CONTENT

COURSE INFORMATION LETTER

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

Course assessment
Total number of assessed students: 141

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ASTF/15	**Course name:** Astrophysics

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, the student must demonstrate a sufficient understanding of the formation of spectra in stellar atmospheres and their properties. Knowledge of chemical analysis, determination of stellar radii, temperatures and photospheric pressures, stellar rotation, micro and macroturbulence is required. The condition for obtaining credits is preparation of seminar essay and passing an oral exam, which consists of three theoretical questions within the curriculum presented during the course. The credit evaluation of the course considers the following student workload: direct teaching (2 credits), self-study (3 credits), individual consultations (2 credits) 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: passed (50-100%), failed (0-49%).

Learning outcomes:
After completing lectures, the student will master important concepts of the physics of stellar atmospheres. It will also have sufficient physical knowledge and mathematical apparatus to independently solve a wide range of astronomical problems related to the analysis of stellar spectra, such as performing chemical analysis, determining stellar radii, temperatures and photospheric pressure, rotational velocity and micro and macroturbulence parameters.

Brief outline of the course:
1. Chemical analysis: Curve of growth. Dependence on the temperature, pressure. Saturation. A reference curve of growth. Derivation of abundances, differential analysis, and synthesis method. The solar chemical composition, stellar abundances, and their evolutionary changes. Chemically peculiar stars.
2. Stellar radii and temperatures: speckle photometry, the interferometers, eclipsing binaries, the bolometric flux method, the surface-brightness method. The effective temperature from absolute flux, the Paschen continuum, colour indices, the Balmer jump, spectral lines of hydrogen and metals.
3. Photospheric pressure: the continuum as a pressure indicator, the spectral lines of hydrogen. The gravity-temperature diagram. The helium abundance.
4. Stellar rotation: the rotation profile, spectroscopic measurements of rotation, Fourier analysis, rotation dwarfs and evolved stars. Rotation and magnetic activity. Rotation of binary stars. Rotational mapping.

5. Velocity fields in stellar photospheres: Micro-turbulence and macro-turbulence. Line asymmetries. Stellar granulation. Modelling. Stellar wind.

Recommended literature:

1. Gray, D.F., The observation and analysis of stellar photospheres, Cambridge University Press, Cambridge, 1992;
2. Böhm-Vitense, E., Introduction to stellar astrophysics, Stellar atmospheres, Cambridge University Press, Cambridge, 1997;
3. Kipenhahn, R., Weigert, A., Stellar Structure and evolution, Springer-Verlag, Berlin, 1990;

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 5

N	P
0.0	100.0

Provides: doc. RNDr. Rudolf Gális, PhD.

Date of last modification: 11.07.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PVS/04	**Course name:** Author's patents, discoveries, software
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Patent filed, invention, software product created.	
Learning outcomes: The PhD student demonstrates the ability to create an innovative product in a given scientific field, or with impact on an interdisciplinary scale or in technical practice.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 46	

abs	n
100.0	0.0

Provides:
Date of last modification: 08.11.2022
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ CM/04	**Course name:** Citation in monograph
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 1	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

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

Course assessment
Total number of assessed students: 74

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ CDC/04	**Course name:** Citation in scientific journal published in the country of residence
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment

Total number of assessed students: 4

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

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

Course assessment

Total number of assessed students: 298

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SMPR/04	**Course name:** Co-worker of project supported by international grant schemes
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 15	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Membership in the research team of an international project.	
Learning outcomes: Active involvement by solving a specific task within a team of international project solvers. The PhD student demonstrates the ability to work in a team, take responsibility for the assigned task, adhere to the time schedule and fulfill the project outputs. The PhD student gains personal experience from the implementation of an international project, participation in its key stages, creation of measurable outputs, grant funding of science	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 113	

abs	n
100.0	0.0

Provides:
Date of last modification: 08.11.2022
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SDPR/04	**Course name:** Co-worker of project supported by national grant schemes
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 616

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ODZP/14	**Course name:** Defence of Doctoral Thesis

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

Number of ECTS credits: 30

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

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

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

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 104

N	P
0.96	99.04

Provides:
Date of last modification: 08.11.2022
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ DZS/14	**Course name:** Dissertation examination

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

Number of ECTS credits: 20

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Obtaining required number of credits as given by the study plan.

