disputes), Dispute origin (Levels of disputes, Escalation warning signals, Escalation removal strategies, Know how to explain escalation stages; How do I approach a dispute?) Dispute Resolution, Dispute Resolution Strategies, Dispute Discussion, Dispute Settlement Initiatives, Knowing how to handle a dispute and how to effectively resolve it), Dispute Resolution (Options, Public Struggle, Covert Struggle, Indefinite Postponement, Agreement, “Fair play ”, compromise, cooperation, capitulation, escape or separation), Prevention (Structures that produce disputes, The meaning and purpose of disputes, Stages and steps of dispute resolution, What does a positive corporate culture mean? Dispute is an incentive for change)

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: Mgr. Ondrej Kalina, PhD., Mgr. Veronika Borgoňová, PhD.

Date of last modification: 04.02.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ DSMa/10	**Course name:** Discrete mathematics I
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: 5	
Recommended semester/trimester of the course: 3.	
Course level: I.	
Prerequisities:	
Conditions for course completion: Examination.	
Learning outcomes: To be familiar with some factual knowledge of combinatorics and graph theory. To understand an appreciate mathematical notions, definitions, and proofs, to solve problems requiring more than just standard recipes, and to express mathematical thoughts precisely and more rigorously.	
Brief outline of the course: Basic principles. Counting and binomial coefficients, Binomial theorem, polynomial theorem. Recurrence: Some miscellaneous problems, Fibonacci-type relations, Using generating functions, miscellaneous methods. The inclusion-exclusion principle. Rook polynomials. Introduction to graphs: The concept of graphs, paths in graphs. Connectivity. Trees, bipartite graphs. Planarity. Polyhedra. Traveling round a graph: Eulerian graphs, Hamiltonian graphs. Partitions and colourings: Vertex colourings of graphs. Edge colourings of graphs	
Recommended literature: 1. I. Anderson, A first course in discrete mathematics, Springer-Verlag London, 2001. 2. J. Matoušek and J. Nešetřil, Invitation to discrete mathematics, Oxford University Press Inc. , New York 1999. 3. S. Jendroľ, P. Mihók: Diskrétna matematika I, UPJŠ Košice 1992.	
Course language: Slovak	
Notes:	

Course assessment
Total number of assessed students: 792

A	B	C	D	E	FX
13.26	13.13	16.54	19.95	30.3	6.82

Provides: doc. RNDr. Roman Soták, PhD., RNDr. Alfréd Onderko, PhD.

Date of last modification: 16.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ DSM2b/22	**Course name:** Discrete mathematics II

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: 4

Recommended semester/trimester of the course: 4., 6.

Course level: I.

Prerequisities: ÚMV/DSMa/10 or ÚMV/DSM3a/10

Conditions for course completion:
In the covered areas of graph theory, the ability to formulate definitions and statements, to present proofs of statements, to explain individual steps in proofs and to solve selected problems related to given topics is required.
During the semester (continuous assessment) two tests take place, from which 50% of points can be obtained, and from the oral exam alike 50% can be obtained. Evaluation: A ... at least 90%, B ... at least 80%, C ... at least 70%, D ... at least 60%, E ... at least 50%, FX ... less than 50% .

Learning outcomes:
Acquired knowledge of basic areas of graph theory, overview of used objects and properties, understanding of important statements and methods, knowledge of possible applications and the ability to formulate and solve problems in this area.

Brief outline of the course:
- (week 1) Introduction to graphs (graph relations, graph operations, special graph classes)
- (week 2-3) Connectivity and distance in graphs (connectedness of vertices, eccentricity, incidence matrix)
- (week 4) (Spanning) Trees (trees isomorphism)
- (week 5-6) Connectivity in graphs (vertex and edge k-connectedness)
- (week (7-8) Independence and coverings (independent set, matching, vertex and edge covering)
- (week 9-10) Extremal graph theory (Ramsey numbers, Turán graphs)
- (week 11-13) Graph colorings (vertex coloring, chromatic polynomial, edge coloring)
- (week 14) Directed graphs (strong/weak connectedness, tounaments, acyclic graphs)

Recommended literature:
1. A. Bondy, U.S.R. Murty, Graph theory, Springer, 2008
2. G. Chartrand, L. Lesniak, P. Zhang, Graphs and digraphs, CRC Press, 2011
3. R. Diestel, Graph Theory, Springer, 2017
4. D. West, Introduction to Graph Theory, Pearson, 2001

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 247

A	B	C	D	E	FX
14.57	11.74	25.1	24.7	18.62	5.26

Provides: RNDr. Igor Fabrici, Dr. rer. nat., RNDr. Alfréd Onderko, PhD.

Date of last modification: 16.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPPaPZ/PUDB/15	**Course name:** Drug Addiction Prevention in University Students

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: 3., 5.

Course level: I.

Prerequisities:

Conditions for course completion:
1st of the evaluation: active participation in the training part (30p). 2nd part of the evaluation: active participation in workshops (20p). In total, students can get 50p and the final evaluation is as follows: 50 - 45: A; 44 - 40: B; 39-35: C; 34-30: D; 29 - 25: E 24 and less: FX. Detailed information in the electronic bulletin board of the course in AIS2. The teaching of the subject will be realized by a combined method.

Learning outcomes:
The student understands the principals of research data based prevention of risk behavior, can describe and explain the determinants of risk behavior as well as protective and risk factors for substance use. Student understands and adequately interprets the theory explaining the background of substance and non-substance addictions.
The student is also able to state and classify the types and forms of prevention, strategies and approaches in prevention, can distinguish effective strategies from ineffective ones.
The student is able to adequately interpret their experience with preventive activities in the group and assume their positive effect as well as limitations and threats.

Brief outline of the course:

Recommended literature:
Orosová, O. a kol. (2012). Základy prevencie užívania drog a problematického používania internetu v školskej praxi. Košice: UPJŠ.
Sloboda, Z., & Bukoski, J. (Eds.). (2006). Handbook of Drug Abuse Prevention: Theory, Science, and Practice. New York: Springer.
National and international scientific journals.

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 663

A	B	C	D	E	FX
79.34	14.93	3.92	1.36	0.15	0.3

Provides: prof. PhDr. Oľga Orosová, CSc., Mgr. Janka Liptáková, PhDr. Anna Janovská, PhD., Mgr. Zuzana Michalove

Date of last modification: 24.06.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚINF/ EDS/15	**Course name:** Educational software
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: 5.	
Course level: I.	
Prerequisities:	
Conditions for course completion: Conditions for ongoing evaluation: 1. Creation of a worksheet for student. 2. Creation of a multimedia educational game. 3. Creation of an interactive educational quiz. 4. Creation of an instructional educational video. Conditions for the final evaluation: Creation and presentation of final project on the use of educational software in education. Conditions for successful completion of the course: Obtaining at least 50% of points for ongoing and final assignments.	
Learning outcomes: Students will receive, resp. deepen their basic skills in working with: a) presentation software, programs for creating and editing images, animations, diagrams, sounds, conceptual maps, b) programs for the creation of didactic tests, questionnaires, surveys, c) simulation and modeling software, d) selected subject-oriented educational programs, Students present and discuss their idea of the use of educational software and educational Internet resources and tools in the selected school subject.	
Brief outline of the course: 1. Overview of educational software and educational web resources and tools. 2. Creating and processing of materials for teaching aid . 3. Creation and use of electronic and interactive educational documents (worksheets, presentations, textbooks and workbooks). 4. Creation of instructional educational video. 5. Electronic voting and questionnaire creation. 6. Creation of didactic tests and educational games. Gamification elements, tools and environments. 7. Collaborative web applications. 8. Online communication tools. 9. Complex online learning environments.	

10. Online educational platforms, repositories, projects and competitions.
11. Simulations and modelling. Subject-focused educational programmes.
12. Use digital tools to plan, monitor, differentiate and personalise learning. Accessibility of digital tools and learning resources.

Recommended literature:

SOLOMON, Gwen and Lynne SCHRUM, 2014. Web 2.0 How-to for Educators. Second. International Society for Technology in Education, 314 p. ISBN 978-1564843517.
STOBAUGH, Rebecca, 2019. Fifty Strategies to Boost Cognitive Engagement: Creating a Thinking Culture in the Classroom (50 Teaching Strategies to Support Cognitive Development). Solution Tree Press, 176 p. ISBN 978-1947604773.
LEMOV, Doug, 2015. Teach Like a Champion 2. 0: 62 Techniques That Put Students on the Path to College [online]. 2nd edition. John Wiley & Sons, Incorporated, 509 p. [cited 2021-7-10]. ISBN 9781118898628. Available from: https://ebookcentral.proquest.com/lib/upjs-ebooks/detail.action?docID=1895720
European Schoolnet: Transforming education in Europe [online]. [cited 2021-7-10]. Available from: http://www.eun.org/home
Science On Stage Europe [online]. Science on Stage Europe e.V. [cited 2021-7-10]. Available from: https://www.science-on-stage.eu/

Course language:
Slovak and partly English due to selected programs and information sources

Notes:
By default, teaching is carried out face to face. If this is not possible (eg due to a pandemic), teaching is provided at a distance through video conferencing programs and LMS.

Course assessment
Total number of assessed students: 106

A	B	C	D	E	FX
76.42	11.32	7.55	0.0	4.72	0.0

Provides: Ing. Zuzana Tkáčová, Ing.Paed.IGIP.

Date of last modification: 16.03.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ ELP1/01	**Course name:** Electonics Practical

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

Number of ECTS credits: 3

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities: ÚFV/ELE1/07 or ÚFV/ELEM1/15

Conditions for course completion:
For successful exam of the subject, the student must demonstrate sufficient understanding of selected problems from electronics. Knowledge of student will be tested by talk during practices. It is necessary to properly process the theoretical preparation of the topic for the preparation of the experiment. Subsequently analyze and interpret experimental results. Condition for obtaining credits is to perform all tasks and passing protocols from measurements. Credit assessment of the subject takes into account the following student burden: performing experimental measurements (1 credit), self-study and theoretical preparation (1 credits) and drafting protocols (1 credits). The minimum boundary for completing the subject is to obtain at least 50% of the total point evaluation, using the following evaluation scale: A (90-100%), B (80-89%), C (70-79%), D (60- 69%), E (50-59%), F (0-49%).

Learning outcomes:
Practical work of students in the design, construction and properties of the measurements of electronic circuits and interpretation of the results obtained to verify and consolidate the theoretical knowledge acquired in lectures on the subject Electronics.

Brief outline of the course:
1. Combinatorial logical circuits.
2.Logical memory circuits.
3. Logical sequence circuits.
4. Rectifiers, filters, stabilizers.
5. Generators of harmonic signals.
6. Operational amplifiers and operational network interfaces.
7. Digital-to-analog converters.
8. Analog-to-digital converters.
9. Reserve.

Recommended literature:
1. Delaney C.F.G.: Electronics for the Physicist with Aplications. John Willey & Sons, New York, 1980.
2. Zbar P.B., Malvino A.P., Miller M.A.: Basic Electronics: a Text-Lab Manual. Macmillan/ McGraw – Hill, New York, 1994.

Course language:
1. Slovak
2. English

Notes:

Course assessment
Total number of assessed students: 43

A	B	C	D	E	FX
90.7	2.33	2.33	4.65	0.0	0.0

Provides: RNDr. Vladimír Tkáč, PhD.

Date of last modification: 20.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ ELEM1/15	**Course name:** Electronics

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: 3

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities: ÚFV/VF1b/03 or ÚFV/VFM1b/15

Conditions for course completion:
Exam

Learning outcomes:
To explain physical principles of classical electronic components and systems and technologies of their realization. To perform analysis of properties and functions of basic electronic elements, electronic circuits and information transmission and processing systems. To introduce student into basic elements and devices in area of nanoelectonics and to explain methods of their fabrication and principles of their functioning.

Brief outline of the course:
1. Introduction to electronics: Basic components of electronic circuits, basic electrical laws
2. Passive components, basic properties of semiconductors
3. Semiconductors without PN junction, components with PN junction
4. Semiconductors with PN junction
5. Transistor phenomenon, transistor
6. Electronic circuit with transistor
7. Operational amplifiers
8. Sources and generators
9. Two-value logic algebra, combinational logic circuits
10. Digital memory circuits
11. Sequential logic circuits
12. Digital-analog converters, analog-digital converters

Recommended literature:
1. Brown P.B., Frantz G.N., Moraff H.: Electronics for the Modern Scientist. Elsevier, 1982.
2. Delaney C.F.G.: Electronics for the Physicist with Aplications. John Willey & Sons, 1980.
3. Wolt E. L.: Quantum Nanoelectronics, An introduction to electronic nanotechnology and quantum computing, Wiley-VCh, 2009

Course language:
Slovak

Notes:

Course assessment Total number of assessed students: 169					
A	B	C	D	E	FX
23.67	24.85	28.4	11.24	5.33	6.51
Provides: RNDr. Vladimír Tkáč, PhD.					
Date of last modification: 02.09.2021					
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: CJP/ PFAJ4/07	**Course name:** English Language of Natural Science

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: 4.

Course level: I.

Prerequisities:

Conditions for course completion:
Active participation in class and completed homework assignments. Students are allowed to miss 2 classes at the most
Continuous assessment:
1 credit test taken presumably in weeks 6/7
1 project (quiz on the topic of the student´s field of study) 25% of the continuous assessment
5 LMS quizzes (25% of the continuous assessment)
In order to be admitted to the final exam, a student has to score at least 65 % from the continuous assessment
The exam test results represent 50% of the final grade for the course, continuous assessment results represent the other 50% of the final grade.
The final grade for the course will be calculated as follows:
A 93-100, B 86-92, C 79-85, D 72-78, E 65-71, FX 64 and less.

Learning outcomes:
Enhancement of students' language skills (speaking, writing, reading and listening comprehension) in English for specific and academic purposes and development of students' linguistic competence. Students obtain knowledge of selected phonological, lexical and syntactic aspects of professional English, improve their pragmatic competence - students can effectively use the language for a given purpose, and acquire presentation skills at B2 level (CEFR) with focus on terminology of natural sciences.

Brief outline of the course:
1. Introduction to studying language
2. Selected aspects of scientific language
3. Talking about academic study
4. Discussing science
5. Defining scientific terminology and concepts
6. Expressing cause and effect
7. Describing structures
8. Explaining processes
9. Comparing objects, structures and concepts

10. Talking about problem and solution
11. Referencing authors
12. Giving examples
13. Visual aids and numbers
14. Referencing time and place
Presentation topics related to students´study fields.

Recommended literature:

lms.upjs.sk - e-kurz Odborný anglický jazyk pre prírodné vedy.
Redman, S.: English Vocabulary in Use, Pre-intermetdiate, Intermediate. Cambridge University Press, 2003.
Armer, T.: Cambridge English for Scientists. CUP, 2011.
Wharton J.: Academic Encounters. The Natural World. CUP, 2009.
P. Fitzgerald : English for ICT studies. Garnet Publishing, 2011.
https://worldservice/learningenglish, https://spectator.sme.sk
www.isllibrary.com
linguahouse.com

Course language:
English, level B2 (CEFR)

Notes:

Course assessment
Total number of assessed students: 3246

A	B	C	D	E	FX
38.63	26.31	16.3	9.52	7.18	2.06

Provides: Mgr. Viktória Mária Slovenská

Date of last modification: 06.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ FRPa/19	**Course name:** Function of real variable

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: 7

Recommended semester/trimester of the course: 1.

Course level: I.

Prerequisities:

Conditions for course completion:
Continuous assessment of student's work during the semester (submission of compulsory homework, writing three tests). Final test and oral discussion on the topics of the subject.

Learning outcomes:
The course provides an introductory knowledge on basic tools of differential and integral calculus of real functions of one real variable, and a development of certain calculation skills in the field.

Brief outline of the course:
1. Basics of mathematical logic and notations (1 week)
2. Real functions - basic notions, operation, graphs and their transformations (2 weeks)
3. Continuity of a real-valued function (1 week)
4. Derivative of a function using the geometric concepts, rules of differentiation (2 weeks)
5. Basic of differential calculus - relations with monotonicity and convexity, extremas, using in optimisation, geometric and physics tasks (2 weeks)
6. Primitive function, methods of their finding (3 weeks)
7. Newton definite integral - methods of its computation, using in geometric and physics tasks (2 weeks)

Recommended literature:
1. Kulcsár, Š. - Kulcsárová, O.: Zbierka úloh z matematickej analýzy I., UPJŠ, 2002.
2. Kulcsár, Š. - Kulcsárová, O.: Zbierka úloh z matematickej analýzy II., UPJŠ, 2003.
3. Hutník, O. - Kulcsár, Š. - Kulcsárová, O. - Mojsej, I.: Zbierka úloh z matematickej analýzy III., UPJŠ, 2011.
4. Demidovič, B. P.: Sbírka úloh a cvičení z matematické analýzy, Fragment, Praha, 2003.
5. Brannan, D.: A First Course in Mathematical Analysis, Cambridge University Press, Cambridge 2006.
6. Bruckner, A. M., Bruckner J. B., Thomson, B. S.: Real Analysis, Second Edition, ClassicalRealAnalysis.com, 2008.
7. Zorich, V. A.: Mathematical Analysis I, Springer-Verlag 2002.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 946

A	B	C	D	E	FX
8.25	8.14	17.12	20.3	29.7	16.49

Provides: prof. RNDr. Ondrej Hutník, PhD., RNDr. Lenka Halčinová, PhD., RNDr. Jana Borzová, PhD., RNDr. Miriam Kleinová, PhD., RNDr. Kristína Hurajová

Date of last modification: 16.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ ZMF2/24	**Course name:** Fundamentals of Mathematics for Physicists 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: 2

Recommended semester/trimester of the course: 2.

Course level: I.

Prerequisities:

Conditions for course completion:
Summary evaluation based on ongoing assessment:
1. Two written tests of knowledge and skills during semester (at least 50% needed)
2. Two group assignments - solving of two sets of problems (at least 50% needed)
3. Active participation during face-to-face learning (3 absences allowed) and during online learning (no absence, all individual ongoing assignments)

Learning outcomes:
The student should deepen and extend the basic ideas, knowledge and skills of mathematical concepts and methods in theoretical physics necessary for the study of theoretical disciplines (Theoretical Mechanics, Electromagnetic Field Theory, Quantum Mechanics and Statistical Physics) in the interdisciplinary study of Physics with another subject.

Brief outline of the course:
01.- 02. Linear algebra and geometry: basic concepts and methods - update (matrices, determinants, systems of equations); curvilinear coordinate systems, transformations of coordinates
03.- 06. Vector and tensor analysis: basic concepts and theorems of vector analysis - update (flow, circulation, divergence, rotation, Gaussian and Stokes' theorem); basic identities of vector analysis, their proofs; tensors - algebraic operations, contractions, invariants; partial differential equations, wave equation
07.- 09. Special functions and distributions: functional series, Taylor and Fourier series; Dirac distribution and its representations; Legendre polynomials and other polynomial systems
10.- 13. Operators: basic concepts and classification (concept, linearity, eigenvalue and eigenfunction, commutativity); eigenfunctions and eigenvalues of linear Hermitian operators; matrix representation of operators, Dirac symbolism

Recommended literature:
1. Kvasnica, J., Mathematical apparatus of Physics [in Czech], Academia, Praha, 1997
2. Shankar, R. Basic Training in Mathematics: A Fitness Program for Science Students, Springer, New York, 1995
3. Martin, B. R., & Shaw, G. Mathematics for Physicists. John Wiley & Sons, 2015
4. Zimmermann et al., Computational Mathematics with SageMath, Creative Commons, 2018

Course language:
Slovak

Notes:
The course builds on the course Fundamentals of Mathematics for Physicists I. The course is mainly aimed at gaining a clear idea of the concepts and their properties and to develop the ability to solve and apply knowledge in tasks related to the physical context using digital technologies (CAS software SageMath) as a discovery and verifying tool.