Learning outcomes:
Evaluation of competences of the student according to his/her scientific profile.

Brief outline of the course:
Presentation of the results in the thesis for disertation exam, responding to referee´s comments, answering questions of exam committee. Two questions are selected subsequently from one compulsory and one optional subject, respectively. The subjects are selected by guarantee of the program according to the study plan and scientific profile of the student. The third question addresses the current state of work on dissertation thesis.

Recommended literature:

Course language:
english

Notes:

Course assessment
Total number of assessed students: 133

N	P
0.0	100.0

Provides:

Date of last modification: 03.05.2015

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VPBP/04	**Course name:** Elaboration of reviewer report
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 23	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 2

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

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

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

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

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

Course language:
English, level B2 according to CEFR

Notes:

Course assessment
Total number of assessed students: 738

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

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

Date of last modification: 16.09.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 3

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

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

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

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

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

Course language:
B2 level according to CEFR

Notes:

Course assessment
Total number of assessed students: 729

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

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

Date of last modification: 10.03.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ASVE/15	**Course name:** High energy astrophysics

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, the student must demonstrate sufficient understanding of the basics of high energy astrophysics. Knowledge of astrophysical mechanisms of origin and properties of high-energy radiation in various types of space objects, as well as methods of detection and analysis of X-rays and gamma rays is required. The condition for obtaining credits is preparation of seminar essay and passing an oral exam, which consists of three theoretical questions within the curriculum presented during the course. The credit evaluation of the course considers the following student workload: direct teaching (2 credits), self-study (3 credits), individual consultations (2 credits) 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: passed (50-100%), failed (0-49%).

Learning outcomes:
After completing the lectures, the student will master the basic knowledge of astrophysical mechanisms of origin and properties of high-energy radiation in various types of space objects, as well as methods of detection and analysis of X-rays and gamma rays. It will also have sufficient physical knowledge and mathematical apparatus to enable independent solving of a wide range of astronomical problems related to high energy astrophysics.

Brief outline of the course:
1. High energy astrophysics: the discovery, properties, and mechanisms for generating of X-rays and gamma rays, observing of high energy photons from cosmic sources. X-ray and gamma ray detectors, location of cosmic X-ray sources, spectroscopy, timing, significant missions.
2. Solar system X-rays: The production of planetary X-rays, Earth and other planets, the Moon, comets. The interstellar medium: absorption of X-ray by interstellar and intergalactic gas, shadows, scattering of X-ray by interstellar dust.
3. Active stellar coronae: The Sun, the dynamo model, coronal emission from binary systems, high-resolution X-ray spectra, X-ray Doppler imaging, Flare stars, young stars.
4. Early-type stars: O stars, stellar winds, X-rays from single stars, colliding winds, Eta Carinae, Superbubbles.
5. Supernova explosions and their remnants: X-ray from supernovae, evolution of supernovae remnants, young shell-like remnants.

6. Neutron stars and pulsars: The Crab nebula, rotation and spin-down, the glitch, pulsed radiation, structure of neutron stars, cooling, pulsar wind nebulae, anomalous pulsars, soft-gamma repeaters, magnetars.
7. Cataclysmic variable stars (CVs): geometry of accretion in CVs, dwarf nova outbursts, X-rays from dwarf novae, formation and evolution of CVs, magnetic CVs, X-ray spectroscopy of CVs, AM CVn systems, super-soft sources.
8. X-ray binaries: high-mass and low-mass X-ray binaries, black-hole X-ray binaries and their observed properties, soft X-ray transients.
9. Galaxies, active galactic nuclei (AGNs) and clusters of galaxies: X-ray sources in the Milky Way, Local Group, star-burst galaxies, the unified model, and structure of AGNs, central supermassive black holes, jets, out-flowing wings, X-rays from inter cluster medium (ICM), temperature and morphology of ICM, the Sunyaev-Zeldovitch effect.
10. The diffuse X-ray background and Gamma-ray bursts (GRBs): extragalactic source populations and cosmic variance, diffuse galactic emission, discovery, afterglows and precise location of GBRs, present understanding.