Course assessment
Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: doc. RNDr. Jozef Hanč, PhD.

Date of last modification: 21.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZMF2/22	**Course name:** Fundamentals of Mathematics for Physicists 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: 2

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities:

Conditions for course completion:
Summary evaluation based on ongoing assessment:
1. Two written tests of knowledge and skills during semester (at least 50% needed)
2. Two group assignments - solving of two sets of problems (at least 50% needed)
3. Active participation during face-to-face learning (3 absences allowed) and during online learning (no absence, all individual ongoing assignments)

Learning outcomes:
The student should deepen and extend the basic ideas, knowledge and skills of mathematical concepts and methods in theoretical physics necessary for the study of theoretical disciplines (Theoretical Mechanics, Electromagnetic Field Theory, Quantum Mechanics and Statistical Physics) in the interdisciplinary study of Physics with another subject.

Brief outline of the course:
01.- 02. Linear algebra and geometry: basic concepts and methods - update (matrices, determinants, systems of equations); curvilinear coordinate systems, transformations of coordinates
03.- 06. Vector and tensor analysis: basic concepts and theorems of vector analysis - update (flow, circulation, divergence, rotation, Gaussian and Stokes' theorem); basic identities of vector analysis, their proofs; tensors - algebraic operations, contractions, invariants; partial differential equations, wave equation
07.- 09. Special functions and distributions: functional series, Taylor and Fourier series; Dirac distribution and its representations; Legendre polynomials and other polynomial systems
10.- 13. Operators: basic concepts and classification (concept, linearity, eigenvalue and eigenfunction, commutativity); eigenfunctions and eigenvalues of linear Hermitian operators; matrix representation of operators, Dirac symbolism

Recommended literature:
1. Kvasnica, J., Mathematical apparatus of Physics [in Czech], Academia, Praha, 1997
2. Shankar, R. Basic Training in Mathematics: A Fitness Program for Science Students, Springer, New York, 1995
3. Martin, B. R., & Shaw, G. Mathematics for Physicists. John Wiley & Sons, 2015
4. Zimmermann et al., Computational Mathematics with SageMath, Creative Commons, 2018

Course language:
Slovak

Notes:
The course builds on the course Fundamentals of Mathematics for Physicists I. The course is mainly aimed at gaining a clear idea of the concepts and their properties and to develop the ability to solve and apply knowledge in tasks related to the physical context using digital technologies (CAS software SageMath) as a discovery and verifying tool.

Course assessment
Total number of assessed students: 22

A	B	C	D	E	FX
40.91	22.73	31.82	0.0	4.55	0.0

Provides: doc. RNDr. Jozef Hanč, PhD.

Date of last modification: 11.05.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZMF/22	**Course name:** Fundamentals of Mathematics for Physicists I

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 1 / 2 **Per study period:** 14 / 28
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 1.

Course level: I.

Prerequisities:

Conditions for course completion:
Summary evaluation based on ongoing assessment:
1. Two written tests of knowledge and skills during semester (at least 50% needed)
2. Two group assignments - solving of two sets of problems (at least 50% needed)
3. Active participation during face-to-face learning (3 absences allowed) and during online learning (no absence, all individual ongoing assignments)

Learning outcomes:
Student should obtain and know to apply basic mathematical concepts and skills
of the vector, differential and integral calculus (single-variable and multi-variable) and ordinary differential equations
required for introductory physics courses: Mechanics &
Molecular Physics and Electricity & Magnetism. At the same time, student should adapt to blended learning in higher education (face-to-face and online) with the help of today's digital technologies.

Brief outline of the course:
01.-02. Introduction to the subject, the concept of a function of single variable and several variables, elementary functions, modeling real processes using functions
03.-04. Concept of ordinary and partial derivative, properties, rules and formulas, interpretation (geometric and physical) and applications of derivatives
05.-06. Concept of vector, directional derivative and gradient of a function of several variables
Vector operations, rules for the directional derivative and the gradient of a function
07.-08. Test of knowledge and skills 1
Concept of integral, properties, rules, interpretation (geometric and physical)
and applications of integrals
09.-10. Concept of differential equation (first and second order), DE solution procedures (separation of variables, variation of constants), application of DEs
11.-12. Test of knowledge and skills 2
Concept and forms of a complex number, arithmetic operations with complex numbers
Concept of a vector function (field), circulation and flux of a vector field
13. Divergence, curle of a vector field, fundamental theorems of vector analysis

Recommended literature:

1. Kvasnica, J., Mathematical apparatus for physics [in Czech], Academia, Praha, 1997
2. Stewart, J., Calculus - Early Transcendentals, Brooks Cole, 8th ed., 2016
3. Hugh-Hallet, D. a kol., Calculus - Single Variable, Multivariable, 7th ed., Wiley, 2017
4. Zeľďovič, J.B., Jaglom, I.M., Higher Math for Beginners (Mostly Physicists and Engineers) [also in Slovak], Mir, Moskva, 1987
5. Zimmermann a kol., Computational Mathematics with SageMath, Creative Commons, 2018
6. Bard, G. V., Sage for Undergraduates. AMS, Providence, 2015
7. Hall, J., & Lingefjärd, T., Mathematical Modeling: Applications with GeoGebra. Wiley, 2016

Course language:
slovak

Notes:
The course does not expect any knowledge of differential and integral calculus or complex numbers from a secondary school. The course is mainly aimed at gaining (1) clear idea and conceptual understanding of the concepts and their properties and (2) developing skills to model, solve and apply knowledge in problems related to the physics context and modelling using digital technologies as a discovery and verfying tool.

Course assessment
Total number of assessed students: 227

A	B	C	D	E	FX
40.97	21.59	18.06	9.69	8.81	0.88

Provides: doc. RNDr. Jozef Hanč, PhD.

Date of last modification: 26.01.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VBFM1/15	**Course name:** General Biophysics I

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: 3

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities:

Conditions for course completion:
Exam.
During an exam, a student should be able to demonstrate his/her knowledge from the parts of Biophysics which are described in the brief outline of the course.

Learning outcomes:
To provide information about the object, significance and role of biophysics in science. The main emphasis will be given on the understanding of the principles determining the structure and function of the most important biological structures (nucleis acids, proteins, biomembranes) as well as on the thermodynamics and kinetics of selected chemical and biophysical processes.

Brief outline of the course:
Week 1
Areas of interest of biophysics and its importance and position in science. Structure of biophysics. Characterization of molecular, cellular, medical, environmental and radiation biophysics. Scientific disciplines related to biophysics. The future of biophysics.
Week 2
Intra-molecular and intermolecular interactions. Covalent bonds. Coulomb (ionic) interactions. Van der Waals forces. Lennard - Jones potential. Hydrogen bonds. The role of hydrogen bonds in biological macromolecules. Hydrophobic interactions. Hydrating forces. Empirical analytical form for the potential energy of intramolecular interactions. Stabilizing non-covalent interactions in biopolymers (proteins, nucleic acids, biological membranes).
Week 3
Thermodynamics in biological systems. Definition of thermodynamics. Thermodynamic system. 1st law of thermodynamics (law of conservation of energy). Internal energy and enthalpy. Heat capacity. Examples of the use of the study of enthalpy change in biological processes. 2nd law of thermodynamics (law of process spontaneity). Entropy. 3rd law of thermodynamics. Gibbs energy. Dependence of Gibbs energy on temperature - Gibbs - Helmoltz equation. Dependence of Gibbs energy on pressure. Chemical potential. Chemical potential in liquids. Equilibrium constant of chemical reaction. Influence of temperature on the equilibrium constant - van‘t Hoff's equation. Calorimetric and van’t Hoff enthalpy of protein and nucleic acid denaturation.
Week 4

Molecular associations. Examples of molecular associations in biological systems. Dissociation and association equilibrium constants. Determination of equilibrium constants of ligand - macromolecule interactions. Langmuir isotherm. Graphical analysis of equilibrium binding data. Multiple independent binding sites. Ligand-macromolecule binding cooperativity. Cooperativity - simultaneous ligand binding, Hill's equation. Cooperativity - gradual binding of ligands. Allosteric interactions.
Week 5
Kinetics of biological and physico-chemical processes. Importance of the study of the kinetics of chemical processes. Rates of chemical reactions. Rate constants and rate law of chemical reactions. Order of chemical reaction. First order chemical reactions. Second order chemical reactions. Consecutive reactions - the rate determining step of the reactions. Reverse chemical reactions. Relaxation processes. Temperature dependence of rate constants - Arrhenius equation. Experimental techniques for determining the rate of chemical reactions.
Week 6
Physical kinetics. Macroscopic diffusion. 1st Fick's law. 2nd Fick's law - diffusion equation. Solutions of the diffusion equation for specific cases. Influence of external forces on diffusion processes. Einstein - Smoluchowski equation. Stokes' law. Kinetics of photophysical and photochemical processes. Jablonski diagram. Quantum yields of photophysical processes. Quenching of the excited state of molecules by external factors. Fluorescence quenching. Stern - Volmer equation. Förster resonant energy transfer.
Week 7
Proteins. Functions and significance of proteins. Chemical structure and properties of amino acids. Peptide bond. Polypeptide chain. Protein structures. Relationship between individual structures. Ramachandra map. Protein solubility. Stability of protein structure. Protein denaturation. Thermal denaturation. Calorimetric and van‘t Hoff enthalpy of denaturation. Chemical denaturation. Molten - globular state of proteins. Protein folding. Levinthal paradox. Physiological consequences of incorrectly folded and aggregated proteins.
Week 8
Nucleic acids. Nucleic acid building blocks (nitrogenous bases, ribose, deoxyribose, phosphoric acid). Chemical structures of nucleotides. Primary and secondary structure of nucleic acids. Polynucleotide strand. Complementarity of bases in DNA. DNA conformations. Circular DNA. RNA structures. Functions of individual RNAs. Forces determining the structure and conformation of nucleic acids. DNA denaturation and renaturation.
Week 9
Biological membranes. Chemical composition of biological membranes. Lipids, cholesterol. Lipid representation in membranes. Membrane proteins. Micelles and liposomes. Structure of biological membranes. Liquid mosaic model. Phase transition in the membrane. Interactions between the lipid and protein part of the biological membrane. Transport of molecules across membranes. Membrane channels. Membrane transporters. Energetics of membrane transport. Nernst potential. Donnan's equilibrium.
Week 10
Biophysical bases of imaging examination methods. Basic principles of bio-imaging. Ultrasound diagnostic methods. Optical imaging methods. Luminescence microscopy. X-ray diagnostic technique. Computed tomography (CT). Principles of magnetic resonance. Magnetic resonance imaging.
Week 11
Biophysical bases of some treatment methods. Photodynamic therapy. Molecular mechanisms of photodynamic action. Biological response to photodynamic action. Photosensitizers. Singlet oxygen. Light sources in photodynamic therapy. Drug transport systems.

Week 12
Radiation and environmental biophysics. Radiobiology. Radiation protection. Effects of physicochemical stimuli on biological organisms (pressure, temperature, humidity). Influence of electromagnetic field on biological systems. Interaction of ionizing and non - ionizing radiation with biological systems.

Recommended literature:

1. R. Glaser. Biophysics (2nd Edition), Springer-Verlach Berlin, 2012.
2. M.B. Jackson. Molecular and Cellular Biophysics, Cambridge University Press, 2006.
3. M. Daune. Molecular biophysics (Structures in motion), Oxford University Press, 2004.
4. J. P. Allen. Biophysical Chemistry, Wiley-Blackwell, 2008.
5. J.A. Tuszynski. Molecelar and Cellular Biophysics, Chapman & Hall/CRC, 2008.
6. D.J. Dowsett, P.A. Kenny and R.E. Johnston. The Physics of Diagnostic Imaging, Hodder Arnold, 2006.
7. P. Nelson. Biological Physics.W.H. Freeman and Company, 2008.
8. G. S. Campbell and J. M. Norman. Introduction to Environmental Biophysics (2nd Edition). Springer Science, 1998.
9. R. Splinter (Ed.). Handbook of Physics in Medicine and Biology. CRC Press, Taylor & Francis Group, 2010.
10. R.K. Hoobbie and B.J. Roth. Intermediate Physics for Medicine and Biology (4th Edition), Springer Science, 2007.

Course language:
English language

Notes:

Course assessment
Total number of assessed students: 12

A	B	C	D	E	FX
16.67	58.33	25.0	0.0	0.0	0.0

Provides: prof. Mgr. Daniel Jancura, PhD.

Date of last modification: 17.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VF1a/12	**Course name:** General Physics I

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

Number of ECTS credits: 7

Recommended semester/trimester of the course: 1.

Course level: I.

Prerequisities:

Conditions for course completion:
Terms and conditions of assessment during the semester
-participation in classes in accordance with study regulations and teacher´s instructions
-active participation at seminars and exercises
-submitting all the assignments in accordance with teacher´s instruction
-tests during the semester
-project group work and its successful presentation and defence
Final assessment:
-final oral examination
Conditions for successful completion of the course:
-participation in lessons in accordance with the study regulations and teacher's instructions
-achieving the level higher than 50 % in assessment during the semester and in final assessment

Learning outcomes:
By the end of the course student masters basic knowledge connected with mechanics, molecular physics and thermodynamics. Student will be able to solve various problems connected with the course content and apply gained knowledge in different situations.

Brief outline of the course:
1. Basic knowledge of the calculus, vector algebra. Standards and units.
2. Mechanics of particle.
3. Gravitational field.
4. Work, power and energy.
5. Mechanics of system of particles.
6. Mechanics of rigid body.
7. Mechanics of elastic body.
8. Mechanics of fluids.
9. Basics of molecular physics. Structure and properties of gases.
10. Basics of thermodynamics.
11. Heat transfer. Thermal expansion.
12. Structure and properties of liquids
13. Changes of state.

Recommended literature:
CUMMINGS, Karen, LAWS, Priscilla, REDISH, Edward, COONEY, Patrick: Understanding Physics, John Wiley & Sons, 2004

Course language:
English

Notes:

Course assessment
Total number of assessed students: 373

A	B	C	D	E	FX
23.32	14.48	21.72	14.75	16.62	9.12

Provides: doc. RNDr. Zuzana Ješková, PhD., RNDr. Katarína Kozelková, PhD.

Date of last modification: 15.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ VF1b/24	**Course name:** General Physics II

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

Number of ECTS credits: 7

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities:

Conditions for course completion:
To successfully complete the course (presence, if necessary distance), the student must demonstrate sufficient understanding of the basic concepts and laws of electromagnetism, so that it is possible to continue the study of general physics III, IV and the discipline of electromagnetic field theory. Knowledge of individual laws of electricity and magnetism and their generalization in the form of Maxwell's equations is required. Knowledge of these laws in nature and in practical use is required. Another requirement is adequate skills in solving the problems of electricity and magnetism.
Credit evaluation takes into account the scope of teaching (4 hours of lectures, 2 hours of numerical exercises, 4 credits), self-study (1 credit), evaluation (2 credits) and the fact that it is a basic subject that is part of the bachelor's state exam.The minimum limit for successful completion of the course is to obtain 50 points from the subsequent point evaluation, while it is necessary to obtain at least 50% of points from each part:
Numerical exercises maximum number of 20 points (usually 2 written tests of 10 points each, the student must obtain at least 5 points from each test)
Oral exam with a maximum of 80 points (answer to three questions, each of which must reach a level of at least 50%).
Rating scale
A 100-91
B 90-81
C 80-71
D 70-61
E 60-50
Fx 49-0

Learning outcomes:
After completing lectures and exercises, the student will have sufficient knowledge of the basics of electricity and magnetism and will be able to solve numerical problems of electromagnetism. He will also gain adequate knowledge about electromagnetic phenomena in nature and the use of electromagnetic phenomena in technical applications.

Brief outline of the course:

1. Week: Electrostatic field in vacuum. Culomb's law. Electric field. Electric dipole. Flux of electric field. Gauss' law.
2. Week: Work of forces in the electrostatic field. Potential. Relationship between electric fiel and electric potential. Potential and its measurement. Capacity of conductor and conductor system. Energy of electrostatic field.
3. Week: Stationary electric field and steady electric current. Ohm's law. Superconductivity. Equation of continuity of electric current. Electrical circuits with steady voltage. Kirchhoff's laws and their application. Work, power, energy and efficiency of the source of electromotive voltage.
4. Week: Electric current in electrolytes, semiconductors, gases and in vacuum. Thermoelectric phenomena and their use.
5. Week: Origin, properties and basic quantities of a stationary magnetic field in vacuum. Biot-Savart law and its application. Magnetic flux density.
6. Week: Interactions of a magnetic field with moving electrically charged particles and with electric currents. Ampere's law. Interaction between current conductors. Definition of ampere as current unit. Lorentz force.
7. Week: Quasi-stationary electric field. Capacitor charging and discharging process (R-C circuit). The phenomenon of electromagnetic induction. Faraday's law. Phenomenon of self-induction and mutual induction, inductance, mutual inductance. Potential of magnetic field.
8. Week: Transient in the R-L circuit. Energy of magnetic field. Energy conservation law. Magnetic dipole. Alternating currents and basic circuits of alternating electric current. RLC circuit
9. Week: Serial and parallel resonance. Multiphase currents. Rotating magnetic field. Formation of multiphase currents. Electric motor. Power of alternating electric current.
10. Week: Electrical phenomena in the material environment. Dielectric polarization, mechanisms. Electric field in dielectric. Interaction of electric charges stored in a dielectric. Gauss' law. Polarization vector and electrical induction vector and their mutual relationship. Linear and nonlinear dielectrics.
11. Week: Magnetic properties of substances. Elementary magnetic field of an atom. Magnetic state of substances. Magnetic polarization. Diamagnetism and paramagnetism. Arranged magnetic structure. Ferromagnets.
12. Week: Unsteady electromagnetic field. Maxwell's equations.

Recommended literature:
T. Matsushita: Electricity and Magnetism, Springer, 2017

Course language:
english

Notes:
Presence form represents a standart form for the course, if a need arises, the course is performed using MS Teams.

Course assessment
Total number of assessed students: 391

A	B	C	D	E	FX
34.78	14.58	16.37	12.28	9.72	12.28

Provides: prof. RNDr. Peter Kollár, DrSc., doc. RNDr. Adriana Zeleňáková, DrSc., doc. RNDr. Erik Čižmár, PhD.

Date of last modification: 21.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ VF1c/24	**Course name:** General Physics III

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

Number of ECTS credits: 7

Recommended semester/trimester of the course: 2.

Course level: I.

Prerequisities: ÚFV/VF1a/12

Conditions for course completion:
Written test (2x) from seminars during the semester.
Oral examination.

Learning outcomes:
The objective is to acquaint the students with the basis of oscilations, waves and optics.

Brief outline of the course:
Undamped oscilations, Mathematical, Physical and Torsional pendulum, Damped oscilations, Fourier transformation, Forced oscilations. Waves, their generation, waves equation.Interference. Huyghens principle. Reflection, difraction. Doppler effect. Waves speed in materials. Acoustics. Geometrical optics. Mirrors, lens. Fotometry.
Light as electromagnetic wave. Dispersion, absorption, interference, difraction, polarization. Photon's theory of light. Law of emision and absorption, Planck's law of radiation. Lasers.