Recommended literature:

1. Melia, F., High-Energy Astrophysics, Princeton University Press, Princeton, 2009;
2. Lewin, W.H.G., van der Klis, M., Compact Stellar X-ray Sources, Cambridge University Press, Cambridge, 2006;
3. Longair, M. S., High Energy Astrophysics, Cambridge University Press, Cambridge, 2011;
4. Seward, F. D., Charles, P. A., Exploring the X-ray Universe, Cambridge University Press, Cambridge, 2010;

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 1

N	P
0.0	100.0

Provides: doc. RNDr. Rudolf Gális, PhD.

Date of last modification: 11.07.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DKZU/04	**Course name:** Home Conference with Foreign Participation
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 320	

abs	n
100.0	0.0

Provides:	
Date of last modification:	
Approved: prof. RNDr. Michal Hnatič, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ MK/04	**Course name:** International Conference
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 6	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 485	
abs	n
100.0	0.0
Provides:	
Date of last modification:	
Approved: prof. RNDr. Michal Hnatič, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ USMA/15	**Course name:** Introduction to standard model

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

Number of ECTS credits: 5

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

Conditions for course completion:
exam

Learning outcomes:
The aim of the course is to give to the students, oriented to the astrophysics, basic knowldges about unified theory of electro-weak interactions

Brief outline of the course:
1.From the metodological point of view the lectures are based on explanation of known processes of weak interaction where beta-decay belongs.
2.Genesis of modern electro-weak theory and standard model is given by inductive method starting from definition of V-A currents, choise of appropriate calibration symmetry, corresponding intermediate bosons and Yang_Mils quantum fields and Higgs mechanism.
3.As a result the modern formulation of Glashow- Weinberg-Salam standard model is proposed.

Recommended literature:
1. J. Hořejší: Introduction to electroweak unification (World Scientific, Singapore 1994);
czech version: Elektroslabé sjednocení a stromová unitarita (Karolinum, Praha 1993).
2. P. Renton: Electroweak interactions (Cambridge Univ. Press, Cambridge 1990).
3. Francis Halzen, Alan D. Martin: Quarks and Leptons, John Wiley&Sons; in russian: F.Helzen, A.D.Martin: Kvarki i leptoni, Mir, Moskva, 1987.
4. Cheng T.P., Li L.F.: Gauge theory of elementary particle Physics, Claredon Press, Oxford, 1984.

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: prof. RNDr. Michal Hnatič, DrSc.
Date of last modification: 03.05.2015
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

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

Course assessment
Total number of assessed students: 537

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZNC/04	**Course name:** Journals not registered in the Current Contents Connect database and published abroad

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 69

abs	n
100.0	0.0

Provides:

Date of last modification:

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DNC/04	**Course name:** Journals not registered in the Current Contents Connect database and published in the country of residence
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 25

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DKC/04	**Course name:** Journals registered in the Current Contents Connect database and published in the country of residence
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 15	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 9

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/DK/04	**Course name:** National Conference

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

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

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

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

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 168

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ NZ/04	**Course name:** Non-reviewed collections of papers and monographs published abroad or in the country of residence
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 114

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ NMAS/15	**Course name:** Numerical methods of astrophysics

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, it is necessary for the student to demonstrate a sufficient understanding of various numerical methods used in astrophysics, be able to apply machine learning approaches and simulate some astrophysical processes. Lectures are organized in blocks. In order to obtain an evaluation and thus also credits, the student must create a software project on a given topic and present the achieved results. Credit evaluation of the course takes into account the following student workload: direct teaching (2 credit), self-study (3 credits), individual consultations (2 credit), and exam (1 credit).

Learning outcomes:
After completing the course, the student will have the knowledge that will enable him to independently solve complex numerical problems in astrophysics, such as Monte-Carlo simulations, integration of N-body motion, etc. They will also be able to apply machine learning approaches and methods to different types of astronomical data.

Brief outline of the course:
Monte-Carlo simulations in astrophysics, energy transfer in a star, determination of parameter errors, simulations of light curves of eclipsing binary stars - ELISA module. Simulations of mass transfer and accretion disks. Dynamics of systems with N bodies. Machine-learning and eclipsing binaries

Recommended literature:
1. Press et. al.: 2002, Numerical Recipes in C.: Cambridge University Press
2. Robert, A. & Cassela, M.: 2005, Monte Carlo Statistical Methods, Springer
3. Raschka, S.: 2016, Python Machine Learning, Packt Publishing
4. Željko, I., et. al.: 2014, Statistics, Data Mining, and Machine Learning in Astronomy, Princeton University Press
5. software manuals NumPy, SciPy, PyKE, published papers

Course language:
Slovak, English

Notes:

Course assessment Total number of assessed students: 4	
N	P
0.0	100.0
Provides: doc. Mgr. Štefan Parimucha, PhD.	
Date of last modification: 07.07.2022	
Approved: prof. RNDr. Michal Hnatič, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

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

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

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

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

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

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 78

abs	n	neabs
98.72	0.0	1.28

Provides: doc. PaedDr. Renáta Orosová, PhD.

Date of last modification: 07.09.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ FOTA/15	**Course name:** Photometry

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, it is necessary for the student to demonstrate a sufficient understanding of astronomical photometry and be able to apply the correct approaches to the processing of various photometric observations. Lectures are organized in blocks and the course ends with a final oral exam. Credit evaluation of the course takes into account the following student workload: direct teaching (2 credit), self-study (3 credits), individual consultations (2 credit), and exam (1 credit).

Learning outcomes:
After completing the lectures, the student will be able to process photometric measurements using various methods and approaches. They will be able to apply the right approaches for specific data and made the transformation to a standard photometric system

Brief outline of the course:
Detection of objects, background determination. Aperture photometry, apertures optimization, profile fitting. PSF photometry. Image substraction method. Measurements calibration, removing systematic trends and errors. Transformation to international system.

Recommended literature:
1. Budding & Demircan: 2007, Introduction to Astronomical Photometry, Cambridge University Press
2. Howell : 2000, Handbook of CCD Astronomy, Cambridge University Press
3. Lena et al.: 1996, Observational Astrophysics, Springer-Verlag
4. Martinez a Klotz: 1998, A practical giude to CCD Astronomy, Cambridge University Press.
manuals to software packages, published papers and internet sources

Course language:
Slovak, English

Notes:

Course assessment Total number of assessed students: 7	
N	P
0.0	100.0
Provides: doc. Mgr. Štefan Parimucha, PhD.	
Date of last modification: 07.07.2022	
Approved: prof. RNDr. Michal Hnatič, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ FTDV/15	**Course name:** Physics of the close binaries

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, it is necessary for the student to demonstrate a sufficient understanding of the physical processes that take place in close binary stars, such as mass transfer, the formation of the accretion disk, as well as to know about their origin and development. Lectures are organized in blocks and the course ends with a final oral exam. Credit evaluation of the course takes into account the following student workload: direct teaching (2 credit), self-study (3 credits), individual consultations (2 credit), and exam (1 credit).

Learning outcomes:
After completing the lectures, the student will have knowledge of the formation and development of close binary stars, of the processes that take place between the two components, such as mass transfer, the formation of the accretion disk and tidal pulsations. They will be able to determine the photometric and absolute parameters of the components and the path elements.

Brief outline of the course:
Kopal's classification of close binaries. Creation and evolution of close binaries. Physical processes in close binaries: mass transfer, outflow, tidal pulsations, accretion disks, mass flows. Methods of observations: photometry, spectroscopy, interferometry, polarimetry, Doppler thomography. Determination of orbital parameters and absolute parameters of bodies.

Recommended literature:
1. Hilditch, R.W.: 2001, An introduction to Close binary Stars, Cambridge University Press
2. Kallrath, J., Milone, E.F.: 1999, Eclipsing Binary Stars, Springer Verlag
3. Kallrath, J., Milone, E.F.: 2009, Eclipsing Binary Stars: Modeling and Analysis,Springer Verlag
4. Richards, M.T., Hubeny, I. (eds.):2012, "From Interacting Binaries to Exoplanets: Essential Modeling Tools", proceedings of IAU Symposium 282, Cambridge University Press

Course language:
Slovak, English

Notes:

Course assessment Total number of assessed students: 0	
N	P
0.0	0.0
Provides: Mgr. Theodor Pribulla, CSc.	
Date of last modification: 07.07.2022	
Approved: prof. RNDr. Michal Hnatič, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/PLSD/15	**Course name:** Planetary systems

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, it is necessary for the student to demonstrate a sufficient understanding of the physical processes that take place in the formation of planetary systems, the influence of the stellar wind on their formation and evolution and understand the dynamics of planetary systems. Lectures are organized in blocks and the course ends with a final oral exam. The credit evaluation of the course takes into account the following student workload: direct teaching (2 credit), self-study (3 credits), individual consultations (2 credit), and exam (1 credit).