Recommended literature:
1. A. Hlavička et al., Fyzika pro pedagogické fakulty, SPN, 1971
2. R.P. Feynman et al., Feynmanove prednášky z Fyziky I,II,III, ALFA, 1985
3. D. Halliday et al.,Fyzika-Vysokoškolská učebnice obecné fyziky, VUTIUM, 2010
4. J. Fuka, B. Havelka, Optika a atómová fyzika, SPN,1961
5. A. Štrba, Všeobecná Fyzika 3 – Optika, ALFA, 1979

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 41

A	B	C	D	E	FX
29.27	24.39	26.83	14.63	4.88	0.0

Provides: doc. RNDr. Ján Füzer, PhD., RNDr. Samuel Dobák, PhD.

Date of last modification: 21.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VF1d/22	**Course name:** General Physics IV

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: 5

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities: ÚFV/VF1c/10 or ÚFV/VF1c/12 or ÚFV/VF1c/22

Conditions for course completion:
- active participation in lectures and excersises
- submission of solved tasks
- 2x test
- an exam

Credit evaluation of the subject: direct teaching and consultations (2credits), self-study (1credit), practical activities- solved tasks (1redits), evaluation (1credits), a total of 5credits. Minimum limit for completion of the course is to obtain at least 51% of the total evaluation.

Learning outcomes:
The student will get basic information about the structure of the atom, atomic spectra, atomic nucleus and elementary particles. He will become familiar with the basic experimental methods and with the passage of ionizing radiation through the environment, he will gain an overview of the applications of nuclear radiation methods in practice. He will be able to independently solve tasks and problems in the field of atomic and nuclear physics.

Brief outline of the course:
1.-6. week Atomic Physics - A.Kravčáková (P):
Corpuscular-wave dualism: De Broglie waves. Experimental confirmation of de Broglie's hypothesis. Uncertainty principle.
Atom structure: Atomic hypothesis. Rutherford's experiment. Bohr model of the atom.
Hydrogen radiation spectra. Combination principle. Quantum mechanical description of a hydrogen atom.
Electron shell: Spectra of hydrogen type atoms. Experimental verification of the existence of discrete levels of atoms (Franck-Hertz experiment). Angulat momentum of electron motion. Stern-Gerlach experiment. Quantum states of electrons. Atoms with more electrons. Alkali metal spectra. Total angular momentum of an atom. Magnetic momentum of an atom. An atom in an external magnetic and electric field. Zeeman's phenomenon. Selection rules. Pauli's principle. Periodic table of elements. X-ray spectra.
7.-12. week Nuclear Physics - J.Vrláková (P):
Basic characteristics of atomic nuclei: Mass and electric charge. Radius of the atomic nucleus. Binding energy. Spin and magnetic momentum of the nucleus.

Nuclear forces and models of atomic nuclei: Properties of nuclear forces. Meson theory of nuclear forces. Models of atomic nuclei (droplet, layer and generalized model).
Radioactive radiation: Basic laws of radioactive decay. Law of decay. Alpha decay. Beta decay. Processes taking place in the nucleus during beta conversion. Neutrino existence hypothesis. Fermi's theory. Internal conversion. Gamma radiation.
Nuclear reactions: Basic terms and definitions. Classification of nuclear reactions. Conservation laws. Effective cross section. Mechanisms of nuclear reactions. Basic types of reactions. Reactions with neutrons. Fission of atomic nuclei. Thermonuclear reactions.
Week 13 Subnuclear physics - A.Kravčáková (P):
Elementary particles: Basic characteristics of particles. Conservation laws. Types of interactions. Classification of elementary particles. Quark model of hadrons.
Week 14 Experimental methods - A.Kravčáková (P):
Passage of radiation through matter.
Detectors: Basic characteristics of detectors. Gas detectors, Scintillation, Cherenkov and semiconductor detectors. Track detectors.
Particle accelerators: Linear accelerator. Cyclic accelerators. Colliders.

Recommended literature:

1. Beiser A., Úvod do moderní fyziky, Praha, 1975.
2. Úlehla I., Suk M., Trka Z.: Atómy, jádra, částice, Praha, 1990.
3. Síleš E., Martinská G.: Všeobecná fyzika IV, skriptá PF UPJŠ, 2. vydanie, Košice, 1992.
4. Vrláková J., Kravčáková A., Vokál S.: Zbierka príkladov z atómovej a jadrovej fyziky, skriptá PF UPJŠ, Košice, 2016.
5. Kravčáková A., Vokál S., Vrláková J., Všeobecná fyzika IV, 1.časť Atómová fyzika, skriptá PF UPJŠ, Košice, 2020.
6. Yang F., Hamilton J.H., Modern Atomic and Nuclear Physics, WSC Singapore, 2010.

Course language:
slovak and english

Notes:

Course assessment
Total number of assessed students: 131

A	B	C	D	E	FX
41.98	27.48	12.98	7.63	9.92	0.0

Provides: doc. RNDr. Adela Kravčáková, PhD., doc. RNDr. Janka Vrláková, PhD., RNDr. Zuzana Paulínyová, PhD.

Date of last modification: 23.08.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ GEO2a/24	**Course name:** Geometry I

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: 4

Recommended semester/trimester of the course: 2.

Course level: I.

Prerequisities:

Conditions for course completion:
In the covered areas of geometry, the ability to formulate definitions and statements, to present proofs of statements, to explain individual steps in proofs and to solve selected problems related to given topics is required. During the semester (continuous assessment) a test take place, from which 50% of points can be obtained, and from the oral exam the remaining 50% can be obtained. Evaluation: A ... at least 90%, B ... at least 80%, C ... at least 70%, D ... at least 60%, E ... at least 50%, FX ... less than 50%

Learning outcomes:
Acquired knowledge about the axiom system of Euclidean geometry, about the validity of the basic tools of planimetry, about sets of points of a given property, about congruence transformations and homothety in the plane, about important points, lines and circles in triangles and about quadrilaterals and their properties. The ability to use the above knowledges and tools to solve problems on this area. A new look at classical geometric results.

Brief outline of the course:
- (week 1-3) Hilbert's axiom system (axioms, triangle congruence theorems, pairs of congruent or "complementary" angles, basic proportionality theorem, triangle similarity theorems)
- (week 4-5) Basic tools of planimetry (Euclid's theorem, Pythagorean theorem, Thales' theorem, law of cosines, extended law of sines, central and inscribed angle theorem, area of a triangle)
- (week 6) Point sets of the given property (bisectors, equidistants, Apollonius circle)
- (week 7) Transformations (congruence transformations of the plane, homothety in the plane)
- (week 8-11) Points and lines connected with a triangle (Menelaus's theorem, Ceva's theorem, points of interest, the incircle and excircles, pedal triangles, Euler line, nine-point circle, Simson lines)
- (week 12-13) Quadrangles (Varignon's parallelogram, cyclic quadrangles, Ptolemy's theorem, Brahmagupta's formula)

Recommended literature:
1. D. Hilbert, Grundlagen der Geometrie, Teubner, 1968.
2. H.G. Forder, Foundations of Euclidean geometry, Dover Publ., 1958.
3. H.S.M. Coxeter, S.L. Greitzer, Geometry revisited, MAA, 1967.
4. R.A. Johnson, Advanced Euclidean geometry, Dover Publ., 2007.

5. D.A. Brannan, M.F. Esplen, J.J. Gray, Geometry, Cambridge Univ. Press, 2007.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 104

A	B	C	D	E	FX
12.5	9.62	27.88	18.27	23.08	8.65

Provides: RNDr. Igor Fabrici, Dr. rer. nat.

Date of last modification: 29.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ GEO2b/22	**Course name:** Geometry II

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

Number of ECTS credits: 2

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities: ÚMV/GEO2a/24

Conditions for course completion:
Mastering the terminology of stereometry, basic properties of geometric solids, understanding concepts, basic stereometric definitions and theorems.
Understanding and using basic transformation methods for projection of solids,
effective use of suitable methods in the construction of planar cutting bodies, in the construction of the intersection of a line with a solid and in solving metric problems.
The conditions of the continuous assessment are active participation in the exercises, elaboration of home assignments and elaboration of two tests. Evaluation: A ... at least 90%, B ... at least 80%, C ... at least 70%, D ... at least 60%, E ... at least 50%, FX ... less than 50%

Learning outcomes:
An important result of education is the deepening and developing of knowledge of school stereometry and the development of the ability to apply a synthetic approach in deriving and proving relationships in stereometry and in their use in solving problems. The construction of solid images and problem solving will develop analytical thinking and spatial imagination of students.

Brief outline of the course:
- basic properties of geometric solids in space,
- images of solids in parallel projection,
- basic stereometric theorems (relative positions of straight lines, parallelism of a line and a plane, parallelism of two planes, relative position of three planes, perpendicularity of a line and a plane, perpendicularity of two planes),
- positional and metric properties of spatial solids (cuttings of polyhedrons, distances and angles of points, straight lines, planes, intersection of a straight line with a solid, intersection of planes),
- properties of polyhedrons, Euler's theorem, regular polyhedrons (Platonic solids, their number and properties)
- volume and surface area of solids and their parts, Cavalieri's principle
- projection methods (principle of parallel and central projection, axial affinity, use of axial affinity in the construction of cuts of prisms and cylinders, basics of Monge's Projection).

Recommended literature:
1. Pomykalová, E.: Matematika pro gymnázia - Stereometrie. Prometheus, 2009.

2. Šedivý, O., Pavlovičová, G., Rumanová, L., Vallo, D.: Stereometria. Umenie vidieť a predstavovať si priestor. Nitra, 2007.
3. Kuřina, F.: Deset pohledů na geometrii. Praha: MÚ AV ČR, 1996.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 45

A	B	C	D	E	FX
8.89	13.33	26.67	15.56	33.33	2.22

Provides: doc. RNDr. Stanislav Lukáč, PhD.

Date of last modification: 20.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ GEO2c/22	**Course name:** Geometry III

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: 4

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities: ÚMV/ALG2b/22

Conditions for course completion:
Two written tests.
Written and oral examinations
For continuous evaluation - max. 40 points
for the written test - max. 20 points
for oral exams - max. 40 points)
Final score:
A: 100-91 points, B: 90-81, C: 80-71, D: 70-61, E: 60-51, F: less than 51 points
Note: In each of the student needs to have at least 50% max. number of points

Learning outcomes:
Mastering the basics of the theory of linear and quadratic formations in the Affine and Euclidean space, mastering the methods of solving problems in analytical geometry in relation to the secondary school curriculum.

Brief outline of the course:
1. Affine n-dimensional space - definition, linear coordinate system.
2. Subspace and its parametric expression, general equation of superplane, subspace as intersection of superstructures, general equations of subspace
3. Mutual position of subspaces, orientation of affine space, change of coordinate system
4. Arrangement of points on a line, half-spaces
5. Scalar product, external product, vector product of vectors and their basic properties
6. Euclidean space and its subspaces, Cartesian coordinate system
7. Perpendicularity of subspaces, distance of point from subspace, distance of point from superstructure, distance of subspaces,
8. Deviation of two lines, two superstructures, line and superplane, deviation of line and subspace
9. Axis of two extraterrestrial subspaces, Gram determinant, examples in E2 and E3

Recommended literature:
1. M.Sekanina, L.Boček, M.Kočandrle, J.Šedivý: Geometrie 1, SPN Praha 1986
2. M.Hejný, V.Zaťko, P.Kršňák: Geometria 1, SPN Bratislava 1985
3. J.Eliaš, J.Horváth, J.Kajan: Zbierka úloh z vyššej matematiky 1, Alfa Bratislava

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 227

A	B	C	D	E	FX
19.38	23.35	22.03	17.62	10.13	7.49

Provides: doc. RNDr. Roman Soták, PhD., RNDr. Daniela Šabaková, Mgr. Diana Švecová

Date of last modification: 17.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ GEO2d/22	**Course name:** Geometry IV

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 3 / 2 **Per study period:** 42 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 5.

Course level: I., II.

Prerequisities:

Conditions for course completion:
In the covered areas of geometry, the ability to formulate definitions and statements, to present proofs of statements, to explain individual steps in proofs and to solve selected problems related to given topics is required. During the semester (continuous assessment) two tests take place, from which 50% of points can be obtained, and from the oral exam alike 50% can be obtained. Evaluation: A ... at least 90%, B ... at least 80%, C ... at least 70%, D ... at least 60%, E ... at least 50%, FX ... less than 50%

Learning outcomes:
Acquired knowledge of the properties of affine, isometric and similarity transformations, understanding of important statements and methods, knowledge of the use of isometric and similarity transformations in construction and optimization problems and the ability to solve other problems in this area.

Brief outline of the course:
- (week 1-2) Quadric surfaces (circular and general quadric surfaces)
- (week 3-7) Affine transformations (associated transformation, matrix representation, affinities, fixed points and lines, pseudo-reflections)
- (week 8-10) Isometric transformations (matrix representation, isometries, classification in the plane, composiion of reflections)
- (week 11-12) Similarity transformations (matrix representation, similarities, homothety, composition of homotheties)
- (week 13-14) Geometry of circles (the power of a point with respect to a circle, radical axis of two circles, pencils of circles)

Recommended literature:
1. M. Sekanina et al, Geometry 2, SPN, 1988 (in slovak).
2. O. Šedivý et al, Geometry 2, SPN, 1987 (in slovak).
3. H.S.M. Coxeter, Introduction to geometry, Wiley, 1989.
4. J.T. Smith, Methods of geometry, Wiley, 2000.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 216

A	B	C	D	E	FX
15.74	15.28	23.61	20.83	18.52	6.02

Provides: RNDr. Igor Fabrici, Dr. rer. nat., RNDr. Daniela Šabaková

Date of last modification: 14.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/ POŽ/21	**Course name:** Getting to know the Student in Education

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: 4.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 113

A	B	C	D	E	FX
65.49	19.47	7.96	2.65	0.0	4.42

Provides: PaedDr. Michal Novocký, PhD., Mgr. Beáta Sakalová, PhD.

Date of last modification: 12.03.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPE/ INP/17	**Course name:** Inclusive Pedagogy
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: 5.	
Course level: I.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 138

A	B	C	D	E	FX
71.74	21.74	2.9	1.45	2.17	0.0

Provides: PaedDr. Michal Novocký, PhD.
Date of last modification: 14.09.2024
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ IPU/22	**Course name:** Informatics course for teachers of mathematics

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

Number of ECTS credits: 2

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities:

Conditions for course completion:
To master the use of basic algorithmic structures, to gain the ability to write algorithms for the construction of geometric shapes in the environment of turtle geometry. To be able to assess the possibilities of using interactive applications available on the Internet and to design procedures for the application of selected applications in the teaching of mathematics. To learn to use numerical and graphical means of a spreadsheet in data analysis, creating models to solve various mathematical problems.
Evaluation:
Algorithm creation paper - 6 b
Elaboration of dynamic constructions for solving geometric problems - 3 b
Seminar work on the use of interactive applications - 7 b + 3 b
Poll - 1 b
Tasks for creating numerical and graphical models in a spreadsheet - 4 b
Classification scale:
A: 91 % - 100 %,
B: 81 % - 90 %,
C: 71 % - 80 %,
D: 61 % - 70 %,
E: 51 % - 60 %,
FX: 0 % - 50 %.

Learning outcomes:
Knowledge and skills from the basics of working with standard information and communication technologies, which provide a variety of opportunities to support mathematics education. Skills to use basic commands of turtle geometry for generalization and writing algorithms for construction of geometric shapes. To master the basic principles of creating structures in the environment of dynamic geometry. Acquire creative and evaluative skills to plan and prepare a meaningful integration of modern technologies into mathematics education.

Brief outline of the course:
1-5: Use of basic algorithmic constructions in turtle geometry for the construction of geometric shapes,

6th - 7th: Basics of work in the environment of dynamic geometry, creation of dynamic constructions,
8th - 9th: Interactive teaching applications available on the Internet, selected possibilities of using digital technologies in mathematics education.
10. - 12 .: Use of numerical and graphical representations of data and modeling in a spreadsheet environment in solving mathematical problems.

Recommended literature:

Brdička, B.: Role internetu ve vzdělávaní, 2003, http://it.pedf.cuni.cz/~bobr/role/econt.htm.
Lukáč, S. a kol.: IKT vo vyučovaní matematiky, Asociácia projektu Infovek 2002.
Vaníček, J.: Počítačové kognitivní technologie ve výuce geometrie. Pedagogická fakulta Univerzity Karlovy, 2009.
Šťastný, Z.: Matematické a statistické výpočty v Microsoft Excelu, Computer Press 2001.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 136

A	B	C	D	E	FX
52.21	25.0	16.18	5.15	1.47	0.0

Provides: doc. RNDr. Stanislav Lukáč, PhD.

Date of last modification: 17.02.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/ IIŠP/21	**Course name:** Integration and Inclusion in School Practice

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: 3.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 114

A	B	C	D	E	FX
50.0	35.09	8.77	4.39	0.88	0.88

Provides: PaedDr. Michal Novocký, PhD., Mgr. Zuzana Vagaská, PhD.

Date of last modification: 14.09.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ UVF/05	**Course name:** Introduction to General Physics

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: I.

Prerequisities:

Conditions for course completion:
Terms and conditions of assessment during the semester
-participation in classes in accordance with study regulations and teacher´s instructions
-active participation at seminars and exercises
-submitting all the assignments in accordance with teacher´s instruction
-tests during the semester
Final assessment:
-based on assessment during the semester
Conditions for successful completion of the course:
-participation in lessons in accordance with the study regulations and teacher's instructions
-achieving the level higher than 50 % in assessment during the semester and in final assessment

Learning outcomes:
By the end of the course student is able to solve problems connected with mechanics, molecular physics and thermodynamics. In solving problems student is able to apply digital tools for data collection, videomeasurement and computer modelling and data processing and their analysis.

Brief outline of the course:
The course is an auxiliary subject to the course General physics 1 - Mechanics, Molecular Physics and Thermodynamics aimed to development of conceptual understanding and problem solving connected with the following areas:
1. Kinematics and dynamics of motion along a line and two-dimensional motion of particle. Equation of motion.
2. Gravitational field. Projectile motion.
3. Work, power and energy. Law of energy conservation.
4. Rotational motion. Equation of rotational motion.
5. Law of momentum conservation and angular momentum conservation.
6. Deformation. Hook´s law.
7. Fluid mechanics.
8. Gases. Ideal gas laws.
9.Basics of thermodynamics. First law of thermodynamics.
10.Heat and heat exchange.

11. Liquids. Surface tension.
12. Changes of state.

Recommended literature:
CUMMINGS, Karen, LAWS, Priscilla, REDISH, Edward, COONEY, Patrick: Understanding Physics, John Wiley & Sons, 2004

Course language:
English

Notes:

Course assessment
Total number of assessed students: 369

A	B	C	D	E	FX
36.86	20.87	24.39	13.28	4.34	0.27

Provides: doc. RNDr. Zuzana Ješková, PhD., RNDr. Katarína Kozelková, PhD.

Date of last modification: 15.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ UVF2/24	**Course name:** Introduction to General Physics II

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: 3.

Course level: I.

Prerequisities:

Conditions for course completion:
Terms and conditions of assessment during the semester
-participation in classes in accordance with study regulations and teacher´s instructions
-active participation at seminars and exercises
-submitting all the assignments in accordance with teacher´s instruction
-tests during the semester Final assessment:
-based on assessment during the semester
Conditions for successful completion of the course:
-participation in lessons in accordance with the study regulations and teacher's instructions
-achieving the level higher than 50 % in assessment during the semester and in final assessment

Learning outcomes:
By the end of the course student is able to solve problems and explain phemomena and experiments connected with selected areas of Electricity and Magnetism.

Brief outline of the course:
The course is an auxiliary subject to the course General physics 2 - Electricity and Magnetism aimed to development of conceptual understanding and problem solving connected with the following areas:
1. Electric field. Coulomb´s law.
2. Work, electric potential energy, electric potential.
3. Electric capacitance and capacitors.
4. Electric current. Ohm´s law, Kirchhoff´s laws.
5. Work and power. Energy and efficiency of sources of electromotive force
6. Magnetic field.
7. Interaction between magnetic field and electric charge.
8. Transient phenomena in RC circuit.
9. Electromagnetic induction.
10. Transient phenomena in RL circuit.
11. Alternating current circuits.
12. Resonance in series and paralel circuits.

Recommended literature:

Matsushita, Teruo. Electricity and Magnetism, Springer 2017
CUMMINGS, Karen, LAWS, Priscilla, REDISH, Edward, COONEY, Patrick: Understanding Physics, John Wiley & Sons, 2004

Course language:
English

Notes:

Course assessment
Total number of assessed students: 2

A	B	C	D	E	FX
0.0	50.0	0.0	0.0	50.0	0.0

Provides: doc. RNDr. Zuzana Ješková, PhD.

Date of last modification: 21.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ UFMI/07	**Course name:** Introduction to Microworld Physics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities:

Conditions for course completion:
1. Active participation in lectures and excersises
2. Written semester task and its presentation, exam.
Credit evaluation of the subject: direct teaching and consultations (1 credit), self-study (1 credit), practical activities - semester task (1 credit) and evaluation (1 credit). Total 4 credits.
The minimum threshold for completing the course is to obtain at least 51% of the total evaluation, using the following rating scale: A (91-100%), B (81-90%), C (71-80%), D (61-70 %), E (51-60%), F (0-50%).

Learning outcomes:
After completing the course, students will get a qualitative overview of the discoveries and advances in elementary particle physics (PEP) from its beginning to the present. They will become familiar with the latest theories of particle physics and their connections with cosmology. At the same time, they will acquire the ability to independently solve simple problems from the mentioned areas.

Brief outline of the course:
1. Atom and nucleus: Atoms as a composed particles, electron discovery, Thomsons model, natural radioactivity.
2. Discovery of the nucleus, Rutherfords model, Bohrs model of the atom, neutron discovery, the structure of the nucleus.
3. Interactions in nature: gravity, electromagnetic, weak and strong - strenght, range, intermediators.
4. Units in particle physics - length, mass a energy.
5. Latest knowledges about the structure of matter and forces: Nuclear particles - particle "ZOO".
6. Classification of particles, eightfold way, quark model
7. Standart model: strong interaction – quarks, gluons and colour charge.
8. Theory of elektroweak interactions.
9. New discoveries, Grand Unification.
10. Cosmology, particle physics and Big Bang.
11. Experimental methods in Particle Physics: basic principles of acceleration and detection of particles.
12. Experiments on LHC collider.

Recommended literature:

1. M.Veltman: Facts and Mysteries in Elementary Particle Physics, World Scientific Publishing, 2003.
2. F. Close: Particle Physics, A Very Short Introduction, Oxford, 2004.
3. F. Close: The cosmic onion, Quarks and the Nature of the Universe, Heinemann Educational Books, 1990.
4. R. Mackintosh, J. Al-Khalili, B. Jonson, T. Pena: Jádro, Cesta do srdce hmoty, Academia Praha, 2003.
5. S. Brandt: The Harvest of a Century, Oxford, 2009.

Course language:
slovak and english

Notes:

Course assessment
Total number of assessed students: 28

A	B	C	D	E	FX
85.71	10.71	3.57	0.0	0.0	0.0

Provides: doc. RNDr. Adela Kravčáková, PhD., Mgr. Lucia Anna Tarasovičová, Dr. rer. nat.

Date of last modification: 23.08.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: Dek. PF UPJŠ/USPV/13	**Course name:** Introduction to Study of Sciences
Course type, scope and the method: **Course type:** Lecture / Practice **Recommended course-load (hours):** **Per week: Per study period:** 12s / 3d **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course: 1.	
Course level: I.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 2369	

abs	n
90.12	9.88

Provides: doc. RNDr. Marián Kireš, PhD.
Date of last modification: 30.08.2022
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ UAD/10	**Course name:** Introduction to data analysis
Course type, scope and the method: **Course type:** Lecture / Practice **Recommended course-load (hours):** **Per week:** 1 / 1 **Per study period:** 14 / 14 **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course: 5.	
Course level: I.	
Prerequisities:	
Conditions for course completion: Test (40p) and individual project work (20p). Oral presentation of the individual project work (5p). At least 50% must be obtained from each part. Final evaluation: ≥90% A; ≥80% B; ≥70% C; ≥60% D; ≥50% E; <50% FX.	
Learning outcomes: To know the basic purpose of statistical data analysis, its methods and statistical thinking and understand its importance for science and practical life. To understand elementary statistical concepts. To gain experience in handling real data using spreadsheet Excel and statistical software R.	
Brief outline of the course: 1. Introduction (the basic philosophy and aim of statistical data analysis, descriptive and inductive statistics) 2. Collecting Data (types of data, random sample, randomized experiment) 3. Handling Data (visualization, summarizing – measures of center, measures of variability, skewness and kurtosis, empirical rule) - 5 weeks 4. Relationships in data (introduction to regression and correlation) - 4 weeks 5. Statistical inference (elementary view into estimation and testing hypothesis) - 2 weeks	
Recommended literature: 1. Rossman, A.J. et al.: Workshop Statistics: Discovery with Data, 4th ed. Wiley, 2011 2. Utts, J.M.: Seeing Through Statistics, 5th ed., Cengage Learning, 2024 3. Utts, J.M., Heckard R.F.: Mind on Statistics, 6th ed.. Cengage Learning, 2021 4. Anděl, J.: Statistické metody, Matfyzpress, 5. vydanie, Praha, 2019 (in Czech)	
Course language: Slovak	
Notes:	

Course assessment
Total number of assessed students: 520

A	B	C	D	E	FX
38.08	23.08	23.46	10.96	0.96	3.46

Provides: doc. RNDr. Martina Hančová, PhD., RNDr. Andrej Gajdoš, PhD., Mgr. Patrik Štein

Date of last modification: 21.11.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ UDM/22	**Course name:** Introduction to mathematics

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

Number of ECTS credits: 3

Recommended semester/trimester of the course: 1.

Course level: I.

Prerequisities:

Conditions for course completion:
Two tests during the semester.

Learning outcomes:
Repetition of problematic sections of the secondary mathematics by interesting tasks. Explanation of basic terms, properties and proof methods used in various areas of mathematics.

Brief outline of the course:
Simplification of algebraic expressions. Real number, absolute value of real numbers; equations and inequalities. Irrational equations and inequalities. Concept of function. Linear and quadratic function; equations and inequalities. Exponencial and logarithmic function; equations and inequalities. Goniometric functions; equations and inequalities. Complex numbers.

Recommended literature:
1. V. Medek - L. Mišík - T. Šalát: REPETITÓRIUM STREDOŠKOLSKEJ MATEMATIKY, Alfa Bratislava, 1976
2. S. Richtárová - D. Kyselová: MATEMATIKA (pomôcka pre maturantov a uchádzačov o štúdium na vysokých školách), Enigma Nitra, 1998
3. O. Hudec – Z. Kimáková – E. Švidroňová: PRÍKLADY Z MATEMATIKY (pre uchádzačov o štúdium na TU v Košiciach), EF TU Košice, 1999
4. F. Peller – V. Šáner – J. Eliáš – Ľ. Pinda: MATEMATIKA – Podklady na prijímacie testy pre uchádzačov o štúdium, Ekonóm Bratislava, 2000/2001
5. F. Vesajda – F. Talafous: ZBIERKA ÚLOH Z MATEMATIKY pre stredné všeobecnovzdelávacie školy a gymnáziá, SPN Bratislava, 1973
6. J. Lukášová – O. Odvárko – B. Riečan – J. Šedivý – J. Vyšín: ÚLOHY Z MATEMATIKY pre 4. ročník gymnázia, SPN Bratislava, 1976

Course language:
Slovak

Notes:

Course assessment Total number of assessed students: 636					
A	B	C	D	E	FX
24.06	19.97	17.77	15.88	9.59	12.74
Provides: RNDr. Igor Fabrici, Dr. rer. nat., Mgr. Daniela Kovalčíková, Mgr. Enikő Schnürerová					
Date of last modification: 29.01.2022					
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/LCO/10	**Course name:** Linear and integer programming

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: 5

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities: ÚMV/ALGa/10

Conditions for course completion:
Continuous evaluation: a small test during each tutorial, two large tests, a project with real data and commercial software. Bonus points awarded for homeworks (formulation of proofs). A necessary condition for final exam is at least 50% of points from th semester. Final exam: demonstrate the understanding of the theory and ability of argumentation.

Learning outcomes:
Ability to formulate practical tasks in a form of a linear program. Proficiency in solving linear programs by several methods, also using software. Understanding of the underlying theory and ability of exact argumentation.

Brief outline of the course:
Formulation of linear and integer programs. Geometric solution. Simplex method, its correctness an finiteness. Duality and its economic interpretation. Dual and revised simplex method. Sensitivity analysis and parametric programming. Algorithms for integer programming: branch and bound, Gomory cuts. Computational complexity of LP and ILP. Solution of practical problems.

Recommended literature:
lms.upjs.sk - podklady k prednáškam a zadania úloh na cvičenia.
Plesník, Dupačová, Vlach: Lineárne programovanie, Alfa, Bratislava 1990
Ch. Papadimitriou – K. Steiglitz: Combinatorial Optimization: Algorithms and Complexity, 1984
R.J. Vanderbei, Linear Programming:Foundations and Extentions, Springer 2020, electronic version: http://www.princeton.edu/~rvdb/LPbook/

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 177

A	B	C	D	E	FX
21.47	18.08	19.21	20.34	18.08	2.82

Provides: prof. RNDr. Katarína Cechlárová, DrSc., Mgr. Juraj Hirjak
Date of last modification: 17.04.2022
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ MAE/10	**Course name:** Macroeconomics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
The final mark is given based on the results of the tests written during the semester ("small" written exams every week, two written exams checking the ability of computations). The final oral exam evaluates the ability of argumentation about the studied models. The student has to obtain at least 50% of points in the written exams to have the right to take part in the oral exam.

Learning outcomes:
The student understands the basic macroeconomic models and is able to use them to explain the real economic phenomena.

Brief outline of the course:
Basic macroekonomic notions: Gross domestic product, inflation, unemployment.. Analysis of godds markets. Financial markets. IS-LM model in closed economy. Open economy. IS-LM model in open economy. Models of labour market. Inflation and economic growth. High depth.

Recommended literature:
1. Olivier Blanchard, Alessia Amighini, Francesco Giavazzi, Macroeconomics, a European perspective, Pearson Education, 2021
2. N. Gregory Mankiw, Macroeconomics, 7th Edition, Harvard University, Worth Publishers 2009

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 93

A	B	C	D	E	FX
29.03	12.9	20.43	18.28	13.98	5.38

Provides: prof. RNDr. Katarína Cechlárová, DrSc.

Date of last modification: 24.11.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ MAN2c/22	**Course name:** Mathematical analysis III

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: 5

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities: ÚMV/MAN2b/22

Conditions for course completion:
During the term, each student receives marks for two written exams each worth 25 points. Final marking is assigned based on the overall points for the work throughout the term followed by a written and oral examination where the student can obtain further 30+20 points.
Marking classification: A:91%-100%, B:81%-90%, C:71%-80%, D:61%-70%, E:51%-60%, FX:0%-50%

Learning outcomes:
Deepening the knowledge of real analysis of function with a single variable. The student will
1. familiarise themselves with mathematical culture, ways of thinking, self-expression and putting forward arguments,
2. gain a deeper understanding of the base terminology of real analysis, their properties and interconnections,
3. be able to define and interpret key terms, prove their basic properties and relationships,
4. know how to solve tasks focused on utilising the aforementioned concepts and interpret the obtained results.

Brief outline of the course:
Definite Riemann integral - definition, elementary properties, calculation methods, applications. Improper Riemann integral. Sequences and series of real functions – pointwise and uniform convergence, properties of the limit function and the sum. Power series, Taylor series and their applications.

Recommended literature:
1. Mihalíková, B. - Ohriska, J.: Matematická analýza II (skriptum), UPJŠ Košice, 2007.
2. Hutník, O.: Určitý integrál (elektronický učebný text), UPJŠ, Košice, 2012.
3. Kluvánek, I. - Mišík, L. - Švec, M.: Matematika I, ALFA, Bratislava, 1971.
4. Demidovič, B. P.: Sbírka úloh a cvičení z matematické analýzy, Fragment, Praha, 2003.
5. Eliaš, J. - Horváth, J. - Kajan, J.: Zbierka úloh z vyššej matematiky 2, 3, 4, Alfa, Bratislava, 1971.
6. Brannan, D.: A First Course in Mathematical Analysis, Cambridge University Press, Cambridge 2006.

7. Bruckner, A. M. - Bruckner J. B. - Thomson, B. S.: Real Analysis, Second Edition, ClassicalRealAnalysis.com, 2008.
8. Zorich, V. A.: Mathematical Analysis I, Springer-Verlag 2002.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 274

A	B	C	D	E	FX
10.22	15.69	13.87	20.44	33.58	6.2

Provides: prof. RNDr. Ondrej Hutník, PhD., Mgr. Miloslav Cisko

Date of last modification: 25.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ MAN2d/22	**Course name:** Mathematical analysis IV

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: 4

Recommended semester/trimester of the course: 4., 6.

Course level: I.

Prerequisities: ÚMV/MAN2b/22

Conditions for course completion:
Continuous assessment is taken the form of two main tests during the semester. Final evaluation is given by continuous assessment (60%), written and oral part of the exam (40%).

Learning outcomes:
The student understands the basic concepts and their properties, which are defined in the content of the course. He has developed skills to use this theory in solving theoretical and practical problems. The student is able to do connections in solving problem tasks.

Brief outline of the course:
1. Function of several real variables - basic notions, limits and continuity. (3 weeks)
2. Differential calculus of functions of several real variables - partial derivative, differentiability, directional derivative, local and global extrema, constrained local extrema. (5 weeks)
3. Multivariable Riemann integral - definition, calculation methods, applications. (2 weeks)
4. Metric space - Euclidean space, topological properties of points and sets in metric space, completeness (3 weeks)

Recommended literature:
1. J. Kuben a kol: Diferenciální počet funkcí více proměnných, Brno a Ostrava, 2012.
2. L. Kluvánek, I. Mišík, M. Švec: Matematika I, II, SVTL, Bratislava, 1959.
3. P. Vodstrčil, J. Bouchala: Integrální počet funkcí více proměnných, Ostrava a Plzeň, 2012.
4. Z. Došlá, O. Došlý: Metrické prostory, Teorie a príklady. 3.vydání, 2006.
5. J. Eliaš, J. Horváth, J. Kajan: Zbierka úloh z vyššej matematiky 3, 4, SVTL, Bratislava, 1966.
6. D. Hughes-Hallett et al.: Calculus, Wiley, 1998.
7. B. S. Thomson, J. B. Bruckner, A. M. Bruckner: Elementary real analysis, Prentice Hall (Pearson), Lexington, 2008.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 79

A	B	C	D	E	FX
25.32	18.99	22.78	13.92	16.46	2.53

Provides: RNDr. Lenka Halčinová, PhD.

Date of last modification: 17.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ MAN2b/22	**Course name:** Mathematical analysis of function of real variable

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 4 / 3 **Per study period:** 56 / 42
Course method: present

Number of ECTS credits: 7

Recommended semester/trimester of the course: 2.

Course level: I.

Prerequisities: ÚMV/FRPa/19

Conditions for course completion:
Two written tests during semeter and activity student to practice. Final evaluation is given by continuous assessment, written and oral part of the exam.

Learning outcomes:
The purpose of the course is to strengthen the knowledge in differential and integral calculus of real functions of one real variable and to develop computational skills in the field.

Brief outline of the course:
Limit and continuity of real functions, elementary functions. Differential calculus - derivatives of the first and of higher orders, the basic theorems of differential calculus and their use to investigate properties and behavior of functions.

Recommended literature:
1. Mihalíková, B. - Ohriska, J.: Matematická analýza I (elektronický učebný text), UPJŠ Košice, 2012.
2. Mihalíková, B. - Ohriska, J.: Matematická analýza II (skriptum), ES UPJŠ Košice, 2007.
3. Kluvánek, I. - Mišík, L. - Švec, M.: Matematika I, ALFA, Bratislava, 1971.
4. Demidovič, B. P.: Sbírka úloh a cvičení z matematické analýzy, Fragment, Praha, 2003.
5. Brannan, D.: A First Course in Mathematical Analysis, Cambridge University Press, Cambridge 2006.
6. Bruckner, A. M., Bruckner J. B., Thomson, B. S.: Real Analysis, Second Edition, ClassicalRealAnalysis.com, 2008.
7. Zorich, V. A.: Mathematical Analysis I, Springer-Verlag 2002.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 139

A	B	C	D	E	FX
13.67	15.83	17.27	20.14	24.46	8.63

Provides: prof. RNDr. Ondrej Hutník, PhD., RNDr. Lenka Halčinová, PhD., RNDr. Jana Borzová, PhD.

Date of last modification: 17.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/MMD/22	**Course name:** Mathematical modeling

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

Number of ECTS credits: 3

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
Submitting a project from the specified list of projects and, possibly, a related short presentation.

Learning outcomes:
Using concrete examples of problems from real life, students will become familiar with several approaches and strategies for creating a mathematical model of specified problem as well as with defining the conditions related a real problem and transforming them into created mathematical model.

Brief outline of the course:
One specified real-life problem will be discussed, explored and modeled each week.

Recommended literature:
1. E. Lindner, A. Micheletti, C. Nunes (eds.), Mathematical Modelling in Real Life Problems, Springer, 2020.
2. K.K. Tung, Topics in Mathematical Modeling, Princeton University Press, 2007.
3. H. P. Williams, Model Building in Mathematical Programming, Wiley, 2013.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 41

A	B	C	D	E	FX
78.05	17.07	4.88	0.0	0.0	0.0

Provides: RNDr. Jana Borzová, PhD., prof. RNDr. Katarína Cechlárová, DrSc., RNDr. Igor Fabrici, Dr. rer. nat., RNDr. Andrej Gajdoš, PhD., RNDr. Lenka Halčinová, PhD., RNDr. Jaroslav Šupina, PhD., doc. RNDr. Martina Hančová, PhD., Mgr. Martin Vodička, Dr. rer. nat., prof. RNDr. Ondrej Hutník, PhD., prof. RNDr. Ivan Žežula, CSc., RNDr. Lucia Kőszegyová, PhD., doc. Mgr. Jozef Kiseľák, PhD., doc. RNDr. Daniel Klein, PhD., prof. RNDr. Tomáš Madaras, PhD.

Date of last modification: 25.08.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ MRUa/22	**Course name:** Mathematical problem solving strategies I

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: 4.

Course level: I.

Prerequisities:

Conditions for course completion:
Assessment is given on the basis of the results of written examinations carried out during the semester and active participation in exercises.
Classification scale:
A: 91 % - 100 %, B: 81 % - 90 %, C: 71 % - 80 %, D: 61 % - 70 %, E: 51 % - 60 %, FX: 0 % - 50 %.

Learning outcomes:
The student is able to explain the basic concepts and methods of solving mathematical problems selected from various areas of school mathematics. The student is able to apply the acquired knowledge in finding and using various strategies for solving problems. The student will get acquainted with typical and more demanding tasks in school mathematics and with specific problems and misconceptions that occur in their solution in the teaching of mathematics in primary and secondary school.