Learning outcomes:
After completing the course, the student will have knowledge of physical processes that lead to the formation of planetary systems, the influence of the stellar wind on their formation and development, and will control the dynamics of planetary systems.

Brief outline of the course:
Methods of exoplanets detection. Origin and evolution of exoplanets, evolution of protoplanetary disks. Exoplanet atmosphere. Dynamics of exoplanets and exoplanets in multiple planetary systems.

Recommended literature:
1. Haswell: 2010, Transiting exoplanets, Cambridge University Press
2. Perryman: 2011, The exoplanet handbook, Cambridge University Press
3. Seager (eds.): 2010, Exoplanets, The University of Arizona Press, Tuscon

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 2

N	P
0.0	100.0

Provides: Mgr. Martin Vaňko, PhD.

Date of last modification: 07.07.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ PTMH/15	**Course name:** Populations of the interplanetary bodies

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, it is necessary for the student to demonstrate a sufficient degree of understanding of the physical properties and dynamics of various types of interplanetary matter. Lectures are organized in blocks and the course ends with a final oral exam. The credit evaluation of the course takes into account the following student workload: direct teaching (2 credit), self-study (3 credits), individual consultations (2 credit), and exam (1 credit).

Learning outcomes:
After completing the course, the student will have knowledge of the physical properties of individual components and populations of interplanetary matter and their dynamics.

Brief outline of the course:
Orbits, distribution of asteroids in the Solar System Types of asteroids according to albedo. Taxonomic types. Populations of asteroids near the Earth's orbit. Meteoroid streams and major meteor showers. Populations of the Edgeworth Kuiper belt. Population of comets with perihelions close to the Sun. Relationship between comets and asteroids. Comets in the final stages of evolution. The relationship of asteroids, comets and meteor streams.

Recommended literature:
1. Michel, Demeo, Bottke: 2015, Asteroids IV, University of Arizona Press
2. Hawkes, Mann, Brown: 2005, Modern Meteor Science, Springer
3. Fernández, Lazzaro, Prialnik, Schulz: 2010, Icy Bodies of the Solar System, Cambridge University Press
4. Swamy: 2010, Physics of comets, World Scientific

Course language:
Slovak, English

Notes:

Course assessment Total number of assessed students: 0	
N	P
0.0	0.0
Provides: doc. RNDr. Ján Svoreň, DrSc.	
Date of last modification: 07.07.2022	
Approved: prof. RNDr. Michal Hnatič, DrSc.	

COURSE INFORMATION LETTER

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

Course assessment
Total number of assessed students: 383

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

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

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

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

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

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

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

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

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 70

abs	n	neabs
100.0	0.0	0.0

Provides: PhDr. Anna Janovská, PhD.

Date of last modification: 24.06.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ KTPA/15	**Course name:** Quantum field theory

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
Exam

Learning outcomes:
To acquaint with quantum field theory methods and their application in theory of elementary particles and astrophysics.

Brief outline of the course:
1. Quantum field, Lagrange formalism, interacting quantum fields, Wick theorems and Feynman diagrammatic technique, higher orders of perturbation theory.
2. Application of quantum field theory in the theory of elementary particles: standard model, unified theories of elementary particles.
3. Application of quantum field theory in statistical physics. Feynman diagrams.
4. Critical dynamics and description of scaling at phase transitions by means of quantum-field technique and renormalization group.
Selection of aforementioned topics will be made by supervisor according to the content and aims of PhD thesis

Recommended literature:
1. L.H. Ryder, Quantum Field Theory, Cambridge University Press, Cambridge, 1996.
2. A. Zee, Quantum Field Theory in Nutshell, Princeton University Press, Princeton, 2010.
3. P. Ramond, Field Theory: A Modern Primer, Westview Press, 1990.
4. Zinn-Justin J., Quantum Field Theory and Critical Phenomena, Claredon Press, Oxford, 2004.
5. W. Greiner, J. Reinhardt, Field Quantization, Springer, Berlin, 1996.
6. W. Greiner, J. Reinhardt, Quantum Electrodynamics, Springer, Berlin, 2009.
7. W. Greiner, S. Schramm, E. Stein, Quantum Chromodynamics, Springer, Berlin, 2007.
8. A.N. Vasiliev, The Field Theoretic Renormalization Group in Critical Behavior Theory and Stochastic Dynamics, Chapman & Hall/CRC Press Company Boca Raton, London, 2004.