Brief outline of the course:
1. - 7. Solving equations, inequalities and systems of equations (equations and inequalities with absolute values, equations with parameters, irrational equations and inequalities, exponential and logarithmic equations and inequalities, trigonometric equations and inequalities).
8. - 13. Concept of function, properties of elementary functions, graphs of functions.

Recommended literature:
Kubáček, Z., Černek, P., Žabka J. a kol.: Matematika a svet okolo nás, zbierka úloh. FMFI UK Bratislava, 2008
Kopka, J., Hrozny problémů ve školské matematice, Univerzita J. E. Purkyně, Ústí nad Labem,1999.
Učebnice a zbierky úloh z matematiky ZŠ a SŠ.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 254

A	B	C	D	E	FX
27.95	21.65	22.05	12.2	14.17	1.97

Provides: prof. RNDr. Jozef Doboš, CSc.

Date of last modification: 25.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ MRUb/22	**Course name:** Mathematical problem solving strategies II

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: 6.

Course level: I.

Prerequisities:

Conditions for course completion:
Conditions for continuous evaluation:
1. Participation in teaching in accordance with the study rules and instructions of the teacher.
2. Activity.
3. Homework and written test.
4. Conditions for successful completion of the course:
1. Participation in teaching in accordance with the study regulations and according to the instructions of the teacher;
2. Credits will be awarded to a student who scores at least 50% on homework assignments and at least 50% on written test. A grade of A requires at least 90%, a grade of B requires at least 80%, a grade of C requires at least 70%, a grade of D requires at least 60%, and a grade of E requires at least 50%.

Learning outcomes:
Students demonstrate a shift in different methods of problem-solving from combinatorics, probability and statistics. They will be aware of the connections between different methods of solution, and also the connections of these methods of solution with other topics of school mathematics.
While solving problems on written tests, the students will show that they have a conceptual understanding of the concepts of school combinatorics, probability and statistics. They are ready to use several methods of solving problems from these topics, they are able to consider whether a non-standard student's solution is correct or not, and they can explain this solution.

Brief outline of the course:
The content is focuses on different methods of problem-solving in combinatorics, probability and statistics. We are dealing with developing combinatorial, probabilistic and statistical thinking through different methods of problem-solving. The content of the course is based on current research results in this area. In solving combinatorial problems, students are introduced to the components of the model of combinatorial thinking - the listing of possibilities, the counting process, and combinatorial formulas and methods, and the connections between these components. When solving probability problems, we emphasize the different approaches to probability -

statistical, classical, geometric, and subjective and their connections. In part aimed at statistics, we focus on descriptive statistics and on the connection between probability and statistics.

Recommended literature:
Hecht, T., Sklenáriková, Z., Metódy riešenia matematických úloh, Bratislava, SPN, 1992. (in slovak)
Krantz, S.G., Techniques of Problem Solving, AMS, 1997.
Larson, L.C., Metódy riešenia matematických problémov, Bratislava, Alfa, 1990. (in slovak)
Textbooks for secondary and middle schools.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 139

A	B	C	D	E	FX
35.25	16.55	24.46	12.23	10.07	1.44

Provides: doc. RNDr. Ingrid Semanišinová, PhD.

Date of last modification: 17.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ MST/19	**Course name:** Mathematical statistics

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: 5

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
Total evaluation based on two written tests during the semester (2x40p) and the result of the written (30p) and oral part of the exam (30p).
At least 50% must be obtained from each part.
Final evaluation: ≥90% A; ≥80% B; ≥70% C; ≥60% D; ≥50% E; <50% FX.

Learning outcomes:
Student should obtain the knowledge about basic statistical methods and the ability to apply theoretical knowledge in practical problems solving.

Brief outline of the course:
1. Random vectors (definition, distributions, characteristics, joint and marginal distributions).
2. Covariance, correlation and regression.
3. Random sample, sampling distributions and characteristics.
4. Some important statistics and their distributions.
5. Point estimators and their properties.
6. Maximum likelihood method.
7. Interval estimates, confidence interval construction (2 weeks).
8. Testing of statistical hypothesis (critical region, level of significance and power of test, methods for searching optimal critical regions).
9. Some important parametric tests (2 weeks).
10. Some important nonparametric tests (2 weeks).

Recommended literature:
1. Skřivánková V.: Pravdepodobnosť v príkladoch, UPJŠ, Košice, 2006 (in Slovak)
2. Skřivánková V.-Hančová M.: Štatistika v príkladoch, UPJŠ, Košice, 2005 (in Slovak)
3. Casella, G., Berger, R., Statistical Inference, 2nd ed., Chapman and Hall/CRC, 2024
4. DeGroot, M. H., Schervish, M. J.: Probability and Statistics, 4th ed., Pearson, Boston, 2012
5. Anděl J.: Základy matematické statistiky, MatfyzPress, Praha, 2011 (in Czech)

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 200

A	B	C	D	E	FX
25.5	21.0	16.5	18.5	10.5	8.0

Provides: doc. RNDr. Martina Hančová, PhD.

Date of last modification: 21.11.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/BMM/25	**Course name:** Mathematics

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: I.

Prerequisities: ÚMV/MAN2c/22 and ÚMV/ATC/22 and ÚMV/GEO2d/22

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:

Recommended literature:

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides:

Date of last modification: 21.11.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/ MKŠP/21	**Course name:** Mentoring and Coaching in School Practice

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: 5.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 85

A	B	C	D	E	FX
88.24	9.41	2.35	0.0	0.0	0.0

Provides: Mgr. Zuzana Vagaská, PhD., Mgr. Beáta Sakalová, PhD.

Date of last modification: 18.09.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SDFM1/15	**Course name:** Methods of Data Processing in Physics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:
1. Numerical processes and their errors. Particular properties of computer representation of numerical data. Introduction in Matlab/Octave.
2. Approximation and interpolation of a function. Algebraic multinomials. Newton, Lagrange, Hermit and spline interpolation. Selection of interpolation knots.
3. Numerical methods for calculation of definite integral – rectangular, trapezoidal, Simpson.
4. Numerical differentiation.
5. Numerical solution of ordinary differential equations – Euler's method and modifications, Runge-Kutta method.
6. Approximate solution of non-linear equations. Roots separation, simple iteration and its convergency. Tangent, secant and combined methods.
7. Iterative solution of linear system of algebraic equations, Gauss method.
8. Linear regression. Regression models, least-square criterion.
10. Non-linear regression models.
8. Basics of probability theory and mathematical statistics - systematic and random errors, Gaussian distribution, three-sigma rule, central limit theorem.
11. Computer simulation of real processes - Monte-Carlo method (principles, random quantities, pseudo-random number generators).
12. Simulation of particle transport through solid.

Recommended literature:
1. Buchanan J. L., Turner P. R.: Numerical Methods and Analysis. McGraw-Hill, Inc., New York, 1992.
2. Hrach R.: Počítačová fyzika I,II. Skriptum PF UJEP. Ed. stredisko UJEP, Ústí nad Labem, 2003.
3. Petrovič P., Nadrchal J., Petrovičová J.: Programovanie a spracovanie dát I, II. Edičné stredisko UPJŠ, Košice 1989.
4. Petrovič P.: Fyzika I – Vybrané kapitoly z klasickej fyziky a počítačovej fyziky. Vydavateľstvo equilibria, Košice, 2009.

4. Siegel A. F.: Statistics and Data Analysis. An Introduction. J. Wiley&Sons, NY, 1988.

Course language:
slovak, basics of english

Notes:

Course assessment
Total number of assessed students: 4

A	B	C	D	E	FX
50.0	50.0	0.0	0.0	0.0	0.0

Provides: doc. RNDr. Erik Čižmár, PhD.

Date of last modification: 21.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ MFYU/15	**Course name:** Methods of Physical Problems Solving

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: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
Summary evaluation based on ongoing assessment:
1. Practical ongoing assignments for given topics and their defense (at least 50% needed)
2. Active participation during face-to-face contact learning in classical or virtual classroom (3 absences allowed) and during online learning (no absence, uploading all ongoing assignments)

Learning outcomes:
The student will gain the following knowledge and skills
1. overview of qualitative, quantitative and experimental methods of solving physical problems
2. can model a given physical problem and apply appropriate methods of solution according to the nature of the physical problem
3. can effectively use digital technologies on PC, mobile and tablet in solving physical problems.

Brief outline of the course:
Introduction to the subject
1. Overview of approaches, methods and means, sources of physical problems, competitions
Qualitative approaches in solving
2. Simple thought modeling and Fermi estimates,
3. Dimensional analysis, scaling
4. Application of symmetry and conservation laws
5. Graphic methods
Experiment and digital technologies in solving
6. Animations and simple simulations
(Geogebra, Phet, Workbench, Physlets)
7. Video analysis (Tracker), iconographic modeling (VnR, Coach)
8. Computer-aided, remote and virtual experiments (PC, tablet, mobile)
Quantitative approaches in solving
9. Models in the form of differential equations - computer modeling (Sage, Jupyter)
10. Symbolic and numerical solutions (Sage, Jupyter),
More advanced approaches to solutions
11. Qualitative approach through the theory of dynamical systems
12. Variational approaches (Lagrange, Hamilton)

13. 2D and 3D visualization and verification of solutions using a computer (Sage, Vpython)

Recommended literature:

1. Halliday, D., Resnick, R., Walker, J.: Fyzika 1-5, Akademické nakladatelství, VUTIUM, ISBN: 8021418680, 2007
2. Moore, T. A. Six Ideas that Shaped Physics: Units C, N, R, E, Q, T. 3rd ed., McGraw-Hill, Boston, 2017, http://www.physics.pomona.edu/sixideas/
3. Mahajan, S. The Art of Insight in Science and Engineering: Mastering Complexity. MIT Press, Boston, 2014.
4. Weinstein, L. Guesstimation: Solving Today's Problems on the Back of a Napkin. Princeton University Press Princeton, 2012.
5. Morin, D. Introduction to Classical Mechanics: With Problems and Solutions. Cambridge University Press. 2008
6. current information from web sites related to collections of physics problems and competitions, digital technologies for problem solving

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 13

A	B	C	D	E	FX
84.62	7.69	7.69	0.0	0.0	0.0

Provides: doc. RNDr. Jozef Hanč, PhD.

Date of last modification: 27.01.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ MIE/13	**Course name:** Microeconomics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
Continuous assessment: feedback in MOODLE, small tests during tutorial (notions), two written exams (solving problems). Final oral exam: ability of verbal argumentation and graphical explanation of studied models.

Learning outcomes:
Understanding of basic principles of microeconomics and ability to apply them in practical situations.

Brief outline of the course:
Economics and economy. Supply and demand. Consumer Theory. Theory of firm. Perfect competition. Monopoly. Labour market. Market failure. Externalities and Public goods.

Recommended literature:
1. lms.upjs.sk: lectures, tutorials and other material
2. H.L. Varian, Intermediate Mikroekonomics, WW Norton, 1993
3. J.M. Perloff, Microeconomics, 6th Edtion, Addison Wesley, 2012
4. J. Sloman, Economics, 6th Edition, Prentice Hall, 2006

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 90

A	B	C	D	E	FX
24.44	22.22	18.89	18.89	13.33	2.22

Provides: prof. RNDr. Katarína Cechlárová, DrSc.

Date of last modification: 24.11.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ MTFM/20	**Course name:** Modern Trends in Physics
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: 2	
Recommended semester/trimester of the course: 4.	
Course level: I.	
Prerequisities:	
Conditions for course completion: To successfully complete the course (full-time, if necessary distance), the student must demonstrate a sufficient understanding of the basic concepts and laws of physics, which were focused on lectures, elaboration of semester work on specified topics and successful oral examination and written processing and presentation of one topic, which is in the content of the subject. Credit assessment takes into account the scope of teaching (2 hours of lectures and self-study 2 credits). Rating scale complied with 100-50 failed 49-0	
Learning outcomes: After completing the lectures and exercises, the student will have sufficient knowledge of those parts of physics that have been included in the content of lectures.	
Brief outline of the course: Week 1-3: Selected lectures in theoretical physics and astrophysics Week 4-6: Selected lectures in nuclear physics Weeks 7-9: Selected lectures in biophysics Week 10-12: Selected lectures on condensed matter physics Week 13.-14: Presentation of students' work and discussion.	
Recommended literature: The literature is specified at the beginning of the semester according to selected topics.	
Course language: english	
Notes: Presence form represents a standart form for the course, if a need arises, the course is performed using MS Teams.	

Course assessment Total number of assessed students: 17	
abs	n
100.0	0.0
Provides: prof. RNDr. Peter Kollár, DrSc.	
Date of last modification: 22.11.2021	
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/ MMKV/17	**Course name:** Multiculturalism and Multicultural Education

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: 4.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 251

A	B	C	D	E	FX
40.64	41.43	16.33	0.8	0.4	0.4

Provides: PaedDr. Michal Novocký, PhD.

Date of last modification: 12.03.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ NUM/19	**Course name:** Numerical methods

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 3 **Per study period:** 28 / 42
Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities: (ÚMV/MANb/19 or ÚMV/MAN2b/22 or ÚMV/FRPb/19) and (ÚMV/ALG1b/24 or ÚMV/ALG2b/22 or ÚMV/ALG3b/22 or ÚMV/ALG4b/22)

Conditions for course completion:
Form: Lectures and practices using computers. Solving problems and programming algorithms using the computational platform SageMath (including Python, NumPy, SciPy, SymPy, R, Maxima, matplotlib, GAP, FLINT, and many other packages).
Interim assessment (50% of the total assessment): Solving assigned tasks e.g. in the form of implementation of algorithms or their parts, modification of existing codes or use of available packages in solving real problems.
Final examination (50% of the total assessment): It consists of verifying the understanding of the theory taken over and demonstrating the practical skills acquired.

Learning outcomes:
After completing the course, the student will acquire theoretical knowledge and practical skills regarding the principles and implementation of basic numerical algorithms with emphasis on algorithms used in the field of data analysis.
The student should be able to understand and implement numerical algorithms in programming language independently, to be able to modify components of existing algorithms
and also be able to solve (real) problems by selecting an appropriate numerical method with the available effective computational packages.

Brief outline of the course:
1. Basic principles and techniques of numerical analysis - computer implementation and representation of real numbers, numerical vs. symbolic (analytical) calculations, method vs. algorithm, error measurement of numerical solution, conditionality of numerical problems, stability and convergence of numerical algorithms.
2. Solution of nonlinear equations - methods of bisection and simple iteration, the false position method and Newton method, Newton-Raphson method.
3. Numerical differentiation and integration - trapezoidal method, Simpson method, Newton-Cotes formulas.
4. Approximation of functions and smoothing of data, using polynomials, interpolation, splines, kernel methods.

5. Linear systems - Gaussian elimination with and without pivoting, forward and backward substitution, scaled partial pivoting, singularity and perturbation, matrix conditionality, Thomas method, iterative methods - Jacobi, Gauss-Seidel, SOR method, gradient methods - gradient descent, conjugate directions.
6. Eigenvalues and eigenvectors of matrices - estimation of eigenvalues, partial eigenvalue problem (power method and Rayleigh method, Hessenberg shape), complete eigenvalue problem (calculation of dominant eigenvalue, LU, QU, QR - decomposition, Jacobi method), SVD - Singular Matrix Decomposition.
7. Optimization - MLS, Cauchy method of the highest gradient, Newton method, conjugated gradient method of Fletcher-Reeves, Quasi-Newton methods, Regularization of ill-conditioned problems.

Recommended literature:

1. Ackleh, A. S., Allen, E. J., Kearfott, R. B., & Seshaiyer, P. (2009). Classical and Modern Numerical Analysis: Theory, Methods and Practice (1 edition). Boca Raton: Chapman and Hall/ CRC.
2. Anastassiou, G. A., & Mezei, R. (2015). Numerical Analysis Using Sage. Springer International Publishing.
3. Cheney, E. W., & Kincaid, D. R. (2012). Numerical Mathematics and Computing (7 edition). Boston, MA: Cengage Learning.
4. O'Leary, D. P. (2008). Scientific Computing with Case Studies. Philadelphia: Society for Industrial and Applied Mathematics.
5. Sauer, T. (2017). Numerical Analysis. (3 edition). Hoboken, NJ? Pearson.
6. Segethová, J. (2002). Základy numerické matematiky. Karolinum.
7. M. Vicher (2003). Numerická matematika.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 142

A	B	C	D	E	FX
13.38	16.9	8.45	14.79	34.51	11.97

Provides: doc. Mgr. Jozef Kiseľák, PhD., RNDr. Andrej Gajdoš, PhD.

Date of last modification: 18.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/Pg/15	**Course name:** Pedagogy

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: 2

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 1331

A	B	C	D	E	FX
21.79	30.65	23.44	13.45	8.41	2.25

Provides: PaedDr. Michal Novocký, PhD., doc. PaedDr. Renáta Orosová, PhD.

Date of last modification: 14.09.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ ZFP1a/22	**Course name:** Physics Practical I

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

Number of ECTS credits: 3

Recommended semester/trimester of the course: 2.

Course level: I.

Prerequisities:

Conditions for course completion:
Summary evaluation based on ongoing assessment:
1. Theoretical preparatory assignments (at least 50% of performance)
2. Group realization of experimental laboratory measurements, reporting their results in the protocol forms and their defense (at least 50% needed)
3. Active participation during group work in the classical or virtual laboratory (3 absences allowed) and during online learning (no absence, all individual theoretical assignments and laboratory protocols needed)

Learning outcomes:
Student should obtain and know to apply basic concepts and skills in
1. Designing and realizing classical and virtual physical experiments to improve or supplement new theoretical knowledge connected to introductory physics course: Mechanics &
Molecular Physics.
2. Processing, visualizing, analyzing, evaluating and scientific presenting experimental data according to Guide to the Expression of Uncertainty in Measurement (GUM) and using modern digital technology (computer probes and simulations, Jupyter notebooks, Google spreadsheets).

Brief outline of the course:
01.-02. Introduction, the concept of measurement error and uncertainty,
new SI units, the basic task of the experimenter
03.-04. Processing direct measurements, type A uncertainties, data visualization using digital technologies
05.- 06. Processing indirect measurements, type B uncertainties, uncertainty budget for the experiment, data analysis using digital technologies, temple and contents of laboratory protocols
07.-09. Laboratory tasks:
A. Measuring density of liquids and solids
B. Measuring spherical radius and area
C. Measuring moment of inertia
10. Defense of protocols
11.-13. Laboratory tasks:
D. Measuring dynamic fluid viscosity

E. Measuring state variables of thermal processes in air
F. Measuring thermal capacity of solids
14. Defense of protocols, final evaluation

Recommended literature:

1. RATCLIFFE, C.P. a RATCLIFFE, B., 2015. Doubt-Free Uncertainty In Measurement: An Introduction for Engineers and Students. London: Springer International Publishing. ISBN 978-3-319-12062-1.
2. DEGRO, J., JEŠKOVÁ, Z., ONDEROVÁ, Ľ. a KIREŠ, M., 2006. Základné fyzikálne praktikum I. Košice: Univerzita Pavla Jozefa Šafárika v Košiciach. ISBN 80-7097-649-7.
3. BUFFLER, A. ALLIE, S., LUBBEN F., CAMPBELL R., 2009. Introduction to Measurement in the Physics Laboratory: A probabilistic approach, University of York, York.
4. TAYLOR, J.R., 1997. Introduction To Error Analysis: The Study of Uncertainties in Physical Measurements. Sausalito CA: University Science Books. ISBN 978-0-935702-75-0.

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 37

A	B	C	D	E	FX
45.95	16.22	10.81	13.51	13.51	0.0

Provides: doc. RNDr. Jozef Hanč, PhD.

Date of last modification: 26.01.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZFP1b/24	**Course name:** Physics Practical II

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

Number of ECTS credits: 3

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities: ÚFV/VF1b/24

Conditions for course completion:
To successfully complete the course, the student must measure at least 11 experimental tasks, process and analyze the measured results and evaluate the experimental results in the form of a protocol.
The condition for the implementation of another experimental task is the submission of a protocol from the previous exercise.
The condition for the implementation of the practical task is sufficient theoretical training at home. If the student is not ready for the task in advance, the teacher can send him home and the student must replace the exercise at another time.
The credit evaluation of the course takes into account the following student workload:
1 credit: self-study of recommended literature and subsequent direct teaching
1 credits: realization of experimental exercise and subsequent defense of measuring procedure - it is obligatory to complete all practical tasks in the semester,
1 credit: elaboration and submission of protocols from measurements, which are evaluated.

Learning outcomes:
By completing the course, the student will get acquainted with selected physical experiments in the field of electricity and magnetism and supplement the theoretical knowledge acquired in the course General Physics in a practical way.
The result of education is:
a) Complementing and summarizing knowledge and experimental skills in the field of electricity and magnetism.
b) Gaining practical experience with recording, analysis and interpretation of experimental data from practical measurements.
c) Gaining experience with the presentation of experimental results in the form of a measurement protocol.

Brief outline of the course:
Students on practical exercises are working in pairs experimental tasks in the field of electrical, electromagnetic and magnetic properties of matters.
1. Electrical Resistivity
2. Self - and Mutual Inductance and Capacity

3. Serial and Parallel Resonance
4. Thermal Dependence of Selected Electrical Phenomena in Solids
5. The Characteristics of Semiconductor Diod
6. The Characteristics of Semiconductor Bipolar Transistor
7. Magnetic Hysteresis
8. Hall Constant Measurements
9. Measurements of Horizontal Component of Earth Magnetic Field
10. Measuring characteristics of switching components
11. Measuring the properties of optoelectronic components
12. Electric current in liquids and electrolysis

Recommended literature:

1. Tumanski S, Handbook of magnetic measurements, CRC press, 2011.
2. Fiorillo F, Characterization and Measurement of Magnetic Materials, Elsevier, 2004.

Course language:
english

Notes:
Teaching is carried out in person. If necessary, part of the teaching can be realized remotely using the MS Teams or BBB tool. At the beginning of the semester, the teacher sets the conditions for completing and mastering the course.

Course assessment
Total number of assessed students: 1

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	100.0	0.0

Provides: doc. RNDr. Adriana Zeleňáková, DrSc., doc. RNDr. Ján Füzer, PhD.

Date of last modification: 21.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ZFP1c/24	**Course name:** Physics Practical III

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

Number of ECTS credits: 3

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities: ÚFV/VF1c/24

Conditions for course completion:
Measurements of experimental tasks, their evaluation in the form of a written report, which must be defended. As a part of evaluation there is is also a good theoretical preparation for the measurement of the task.

Learning outcomes:
To gain some physical inside into some of the concepts presented in the lectures. b. To gain some practice in data collection, analysis and interpretation of resumance. c. To gain experience and report writing presentation and results.

Brief outline of the course:
Oscilations. Pendulum. Composition and decomposition of oscillations. Resonance. The speed of sound. Refractive index. Lense's focal length. Interference. Diffraction. Diffraction and reflection of waves. Polarization. The speed of light. Quantum optics.

Recommended literature:
Degro,J., Ješková, Z., Onderová,Ľ., Kireš,M.: Základné fyzikálne praktikum I, PF UPJŠ Košice, 2006
P. Kollár a kol. Základné fyzikálne praktikum II, PF UPJŠ Košice, 2006
J. Brož Základy fysikálních měření, SPN Praha, 1981.

Course language:
slovak, english

Notes:

Course assessment
Total number of assessed students: 1

A	B	C	D	E	FX
0.0	0.0	100.0	0.0	0.0	0.0

Provides: doc. RNDr. Marián Kireš, PhD., doc. RNDr. Ján Füzer, PhD.

Date of last modification: 21.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ ZFP1d/14	**Course name:** Physics Practical IV

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

Number of ECTS credits: 3

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
- a check of the theoretical preparation for measuring the given task
- tests for tasks no. 2 (2x), 4,5,6,8, tests from the theoretical part - basic characteristics of radiation and detectors, each test with a minimum success rate of 51%,
- measurement of tasks, elaboration and submission of protocols of measured tasks
- the overall evaluation is the sum of the evaluations of the individual tasks

Learning outcomes:
The student will acquire knowledge and practical skills about the registration of various types of ionizing radiation and verify the knowledge acquired in the subject General Physics IV - Atomic and Nuclear Physics.

Brief outline of the course:
1. Introduction to measurements.
2. Dosimetry measurements.
3. Statistic distribution of measured quantities.
4. Measurement time scale selection.
5. Absorption of beta rays.
6. Backward scattering of beta rays.
7. Scintillation gamma spectrometer.
8. Emulsion detector.
9. Franck Hertz experiment.
10. Beta - spectroscopy.
11. Energy dependence of the gamma-absorption coefficient.
12. MEDIPIX.
13. Interaction of photons with matter.

Recommended literature:
1. J.Vrláková, S.Vokál: Základné fyzikálne praktikum III, skriptá PF UPJŠ, Košice, 2012, dostupné
na
http://www.upjs.sk/public/media/5596/Zakladne-fyzikalne-praktikum-III.pdf

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 125

A	B	C	D	E	FX
81.6	8.8	4.8	2.4	0.8	1.6

Provides: doc. RNDr. Janka Vrláková, PhD., doc. RNDr. Adela Kravčáková, PhD., RNDr. Dominika Švecová, RNDr. Zuzana Paulínyová, PhD.

Date of last modification: 23.08.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/FDE/15	**Course name:** Physics in Demonstration Experiments

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: 3.

Course level: I.

Prerequisities:

Conditions for course completion:
Seminar work – a project dealing with hands-on experiments and their role in Physics teachig.

Learning outcomes:
The goal of the course is to get better the understanding of basic physical concepts and phenomena through demonstrational physical experiments.

Brief outline of the course:
The course is aimed at the conceptual understanding of basic physical concepts and phenomena with the help of selected demonstrational experiments. The experiments concern the content of the subject Introductory physics and their realization is based on students´ active participation.

Recommended literature:
1. D.Halliday, R.Resnick, J.Walker: Fyzika, VUTIUM, Brno, 2000
2.K.Cummings, P.W.Law, E.F.Redish, P.J.Cooney: Understanding Physics,
John Wiley & Sons, Inc., 2004
3.P.G.Hewitt: Conceptual Physics, tenth edition, Pearson, Addison Wesley, 2006
4.Ľ.Onderová, M.Kireš, Z.Ješková, J.Degro: Praktikum školských pokusov II, PF UPJŠ, 2004

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 59

A	B	C	D	E	FX
81.36	13.56	3.39	1.69	0.0	0.0

Provides: doc. RNDr. Marián Kireš, PhD.

Date of last modification: 15.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/PP/15	**Course name:** Positive Psychology

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: 4., 6.

Course level: I.

Prerequisities:

Conditions for course completion:
Assessment of Study Results:
The evaluation of study results for the course is conducted through continuous assessment. Active participation in seminars (a maximum of 2 absences is allowed) accounts for 20%; a presentation during the exercises on a pre-assigned date accounts for 30%; and the preparation and submission of a group year-long methodological guide on Positive Psychology accounts for 50%.
Final Grading Scale:
A: 100 – 90%
B: 89 – 80%
C: 79 – 70%
D: 69 – 60%
E: 59 – 50%
FX: 49% or less – failed and must revise the assignment where a low score was obtained.cademic information system of the UPJŠ.

Learning outcomes:
Knowledge: Students will gain basic knowledge about the origins, foundations, and applications of Positive Psychology as a new and dynamically developing field of psychology. They will become familiar with research in this area and various perspectives on personal well-being, happiness, and life meaning. They will acquire an overview of the main theoretical approaches in Positive Psychology and their application in the context of individuals and society, with an emphasis on their use in educational settings.
Skills: Students will develop the ability to independently and critically address current topics in Positive Psychology, such as positive emotions, interpersonal relationships, hope, optimism, gratitude, and wisdom. They will learn to apply Positive Psychology principles in designing programs aimed at promoting personal well-being and developing positive traits, which can be utilized in working with children and youth in school environments.
Competencies: After completing the course, students will be able to effectively apply the principles of Positive Psychology in educational contexts, such as fostering positive interpersonal relationships and developing optimism and gratitude in students. They will be prepared to

participate in the creation and implementation of programs focused on personal development and mental well-being, contributing to the creation of a positive and supportive school environment.

Brief outline of the course:

1. Different perspectives on well-being nad happiness in psychology
2. Main theoretical approaches to positive psychology
3. Positive emotions and positivity
4. Meaningfulness
5. Positive interpersonal relations
6. Post-traumatic growth
7. Hope and optimism
8. Gratitude
9. Spirituality as a personality dimension
10. Wisdom
11. Positive institutions
12. New themes and topics in PP

Recommended literature:

Brewer, M. B., & Hewstone, M. (2004). Emotion and motivation. Blackwell.
Deci, E., & Ryan, R. M. (2002). Handbook of self-determination research. Rochester.
Křivohlavý, J. (2003). Pozitivní psychologie. Praha: Portál.
Křivohlavý, J. (2007). Psychologie vděčnosti a nevděčnosti. Praha: Grada.
Křivohlavý, J. (2012). Psychologie moudrosti a dobrého života. Praha: Grada.
Křivohlavý, J. (2013). Psychologie pocitu štěstí. Praha: Grada.
McAdams, D. P. (2002). The person. New York.
Seligman, M. E. P., & Csikszentmihalyi, M. (Eds.). (2000). Positive psychology [Special issue]. American Psychologist, 55(1).
Říčan, P. (2007). Psychologie náboženství a spirituality. Praha: Portál.
Slezáčková, A. (2012). Průvodce pozitivní psychologií. Praha: Grada.
Carr, A. (2022). Positive psychology: The science of wellbeing and human strengths (3rd ed.). Routledge.

Course language:

Notes:

Course assessment

Total number of assessed students: 462

A	B	C	D	E	FX
98.27	1.3	0.22	0.0	0.22	0.0

Provides: doc. Mgr. Gabriel Baník, PhD.

Date of last modification: 04.02.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ TPP2/22	**Course name:** Probability theory

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: 4

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities: ÚMV/MAN2c/22

Conditions for course completion:
To obtain at least 50% in two written tests during the semester.
Total evaluation based on written tests and oral exam.

Learning outcomes:
To obtain knowledge of the axiomatic theory of probability, random variables and their characteristics, special types of distributions and their applications.

Brief outline of the course:
Probability space, definitions and properties of probability.
Conditional probability and independence.
Random variables, their distribution function and characteristics.
Mean, variance and skewness.
Discrete and absolutely continuous distributions.
Quantile and characteristic functions, their properties. Relation between characteristic function and moments. Median and mode.
Transformation of random variables.
Special types of distributions with applications (binomial, Poisson, geometric, uniform, exponential, normal, chi-square, Student, Fisher).
Central limit theorem.

Recommended literature:
1. Skřivánková V.: Pravdepodobnosť v príkladoch, UPJŠ, Košice, 2006 (in Slovak)
2. DeGroot, M. H., Schervish, M. J.: Probability and Statistics, 4th ed., Pearson, Boston, 2012
3. Evans, M. J., Rosenthal, J. S.: Probability and Statistics: The Science of Uncertainty, 2nd Ed., W. H. Freeman, 2009
4. Riečan et al.: Pravdepodobnosť a matematická štatistika, Alfa, Bratislava, 1984 (in Slovak)
5. Potocký a kol.: Zbierka úloh z pravdepodobnosti a matematickej štatistiky, Alfa, Bratislava, 1991

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 138

A	B	C	D	E	FX
26.81	15.22	11.59	10.87	35.51	0.0

Provides: doc. RNDr. Daniel Klein, PhD., RNDr. Andrej Gajdoš, PhD.

Date of last modification: 17.02.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚINF/ PAZ1a/15	**Course name:** Programming, algorithms, and complexity

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 3 / 4 **Per study period:** 42 / 56
Course method: present

Number of ECTS credits: 8

Recommended semester/trimester of the course: 3., 5.

Course level: I.

Prerequisities:

Conditions for course completion:
Graded activities during semester: assignments, small exams, midterm, final project.
Final examination: practical finalterm focused on a complex task.
Rules to pass the subject: Pass the minimal limit of points for category of homeworks (assignments, final project) and tests (small exams, midterm). Get at least 42% from the finalterm and pass the defined limit of total points for all graded activities.

Learning outcomes:
Get an ability to implement basic Java programs and obtain essential knowledge related to object-oriented programming.

Brief outline of the course:
1. Introduction to Java and JPAZ2 framework, first Eclipse project, interactive communication with objects using turtle graphics, repeating code in loops, notion of class, object, and method.
2. For-loops, local variables, variable types, arithmetic expressions, random numbers, random walk, conditions.
3. While-loop, returning a value from a method, reference and reference variables, debugging.
4. Primitive and reference types, chars, String objects (including basic algorithms), mouse events, instance variables.
5. Array of primitive values and array of references, simple array algorithms.
6. Advanced array algorithms, two-dimensional array.
7. Exceptions and exception handling, files and directories, writing to text files.
8. Reading from text files.
9. Creating classes, encapsulation, getters and setters, constructors and their hierarchy, method overloading.
10. Inheritance and polymorphism.
11. Java Collections Framework, ArrayList class, wrapper classes for primitive types and autoboxing, interfaces List, Set, Map and their implementations, methods equals and hashCode.
12. Access modifiers, abstract classes and methods, creating and implementing interfaces, sorting, static methods and variables.
13. Creating and throwing exceptions, checked and runtime exceptions, JavaDoc, Maven.

Recommended literature:

1. ECKEL, Bruce. Thinking in Java. Fourth edition. Upper Saddle River, NJ: Prentice Hall, c[2006]. ISBN 978-01-318-7248-6.
2. PECINOVSKÝ, Rudolf. OOP: naučte se myslet a programovat objektově. Brno: Computer Press, 2010. ISBN 978-80-251-2126-9.
3. SIERRA, Kathy a Bert BATES. Head first Java. Vyd. 2. Sebastopol: O´Reilly, 2005. ISBN 978-05-960-0920-5.

Course language:
Slovak language, english language is required only to read Java API documentation.

Notes:

Course assessment
Total number of assessed students: 961

A	B	C	D	E	FX
16.86	8.64	12.28	18.73	13.94	29.55

Provides: RNDr. Juraj Šebej, PhD., RNDr. Miroslav Opiela, PhD., RNDr. Viktor Pristaš, RNDr. Richard Staňa, Mgr. Viktor Olejár, Mgr. Dominika Kotlárová, doc. RNDr. Ľubomír Šnajder, PhD.

Date of last modification: 04.01.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPPaPZ/Ps/15	**Course name:** Psychology

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: 2

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 978

A	B	C	D	E	FX
40.49	22.39	14.52	11.04	10.02	1.53

Provides: doc. Mgr. Mária Bačíková, PhD., Mgr. Ondrej Kalina, PhD.

Date of last modification: 04.02.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/PKŽ/15	**Course name:** Psychology of Everyday Life

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: 3., 5.

Course level: I.

Prerequisities:

Conditions for course completion:
The evaluation of the course and its subsequent completion will be based on clearly and objectively set requirements, which will be set in advance and will not change. The aim of the assessment is to ensure an objective and fair mapping of the student's knowledge while adhering to all ethical and moral standards. There is no tolerance for students' fraudulent behavior, whether in the teaching process or in the assessment process.
1. Active participation in seminars
2. Elaboration and presentation of PPT presentation on the assigned topic. Maximum number of points 20; minimum number of points 11.
3. Elaboration of an essay in the range of 4xA4 (standard pages). Maximum number of points 20; minimum number of points 11.
The final evaluation (grade) is the sum of points for the presentation and the essay.
A 40b - 37b
B 36b - 33b
C 32b - 29b
D 28b - 25b
E 24b - 21b
FX 20b - 0b

Learning outcomes:
The student is able to demonstrate an understanding of the individual's behavior in selected everyday situations such as conflict, group influence, empathy, helping, aggression, etc.
The student is able to describe, explain and evaluate the psychological mechanisms that occur in everyday situations.
The student is able to apply basic psychological knowledge to himself (self-regulation) but also in interaction with others (cooperation).
The method of teaching the subject will be oriented to the student. Speakers will be interested in the needs, expectations and opinions of students so as to encourage them to think critically by expressing respect and feedback on their opinions and needs.
The content of the curriculum will be based on primary and high-quality sources that will reflect the topicality of the topics so as to ensure the connection of the curriculum with other subjects and also

the connection of the curriculum with practice. Students will be expected to take an active approach in lectures and seminars with an emphasis on their independence and responsibility.

Brief outline of the course:
How to understand human behavior (overview of basic approaches in psychology); Basic overview of cognitive processes; Learning processes and their use in practice; Social influences, prosocial and antisocial behavior; How human emotions and motivations work; Deciding - why and when we take risks; Childhood experiences and their relationship to adulthood; Abnormal behavior, mental disorders and therapeutic approaches

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 253

A	B	C	D	E	FX
46.25	23.32	24.51	4.35	1.19	0.4

Provides: Mgr. Ondrej Kalina, PhD.

Date of last modification: 10.02.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ KVM/15	**Course name:** Quantum Mechanics I.

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 3 / 2 **Per study period:** 42 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
To successfully complete the course, the student must demonstrate sufficient understanding of the basics terms, concepts and applications of quantum physics. Knowledge of basic concepts is required from quantum physics at the level of their mathematical definition as well as their physical content and concrete applications. During the semester, the student must continuously master the content of the curriculum in order to gain the acquired knowledge, which he should actively and creatively use in solving specific tasks during exercises and complete continuous written tests taken into account in the overall evaluation of the subject. The condition for obtaining credits is passing 2 continuous written tests in exercises and an oral exam, which consists of one computational task and theoretical questions. The credit evaluation of the course takes into account the following student workload: direct teaching (2 credits), self-study (1 credit), individual consultations (1 credit) and assessment (1 credit). The minimum threshold for completing the course is to obtain at least 50% of the total score, using the following rating scale: A (90-100%), B (80-89%), C (70-79%), D (60-69%), E (50-59%), F (0-49%).

Learning outcomes:
After completing lectures and exercises, the student will have sufficient physical skills, knowledge and mathematical apparatus enabling independent solution of a wide range of traditional scientific problems in quantum physics. At the same time, he will gain an overview of the applications of quantum physics in various areas of physics such as nuclear physics, condensed matter physics, statistical physics, etc.

Brief outline of the course:
1. Subject of study, experimental and theoretical foundations of quantum mechanics (QM).
2. Wave formulation of QM. Postulate about wave function, superposition principle and postulate about operators.
3. Eigenvalues and eigenfunctions of operators. Measurement of quantities and reduction of wave function.
4. Time-independent and time-dependent Schrödinger equation. Ehrenfest equations and integrals of motion. A continuity equation.
5. Matrix formulation of QM, Dirac symbolism, calculation of mean values and density matrix.
6. Current immeasurability of physical quantities, Heisenberg uncertainty relations.

7. Solution of the Schrödinger equation for a particle in an infinitely deep potential well and a particle in the final potential well. Bound and scattering states.
8. Passage of a particle through a potential barrier: tunneling and barrier reflection.
9. Solution of Schrödinger equation for linear harmonic oscillator.
10. Particle motion in the central potential field, angular part of the Schrödinger equation.
11. Particle motion in the central potential field, radial part of the Schrödinger equation. Hydrogen atom.
12. Electron spin, Pauli matrix. Principle of indistinguishability of identical particles, fermions and bosons. Pauli's exclusion principle.

Recommended literature:

1. Ľ. Tóth, M. Tóthová, Kvantová a štatistická fyzika I, Rektorát Univerzity P. J. Šafárika, 1982. (in Slovak language)
2. Ľ. Skála, Úvod do kvantovej mechaniky, Academia, Praha, 2005. (in Czech language)
3. J. Pišút, L. Gomolčák, Úvod do kvantovej mechaniky, Bratislava 1983. (in Slovak language)
4. W. Greiner, Quantum Mechanics, 4th edition, Springer, Berlin, 2000.
5. A. C. Philips, Introduction to Quantum Mechanics, Wiley, Weinheim, 2003.
6. D. J. Griffiths, Introduction to Quantum Mechanics, Prentice Hall, New Jersey, 1995.
7. G. Auletta, M. Fortunato, G. Parisi, Quantum Mechanics, Cambridge University Press, Cambridge, 2009.

Course language:
EN - english

Notes:

Course assessment
Total number of assessed students: 56

A	B	C	D	E	FX
23.21	23.21	23.21	16.07	7.14	7.14

Provides: doc. RNDr. Jozef Strečka, PhD.

Date of last modification: 19.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/OLŠ/15	**Course name:** School Administration and Legislation

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: 3., 5.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 355

A	B	C	D	E	FX
45.92	31.27	13.24	5.92	3.1	0.56

Provides: PaedDr. Michal Novocký, PhD., Mgr. Beáta Sakalová, PhD.

Date of last modification: 14.09.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KF/ VKFV/07	**Course name:** Selected Topics in Philosophy of Education (General Introduction)
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: 3., 5.	
Course level: I.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 52

A	B	C	D	E	FX
63.46	17.31	17.31	1.92	0.0	0.0

Provides: PhDr. Dušan Hruška, PhD.
Date of last modification: 13.04.2022
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ VEM/22	**Course name:** Selected topics in elementary mathematics

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

Number of ECTS credits: 2

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities: ÚMV/MAN2c/22

Conditions for course completion:
During the term, each student receives marks for two written exams. Final marking is assigned based on the overall points for the work throughout the term, for homework and their presentation. Marking classification: A:91%-100%, B:81%-90%, C:71%-80%, D:61%-70%, E:51%-60%, FX:0%-50%

Learning outcomes:
Obtain knowledge about the structure of elementary mathematics with respect to advanced mathematics; the development of mathematical skills of prospective teachers. The student will
1. familiarise themselves with mathematical culture, ways of thinking, self-expression and putting forward arguments,
2. gain a deeper understanding of the base terminology of real analysis, their properties and interconnections,
3. be able to define and interpret key terms, prove their basic properties and relationships,
4. know how to solve tasks focused on utilising the aforementioned concepts and interpret the obtained results.

Brief outline of the course:
Theory of Equations and Inequalities, Solving Higher Order Polynomials, The Role of CAS systems in Solving Equations and Inequalities,
Building the Real Number System, Rational and Irrational Numbers, Farey Sequences, Review of Geometric Series: Preparation for Decimal Representation, Decimal Expansion, Decimal Periodicity, Building the Complex Numbers, Operating on the Complex Numbers, Picturing Complex Numbers and Connections to Transformation Geometry, The Polar Form of Complex Numbers and De Moivre's Theorem, Some Connections to Roots of Polynomials, Euler's Identity and the Irrationality of e,
Functions and Modeling, Ways of Representing Functions, Solutions of Cubic Equations Using Trigonometry

Recommended literature:
J. Doboš: Rovnice a nerovnice, Bolchazy-Carducci Publ., 2003.
W.W. Esty: The language of mathematics, Montana State University, 2007.
F. Klein: Elementary Mathematics from an Advanced Standpoint, Dower Publications, 1945.

F. Kuřina, Z. Půlpán: Podivuhodný svět elementární matematiky, Academia, Praha, 2006.
P. Vrábel: Heuristika a metodológia matematiky, Nitra, 2005.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 58

A	B	C	D	E	FX
6.9	27.59	13.79	24.14	27.59	0.0

Provides: prof. RNDr. Jozef Doboš, CSc.

Date of last modification: 25.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/SELFM/25	**Course name:** Self-Marketing

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: 4

Recommended semester/trimester of the course: 4., 6.

Course level: I., P

Prerequisities:

Conditions for course completion:
The conditions for passing the subject are as follows: 1. Active participation in exercises. Max. the missed range is 90 min. 2. Submission of the reflection on the selected topic within the specified time. Reflection topic: will be given in the exercise.
The evaluation of the subject and its subsequent completion will be based on clearly and objectively determined requirements, which will be determined in advance and will not change. The aim of the evaluation is to ensure an objective and fair mapping of the student's knowledge while observing all ethical and moral standards. There is no tolerance for fraudulent student behavior in either the teaching or assessment process.

Learning outcomes:
The student is able to understand and explain the basic assumptions of good self-marketing, knows the possibilities for the correct presentation of his own person and understands the related knowledge and principles of personal and communication area. He / she can understand his / her competencies, his / her goals, how to make his / her strengths visible and he / she can apply this knowledge and social and professional skills in the personal and professional sphere of his / her life, which will also improve his / her employment opportunities.

Brief outline of the course:
What is marketing? (Marketing - Mix)
Basics of self-marketing (Personal opinion is crucial, Goal setting, Proper use of opportunity)
Me and my influence (What can I offer? What does he / she have unlike me? How do others see me? Ability to defend one's own opinion, Think positively!, I know how to explore myself - what options do I have?),
Competence (Have your own opinion, How to withstand criticism, Be a team player, Competence at work),
Draw attention to yourself (Voice and word selection, Active in meetings, Present yourself successfully).

Recommended literature:
VÝROST, Jozef - SLAMĚNÍK, Ivan. Sociální psychologie. 2., přepr. a rozš. vyd. Praha : GRADA, 2008. 408 s.

VÝROST, Jozef - SLAMĚNÍK, Ivan. Aplikovaná sociální psychologie I : Člověk a sociální instituce. 1. vyd. Praha : Portál, 1998. 384 s. ISBN 80-7178-269-6.
KOMÁRKOVÁ, Růžena - SLAMĚNÍK, Ivan - VÝROST, Jozef. Aplikovaná sociální psychologie III : Sociálněpsychologický výcvik. 1. vyd. Praha : Grada Publishing, 2001. 224 s.
VÝROST, Jozef - SLAMĚNÍK, Ivan. Aplikovaná sociální psychologie II. 1. vyd. Praha : Grada Publishing, 2001. 260 s.

Course language:
slovak

Notes:
After passing the certification exams from all 4 modules (Teamwork, Selfmarketing, Conflict Management, Communication) the student will receive an ECo-C card and an ECo-C certificate.

Course assessment
Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: Mgr. Ondrej Kalina, PhD., Mgr. Lenka Hudáková, PhD.

Date of last modification: 04.02.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ SMK/17	**Course name:** Seminar to mathematical clubs

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: 6.

Course level: I.

Prerequisities:

Conditions for course completion:
Conditions for continuous evaluation:
1. Participation in teaching in accordance with the study rules and instructions of the teacher.
2. Activity.
3. Homework and written tests.
4. Seminar work and its presentation at the seminar - plan the selected topic for one math circle
Conditions for successful completion of the course:
1. Participation in teaching in accordance with the study regulations and according to the instructions of the teacher;
2. Credits will be awarded to a student who scores at least 50% on homework assignments, at least 50% on written tests, and at least 50% on a seminar work. A grade of A requires at least 90%, a grade of B requires at least 80%, a grade of C requires at least 70%, a grade of D requires at least 60%, and a grade of E requires at least 50%.

Learning outcomes:
While solving homework, the student will become familiar with different types of problems from mathematical competitions and demonstrate the ability to solve them with the mathematical apparatus of the student for whom the problem is intended.
While solving problems in written tests, the student will gain proficiency in solving problems from mathematical competitions such as Pythagorean and Mathematical Kangaroo.
The student will demonstrate in the seminar work that he/she can prepare the content of a mathematics circle that are motivating for his/her students.

Brief outline of the course:
The content is focuses on solving problems from mathematical competitions, and on familiarization with activities that will be motivating and fun for pupils and will develop their mathematical thinking
Students will also learn about the structure of mathematical competitions for middle and high school students and will be theoretically prepared for guiding mathematics circle.
The seminars focus on the following topics:
Number theory.
Equations, inequalities, inequalities.

Word problems.
Planimetry.
Stereometry.
Combinatorics. Dirichlet principle. Combinatorial geometry. Probability.
Mathematical games.

Recommended literature:

Acheson, D.: 1089 a další parádní čísla, Dokořán, 2006. (in czech)
Brožúry z edície Škola mladých matematikov. (in slovak)
Séria brožúr: XY. ročník matematickej olympiády. (in slovak)
Ziegler, G.M.: Matematika Vám to spočítá, Universum, Praha, 2011. (in czech)
Zhouf, J. a kol.: Matematické příběhy z korespondenčních seminářu, Prometheus, Praha, 2006. (in czech)

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 149

A	B	C	D	E	FX
57.05	21.48	11.41	6.71	3.36	0.0

Provides: doc. RNDr. Ingrid Semanišinová, PhD.

Date of last modification: 18.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPO/ SPKVV/15	**Course name:** Social and Political Context of Education

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: 2

Recommended semester/trimester of the course: 4., 6.

Course level: I.

Prerequisities:

Conditions for course completion:
Evaluation of the developed assignment.
A ... 100,00% - 91,00%
B ... 90,99% - 81,00%
C ... 80,99% - 71,00%
D ... 70,99% - 61,00%
E ... 60,99% - 51,00%
FX ... 50,99% and less

Learning outcomes:
The aim and purpose of teaching the subject is to impart knowledge and promote reflection on the issues of education and training in the context of social and political change.
Development of knowledge: the student will be able to know the current theoretical background related to the process of education and training in a modern democratic society.
The student will be able to navigate the social and political space - politically, legally, socially and culturally. He/she will be able to look for alternatives and solutions to dysfunctions, while at the same time exploiting opportunities and ways to implement them.

Brief outline of the course:
The status, role and functions of education in human life and society. The political, social and economic objectives of education. Education, learning and social change in the context of globalisation. Macrosocial determinants of education. Current roles of education and training in modern performance and democratic society.

Recommended literature:
Domestic and foreign journal literature
Kudláčová, B.(2007) Človek a výchova v dejinách európskeho myslenia. Trnava: PdF TU
Zeus Leonardo (2010) Handbook of Cultural Politics and Education. Rotterdam, The Netherlands.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 201

A	B	C	D	E	FX
60.7	20.9	10.95	4.48	1.49	1.49

Provides: Mgr. Ján Ruman, PhD.

Date of last modification: 13.04.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/TRS/03	**Course name:** Special Theory of Relativity

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 5.

Course level: I., II.

Prerequisities: ÚFV/TEP1/03

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 187

A	B	C	D	E	FX
49.73	20.86	15.51	8.02	5.88	0.0

Provides: RNDr. Tomáš Lučivjanský, PhD., univerzitný docent

Date of last modification: 06.03.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ TVa/11	**Course name:** Sports Activities I.

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: I., II., P

Prerequisities:

Conditions for course completion:
Min. 80% of active participation in classes.

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Brief outline of the course:
The Institute of physical education and sport at the Pavol Jozef Šafárik University offers 20 sports activities aerobics; aikido, basketball, badminton, body-balance, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, fitness, indoor football, SM system, step aerobics, table tennis, chess, volleyball, tabata, cycling.
Additionally, the Institute of physical education and sport at the Pavol Jozef Šafárik University offers winter courses (ski course, survival) and summer courses (aerobics by the sea, rafting on the Tisza River) with an attractive programme, sports competitions with national and international participation.

Recommended literature:
BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571
BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252.
JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308.
KAČÁNI, L. 2002. Futbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027.
KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.
LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 15781

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
85.74	0.06	0.0	0.0	0.0	0.04	9.0	5.15

Provides: Mgr. Patrik Berta, Mgr. Agata Dorota Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Ladislav Kručanica, PhD., Mgr. Richard Melichar, Mgr. Petra Tomková, PhD., Mgr. Marcel Čurgali, Mgr. Alena Buková, PhD., univerzitná docentka, doc. PaedDr. Ivan Uher, MPH, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Zuzana Küchelová, PhD., Mgr. Ferdinand Salonna, PhD.

Date of last modification: 07.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ TVb/11	**Course name:** Sports Activities II.

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: 2.

Course level: I., II., P

Prerequisities:

Conditions for course completion:
active participation in classes - min. 80%.

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Brief outline of the course:
The Institute of physical education and sport at the Pavol Jozef Šafárik University offers 20 sports activities aerobics; aikido, basketball, badminton, body-balance, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, fitness, indoor football, SM system, step aerobics, table tennis, chess, volleyball, tabata, cycling.
Additionally, the Institute of physical education and sport at the Pavol Jozef Šafárik University offers winter courses (ski course, survival) and summer courses (aerobics by the sea, rafting on the Tisza River) with an attractive programme, sports competitions with national and international participation.

Recommended literature:
BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571
BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252.
JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308.
KAČÁNI, L. 2002. Futbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027.
KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.
LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 13802

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
83.85	0.49	0.01	0.0	0.0	0.04	11.17	4.43

Provides: Mgr. Agata Dorota Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Marcel Čurgali, Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Mgr. Richard Melichar, Mgr. Petra Tomková, PhD., Mgr. Alena Buková, PhD., univerzitná docentka, doc. PaedDr. Ivan Uher, MPH, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Zuzana Küchelová, PhD., Mgr. Ferdinand Salonna, PhD.

Date of last modification: 07.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ TVc/11	**Course name:** Sports Activities III.

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: 3.

Course level: I., II.

Prerequisities:

Conditions for course completion:
min. 80% of active participation in classes

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Brief outline of the course:
The Institute of physical education and sport at the Pavol Jozef Šafárik University offers 20 sports activities aerobics; aikido, basketball, badminton, body-balance, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, fitness, indoor football, SM system, step aerobics, table tennis, chess, volleyball, tabata, cycling.
Additionally, the Institute of physical education and sport at the Pavol Jozef Šafárik University offers winter courses (ski course, survival) and summer courses (aerobics by the sea, rafting on the Tisza River) with an attractive programme, sports competitions with national and international participation.

Recommended literature:
BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571
BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252.
JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308.
KAČÁNI, L. 2002. Futbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027.
KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.
LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 9334

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
87.96	0.06	0.01	0.0	0.0	0.02	4.92	7.03

Provides: Mgr. Marcel Čurgali, Mgr. Agata Dorota Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Mgr. Richard Melichar, Mgr. Petra Tomková, PhD., Mgr. Alena Buková, PhD., univerzitná docentka, doc. PaedDr. Ivan Uher, MPH, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Zuzana Küchelová, PhD., Mgr. Ferdinand Salonna, PhD.

Date of last modification: 07.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ TVd/11	**Course name:** Sports Activities IV.

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: 4.

Course level: I., II.

Prerequisities:

Conditions for course completion:
min. 80% of active participation in classes

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Brief outline of the course:
The Institute of physical education and sport at the Pavol Jozef Šafárik University offers 20 sports activities aerobics; aikido, basketball, badminton, body-balance, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, fitness, indoor football, SM system, step aerobics, table tennis, chess, volleyball, tabata, cycling.
Additionally, the Institute of physical education and sport at the Pavol Jozef Šafárik University offers winter courses (ski course, survival) and summer courses (aerobics by the sea, rafting on the Tisza River) with an attractive programme, sports competitions with national and international participation.

Recommended literature:
BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571
BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252.
JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308.
KAČÁNI, L. 2002. Futbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027.
KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.
LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 5846

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
82.54	0.27	0.03	0.0	0.0	0.0	8.24	8.91

Provides: Mgr. Marcel Čurgali, Mgr. Agata Dorota Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Mgr. Richard Melichar, Mgr. Petra Tomková, PhD., Mgr. Alena Buková, PhD., univerzitná docentka, doc. PaedDr. Ivan Uher, MPH, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Zuzana Küchelová, PhD., Mgr. Ferdinand Salonna, PhD.

Date of last modification: 07.02.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SVL1/03	**Course name:** Structure and Properties of Solids

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: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
For successful completing of the subject student after taking exam shows adequate knowledge from area of structure and properties of solids, After completing the subject student is able to continue with the lectures from the specialized courses like Magnetism, Low Temperature Physics, Structural analysis, Supercondutors etc. Credits evaluation takes into account taking part at the lectures - 2 credits, study of recommended literature -1 credit, exam - 2 credits. Minimal value to obtain evaluation is reach 50% of each evaluation (test and exam) points. Point ratio exam/test is 70/30. Evaluation scale is: A (90-100%), B (80-89%), C (70-79%), D (60-69%), E (50-59%), F (0-49%)

Learning outcomes:
After completing the lectures and taking the written test, the student will have a deep knowledge which allows her/him to find relationships between structure and physical properties of selected solids. Student is also able to continue with the lectures from the specialized courses like Magnetism, Low Temperature Physics, Structural analysis, Supercondutors etc.metals and also will have the ability to enter into a systematic theoretical and experimental solution of the problems of condenset mater physics.

Brief outline of the course:
Time schedule of the subject contents is updated in electronic board in AiS2 sw. The subject content is focused in the following main topics: Periodic array of atoms. Fundamental type of lattices. Index systems for crystal planes. Simple crystal structure. Symetry and crystal structure. Point and space groups. Crystal binding and elastic constants. Wave diffraction and the reciprocal lattice. X.ray diffractometry. Brag´s law, Laue conditions, scatering of x-rays, Neutrons and neutron scattering, CW - diffractometer, Ewald´s sphere, Diffraction on powder samples, Structure factor, Ocupation factor, Atomic displacement factor. Thermal properties. Phonon heat capacity, thermal conductivity. Free electron Fermi gas. Energy bands. Semiconductor crystals. Superconductivity.

Recommended literature:
1. V. Valvoda: Základy krystalografie, SPN Praha, 1982
2. Z.T. Durski: Podstawy krystalografii strukturalnej i rentgenovskej, PWN, 1994
3. V. Kavečanský: Fyzika tuhých látok, Košice 1983
4. CH. Kittel: Úvod do fyziky Pevných látek, Academia, Praha 1985.
5. W. D. Callister: Materials Science and Engineering, John Willey aand Sons, New York, 1994.

6. Chetan Nayak, Solid State Physics, www.physics.ucla.edu/~nayak/solid_state.pdf
7. Bernard Ruph, X-ray Crystallography, http://www.ruppweb.org/Xray/101index.html

Course language:
English

Notes:
Lectures can be done at presence form or online using MS Teams. Education form is updated at the begining of the subject. All ppt presentations are accesible in LMS UPJŠ.

Course assessment
Total number of assessed students: 57

A	B	C	D	E	FX
36.84	24.56	21.05	10.53	5.26	1.75

Provides: prof. RNDr. Pavol Sovák, CSc., RNDr. Jozef Bednarčík, PhD., univerzitný docent

Date of last modification: 21.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SVKD/04	**Course name:** Student Scientific 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: 4	
Recommended semester/trimester of the course:	
Course level: I., II.	
Prerequisities:	
Conditions for course completion: presentation of results of studnets´ research work at Students´ scientific conference	
Learning outcomes: Student gains experience and skills in processing and presentation of results of his research work.	
Brief outline of the course: Presentation of results of studnets´ research work at Students´ scientific conference.	
Recommended literature: Based on the recommendations of supervisor	
Course language: Slovak	
Notes:	
Course assessment Total number of assessed students: 9	

abs	n
100.0	0.0

Provides:
Date of last modification: 03.05.2015
Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ SVK/10	**Course name:** Students scientific 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: 4

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Individual scientific work of students. Publishing of obtained results in a written form and as a public presentation.

Brief outline of the course:

Recommended literature:
With respect to the research problematics (article in journals, books).

Course language:
Slovak or English

Notes:

Course assessment
Total number of assessed students: 101

A	B	C	D	E	FX
99.01	0.99	0.0	0.0	0.0	0.0

Provides:

Date of last modification: 01.12.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DGS/21	**Course name:** Students` Digital Literacy

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: I.

Prerequisities:

Conditions for course completion:
Summary evaluation based on ongoing assessment:
1. Practical ongoing assignments and their defense (at least 50% needed)
3. Active participation during face-to-face contact learning in classical or virtual classroom (3 absences allowed) and during online learning (no absence, uploading all individual ongoing assignments)

Learning outcomes:
The student should obtain and know to apply basic knowledge and skills in working with current digital technologies (mobile phone, tablet, laptop, web technologies):
1. according to the current European framework for the Digital competence DigComp and ECDL
2. for better and more effective learning, work and active life in higher education, later lifelong learning and further career prospects.

Brief outline of the course:
01.-02. Basic digital skills, DigComp framework, ECDL
- modern web browser and its personalization
- security, privacy, responsible use of DT
03.-05. Search, collection and evaluation of digital content
- scanning, audio recording and speech resolution, optical resolution (OCR)
- digital notebooks (Google keep, Evernote, Onenote)
- evaluation of digital resources (Google forms and sections)
06.-08. Editing and creating digital content
- cloud and interactive documents
(text and spreadsheet editors - Google, Microsoft, Jupyter)
- work with pdf documents, e-books and videos
(Kami, Google books, Screencasting)
09. - 10. Organization, protection and sharing of digital content
- modern LMS and cloud storage
(Google Classroom, Microsoft team, Google Drive, Dropbox)
- time management (Google Calendar)
11.-13. Digital communication and cooperation

- collaborative interactive whiteboards (Jamboard, Whiteboard)
- online presentations and online meetings
(Google presentations, Powerpoint, Google meet, Microsoft teams)

Recommended literature:

1. Carretero Gomez, S., Vuorikari, R. and Punie, Y., DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use, Luxembourg, 2017, ISBN 978-92-79-68006-9, https://www.ecdl.sk/
2. Bruff, D. (2019). Intentional Tech: Principles to Guide the Use of Educational Technology in College Teaching (1st edition). Morgantown: West Virginia University Press.
3. Baker, Y. (2020). Microsoft Teams for Education. Amazon Digital Services.
4. Miller, H. (2021). Google Classroom + Google Apps: 2021 Edition. Brentford: Orion Edition Limited.

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 245

A	B	C	D	E	FX
76.33	5.31	2.86	0.0	14.69	0.82

Provides: doc. RNDr. Jozef Hanč, PhD.

Date of last modification: 26.01.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ LKSp/13	**Course name:** Summer Course-Rafting of TISA River

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:

Course level: I., II., P

Prerequisities:

Conditions for course completion:
Completion: passed
Condition for successful course completion:
- active participation in line with the study rule of procedure and course guidelines
- effective performance of all tasks: carrying a canoe, entering and exiting a canoe, righting a canoe, paddling

Learning outcomes:
Content standard:
The student demonstrates relevant knowledge and skills in the field, which content is defined in the course syllabus and recommended literature.
Performance standard:
Upon completion of the course students are able to meet the performance standard and:
- implement the acquired knowledge in different situations and practice,
- implement basic skills to manipulate a canoe on a waterway,
- determine the right spot for camping,
- prepare a suitable material and equipment for camping.

Brief outline of the course:
Brief outline of the course:
1. Assessment of difficulty of waterways
2. Safety rules for rafting
3. Setting up a crew
4. Practical skills training using an empty canoe
5. Canoe lifting and carrying
6. Putting the canoe in the water without a shore contact
7. Getting in the canoe
8. Exiting the canoe
9. Taking the canoe out of the water
10. Steering
a) The pry stroke (on fast waterways)
b) The draw stroke

11. Capsizing
12. Commands

Recommended literature:
1. JUNGER, J. et al. Turistika a športy v prírode. Prešov: FHPV PU v Prešove. 2002. ISBN 8080680973.
Internetové zdroje:
1. STEJSKAL, T. Vodná turistika. Prešov: PU v Prešove. 1999.
Dostupné na: https://ulozto.sk/tamhle/UkyxQ2lYF8qh/name/Nahrane-7-5-2021-v-14-46-39#!ZGDjBGR2AQtkAzVkAzLkLJWuLwWxZ2ukBRLjnGqSomICMmOyZN==

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 232

abs	n
36.64	63.36

Provides: Mgr. Dávid Kaško, PhD.

Date of last modification: 29.03.2022

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚTVŠ/ KP/12	**Course name:** Survival Course

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:

Course level: I., II., P

Prerequisities:

Conditions for course completion:
Completion: passed
Condition for successful course completion:
- active participation in line with the study rule of procedure and course guidelines,
- effective performance of all the tasks defined in the course syllabus

Learning outcomes:
Content standard:
The student demonstrates relevant knowledge and skills in the field, which content is defined in the course syllabus and recommended literature.
Performance standard:
Upon completion of the course students are able to meet the performance standard and should:
- acquire knowledge about safe stay and movement in natural environment,
- obtain theoretical knowledge and practical skills to solve extraordinary and demanding situations connected with survival and minimization of damage to health,
- be able to resist and face situations related to overcoming barriers and obstacles in natural environment,
- be able implement the acquired knowledge as an instructor during summer sport camps for children and youth within recreational sport.

Brief outline of the course:
Brief outline of the course:
1. Principles of conduct and safety in the movement in unfamiliar natural environment
2. Preparation and guidance of a hike tour
3. Objective and subjective danger in the mountains
4. Principles of hygiene and prevention of damage to health in extreme conditions
5. Fire building
6. Movement in the unfamiliar terrain, orientation and navigation
7. Shelters
8. Food preparation and water filtering
9. Rappelling, Tyrolian traverse
10. Transport of an injured person, first aid

Recommended literature:

1. JUNGER, J. et al. Turistika a športy v prírode. Prešov: Fakulta humanitných a prírodných vied PU v Prešove. 2002. 267s. ISBN 80-8068-097-3.
2. PAVLÍČEK, J. Člověk v drsné přírodě. 3. vyd. Praha: Práh. 2002. ISBN 8072520598.
3. WISEMAN, J. SAS: příručka jak přežít. Praha: Svojtka & Co. 2004. 566s. ISBN 8072372807.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 461

abs	n
46.2	53.8

Provides: Mgr. Ladislav Kručanica, PhD.

Date of last modification: 16.05.2023

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/SSU/15	**Course name:** Teachers´ Support Groups

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: 6.

Course level: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 65

A	B	C	D	E	FX
83.08	9.23	6.15	0.0	0.0	1.54

Provides: doc. PaedDr. Renáta Orosová, PhD.

Date of last modification: 12.03.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPPaPZ/TIMPR/25	**Course name:** Team Work

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: 4

Recommended semester/trimester of the course: 4., 6.

Course level: I., P

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

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: PhDr. Anna Janovská, PhD.

Date of last modification: 04.02.2025

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ TMEU/15	**Course name:** Theoretical Mechanics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 3.

Course level: I.

Prerequisities: ÚFV/VF1a/12

Conditions for course completion:
To successfully complete the course, the student must demonstrate sufficient understanding of all basic concepts and applications of theoretical mechanics. Knowledge of basic concepts at the level of their mathematical definition is required, as well as their physical content and principled applications. The student must be able to actively master the content of the curriculum continuously during the semester, so that he can actively and creatively use the acquired knowledge in solving specific problems in exercises and independent homework. In addition to direct participation in teaching, the student is obliged to independently study professional topics assigned by the teacher and also to develop and present one home assignments. The condition for obtaining credits is, in addition to participation in teaching, also the successful completion of the two written tests from exercises and lectures and the elaboration of home assignments. The minimum limit for passing the exam is to obtain 51% of the total score, which takes into account all required activities with relevant weight.
Rating scale: A - 91% - 100% points, B - 81% - 90% points, C - 71% - 80% points, D - 61% -70% points, E - 51% - 60% points.

Learning outcomes:
The lecture on Theoretical Mechanics is the first lecture of an extensive university course in theoretical physics, where the student gets acquainted with fundamental theoretical concepts (e.g., generalized coordinates, velocities and momentum, phase space, Hamiltonian Lagrangian ...), which constitute the basis for understanding advanced theoretical methods of advanced courses such as quantum mechanics, statistical physics and quantum field theory. For this reason, attending this lecture is essential for all physics students. In addition to deep physical knowledge, students will also gain practical experience in solving complex problems of mechanics of systems of mass points and mechanics of a rigid body.

Brief outline of the course:
1. Dynamics of a free system of mass points.
2. Motion of a constrained system of mass points. Constrains and their classification. The principle of virtual work and search for equilibrium positions.
3. D'Alembert's principle. Lagrange equations of the first kind. Generalized coordinates and generalized forces.

4. Lagrange equations of the second kind and generalized potential.
5. Basic properties of Lagrange equations. First integrals of equations of motion: Integral of energy and generalized momentum.
6. Integral principles. Variation of functions and integrals. Hamilton's principle.
7. Hamilton's function. Hamilton's canonical equations.
8. Mechanics of a perfectly rigid body. Position of a rigid body in space, independent coordinates. The speed of the points of a rigid body.
9. Center of gravity, linear and angular momentums of a rigid body. Tensor of inertia. Euler angles and Euler kinematic equations.
10. Kinetic energy of a rigid body. Euler's equations of motion of a perfectly rigid body.

Recommended literature:

1. Meirovitch L.: Methods of Analytical dynamics, McGraw-Hill, New York, 1970.
2. Taylor T.T.: Mechanics: Classical and Quantum, Pergamon Press, Oxford, 1976.
3. Strelkov S.P.: Mechanics, Mir Publishers, Moscow, 1985.
4. Greiner W.: Classical Mechanics, Springer-Verlag, Berlin, 2010.
5. Goldstein H.: Classical Mechanics, Addison-Wesley, London, 1970.
6. Barger V., Olsson M.: Classical Mechanics: A Modern Perspective, McGraw-Hill, London, 1973.

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 59

A	B	C	D	E	FX
49.15	6.78	13.56	20.34	5.08	5.08

Provides: prof. RNDr. Michal Jaščur, CSc.

Date of last modification: 20.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPE/ TVE/08	**Course name:** Theory of Education

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: 4., 6.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 692

A	B	C	D	E	FX
44.94	29.91	16.33	5.06	1.88	1.88

Provides: Mgr. Beáta Sakalová, PhD., Mgr. Zuzana Vagaská, PhD.

Date of last modification: 12.03.2024

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ TEP1/03	**Course name:** Theory of the Electromagnetic Field

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: 5

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities: ÚFV/VFM1b/15 or ÚFV/VF1b/03

Conditions for course completion:
To successfully complete the course, the student must demonstrate sufficient understanding of the basics terms, concepts and applications of electromagnetic field theory. Knowledge of basic concepts is required at the level of their mathematical definition, as well as their physical content and specific applications. During the semester, the student must continuously master the content of the curriculum so that he can actively and creatively use the acquired knowledge in solving specific tasks during the exercises and pass continuous written tests taken into account in the overall evaluation of the subject. The condition for obtaining credits is passing 2 continuous written tests in exercises and an oral exam, which consists of theoretical questions covering the entire scope of the course. The credit evaluation of the course takes into account the following student workload: direct teaching (2 credits), self-study (1 credit), individual consultations (1 credit) and assessment (1 credit). The minimum threshold for completing the course is to obtain at least 50% of the total score, using the following rating scale: A (90-100%), B (80-89%), C (70-79%), D (60- 69%), E (50-59%), F (0-49%).

Learning outcomes:
After completing lectures and exercises, the student will have sufficient physical skills, knowledge and mathematical apparatus enabling independent solution of a wide range scientific problems in electromagnetic field theory. The student also gets an overview of applications of electromagnetic field theory in various fields of physics such as electricity, magnetism, optics, etc.

Brief outline of the course:
1. Charge density and current density. Continuity equation. Definition of electromagnetic field.
2. System of Maxwell's equations in vacuum: differential formulation of Gauss' law of electrostatics, law of total current. The absence of magnetic monopoles and the law of electromagnetic induction.
3. Scalar and vector potential, gauge transformation. Wave equations for potentials. Energy conservation law in electromagnetic field theory: Poynting vector.
4. Conservation law of momentum of electromagnetic field: Maxwell's stress tensor.
5. Electrostatic field in vacuum and its potential. Potential of charges distributed in space and on surfaces. Boundary conditions on a charged area.

6. Multipole development of charge system potential. Electrostatic field energy. Electrostatic potential energy of a charge system and its multipole development in an external electric field.
7. Dielectric polarization. Vector of electrical induction, dielectric susceptibility and permittivity. Electrostatic field induced by a system of free charges in a dielectric, boundary conditions at the interface of two dielectrics.
8. Magnetic fields of stationary currents in vacuum; Biot-Savart law.
9. Stationary magnetic field of closed elementary current system, magnetic moment. Magnetization of magnets, magnets in the magnetic field of stationary currents.
10. Magnetic field strength, magnetic susceptibility and permeability. Magnetic field of a system of conductive currents in magnetics, boundary conditions at the interface of two magnets.
11. System of Maxwell's equations in the material environment and the conservation law of electromagnetic field energy. Quasi-stationary electromagnetic field.
12. Electromagnetic waves in homogeneous non-conductive medium, plane electromagnetic wave. Monochromatic plane wave and its polarization.
13. Refraction and reflection of a plane monochromatic wave at the interface of two media.

Recommended literature:

Kvasnica J.: Teorie elektromagnetického pole. Academia Praha, 1985.
Bobák A.: Teória elektromagnetického polľa, UPJŠ Košice, 2002.
Bobák A., Vargová E.: Zbierka riešených úloh z elektromagnetického poľa, UPJŠ Košice, 2001.
Greiner W.: Classical Electrodynamics, Springer-Verlag, New York, 1998.

Course language:

1. Slovak,
2. English

Notes:

Course assessment

Total number of assessed students: 349

A	B	C	D	E	FX
26.36	8.88	19.2	20.92	16.91	7.74

Provides: doc. RNDr. Jozef Strečka, PhD.

Date of last modification: 19.09.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ TSF/17	**Course name:** Thermodynamics and Statistical physics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 3 / 2 **Per study period:** 42 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities:

Conditions for course completion:
To successfully complete the course, the student must demonstrate sufficient understanding of all the basic concepts and applications of thermodynamics and classical statistical physics within the syllabus of the course. Knowledge of basic concepts of thermodynamics and classical statistical physics at the level of their mathematical definition, as well as their physical content and principled applications is required. The student must be able to actively master the content of the curriculum continuously during the semester, so that he can actively and creatively use the acquired knowledge in solving specific problems during exercises and for independent homework. In addition to direct participation in lectures, the student is obliged to study within the self-study professional topics assigned by the teacher and also to develop and present two homework assignments. The condition for obtaining credits is, in addition to participation in lectures, also the successful completion of three written tests from exercises and lectures and the elaboration of home assignments. The minimum limit for passing the exam is to obtain 51% of the total score, which takes into account all required activities with relevant weight.
Rating scale: A - 91% -100% points, B - 81% -90% points, C - 71% -80% points, D - 61% -70% points, E - 51% -60% points.

Learning outcomes:
After completing lectures and exercises, the student will acquire fundamental knowledge and skills in thermodynamics and classical statistical physics, which are prerequisites for completing advanced courses in quantum statistical physics, computer physics and condensed matter theory at the master's courses. The graduate of this course masters sufficient physical knowledge and mathematical apparatus to independently solve a wide range of current scientific problems in various fields of classical physics. These are mainly practical applications to systems consisting of a huge number of interacting particles described by the equations of classical physics. The graduate is able to apply the acquired knowledge in the field of life sciences (e.g. the spread of dangerous infectious diseases), but also in the field of big data processing and in the social and political sciences (e.g. prediction of election results).

Brief outline of the course:
1. Historical introduction and basic concepts of thermodynamics. Macroscopic system and macroscopic parameters. Internal, external, extensive and intensive macroscopic parameters. State

of system, state parameters and status functions. Basic division of thermodynamic systems - isolated, closed and open systems. Homogeneous and heterogeneous systems, thermaly homogeneous system. State of thermodynamic equilibrium. The first postulate of thermodynamics, transitivity and the principle of spontaneous inviolability of the equilibrium state.
2. The second postulate of thermodynamics and thermodynamic temperature. Natural, reversible, irreversible and quasi-static processes in thermodynamics. Internal energy, work and heat in thermodynamics. Thermal and caloric equation of state. The first law of thermodynamics. Heat capacity, specific and latent heat. Isothermal, isochoric, isobaric, adiabatic and polytropic processes in thermodynamics and their description.
3. Pfaff differential form, integrating factor, complete differential and their use in thermodynamics. Basic formulations of the second law of thermodynamics. Caratheodory's principle and mathematical formulation of the second law of thermodynamics for quasi-static processes. Introduction of absolute temperature and entropy in thermodynamics.
4. Relationship between thermodynamic and absolute temperature. Entropy and Claussius equation for reversible processes. Thermodynamic potentials for quasi-static processes. Maxwell's relations. The third law of thermodynamics. Unattainability of absolute zero temperature.
5. Dependence of thermodynamic quantities on the mass of the number of particles. Euler's theorem for homogeneous functions and its application. Thermodynamic potentials for systems with variable particle number. Non-static processes and nonequilibrium states. Slow and fast non-static processes. Mathematical formulation of the second law of thermodynamics for non-static processes. Clausius inequality.
6. Thermodynamic potentials of nonequilibrium systems and equilibrium conditions. Maximum work done by the body in the external environment. Heterogeneous systems. Gibbs phase rule.
7. Phase space, configuration space and impulse space. Statistical ensemble and distribution function. Stationary ensemble. Canonical invariance of phase volume. Calculation of mean values of physical quantities in classical statistical physics.
8. Microcanonical, canonical and grand canonical ensembles in classical statistical physics. Canonical and grand canonical partition function, internal energy, entropy, free energy and grand canonical potential.
9. Equipartition and virial theorems. Calculation of ideal gas entropy in a microcanonical ensemble, Gibbs paradox.
10. The ideal gas in the canonical ensemble and the classical theory of paramagnetism. Classical theory of heat capacity - Dulong's-Petit's law.

Recommended literature:

1) J. Kvasnica, Termodynamika, SNTL, Praha (1965).
2) J. Kvasnica, Statistická fyzika, ACADEMIA, Praha (1983).
3) M. Varady, Statisticka fyzika, UJEP Ústi nad Labem, 2007.
4) M. Jaščur, M. Hnatič, Úvod do termodynamiky, Univerzita P.J. Šafárika, Košice (2013).

Course language:

Notes:

Course assessment

Total number of assessed students: 33

A	B	C	D	E	FX
42.42	18.18	33.33	3.03	3.03	0.0

Provides: prof. RNDr. Michal Jaščur, CSc.

Date of last modification: 06.11.2021

Approved: doc. RNDr. Zuzana Ješková, PhD., prof. RNDr. Ondrej Hutník, PhD.