Course language:
Slovak, English

Notes:

Course assessment Total number of assessed students: 0	
N	P
0.0	0.0
Provides: prof. RNDr. Michal Hnatič, DrSc.	
Date of last modification: 03.05.2015	
Approved: prof. RNDr. Michal Hnatič, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ RZ/04	**Course name:** Reviewed International or National Proceedings
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 280	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

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

Course assessment
Total number of assessed students: 195

N	P
0.0	100.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SASTb/15	**Course name:** Seminar in Astrophysics
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: III.	
Prerequisities:	
Conditions for course completion: To successfully complete the course, the student must demonstrate progress in the preparation of the dissertation thesis and present the partial results. The credit evaluation of the course takes into account the following student workload: self-study (2 credits), evaluation - presentation of an interim report on the preparation of the dissertation (1 credit). The minimum threshold for completing the course is to obtain at least 50% of the total score, using the following rating scale: passed (50-100%), failed (0-49%).	
Learning outcomes: The student will master the methods and procedures for solving scientific problems and demonstrate the ability to solve them independently and creatively in accordance with current scientific methods and procedures used in astrophysics. The student is also able to critically approach the analysis of possible research tasks and the creation of models. After completing the course, the student will be able to evaluate the progress of preparing the dissertation thesis and based on comments and recommendations will be able to modify the next steps in its preparation.	
Brief outline of the course: Study of assigned problems, acquisition of literary sources and observational data. Processing and analysis of observational data, physical interpretation of results. Processing and presentation of achieved partial results of the dissertation thesis. Consultations of the processes and results of dissertation thesis.	
Recommended literature: Current papers in astronomical and astrophysical journals. According to the topic of particular dissertation thesis.	
Course language: Slovak, English	
Notes:	

Course assessment
Total number of assessed students: 7

N	P
0.0	100.0

Provides: doc. RNDr. Rudolf Gális, PhD., doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 11.07.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SASTa/15	**Course name:** Seminar in astrophysics
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: 1.	
Course level: III.	
Prerequisities:	
Conditions for course completion: To successfully complete the course, the student must demonstrate progress in the preparation of the dissertation thesis and present the partial results. The credit evaluation of the course takes into account the following student workload: self-study (2 credits), evaluation - presentation of an interim report on the preparation of the dissertation (1 credit). The minimum threshold for completing the course is to obtain at least 50% of the total score, using the following rating scale: passed (50-100%), failed (0-49%).	
Learning outcomes: The student will master the methods and procedures for solving scientific problems and demonstrate the ability to solve them independently and creatively in accordance with current scientific methods and procedures used in astrophysics. The student is also able to critically approach the analysis of possible research tasks and the creation of models. After completing the course, the student will be able to evaluate the progress of preparing the dissertation thesis and based on comments and recommendations will be able to modify the next steps in its preparation.	
Brief outline of the course: Study of assigned problems, acquisition of literary sources and observational data. Processing and analysis of observational data, physical interpretation of results. Processing and presentation of achieved partial results of the dissertation thesis. Consultations of the processes and results of dissertation thesis.	
Recommended literature: Current papers in astronomical and astrophysical journals. According to the topic of particular dissertation thesis.	
Course language: Slovak, English	
Notes:	

Course assessment Total number of assessed students: 7	
N	P
0.0	100.0
Provides: doc. RNDr. Rudolf Gális, PhD., doc. Mgr. Štefan Parimucha, PhD.	
Date of last modification: 11.07.2022	
Approved: prof. RNDr. Michal Hnatič, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SASTc/15	**Course name:** Seminar in astrophysics
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: III.	
Prerequisities:	
Conditions for course completion: To successfully complete the course, the student must demonstrate progress in the preparation of the dissertation thesis and present the partial results. The credit evaluation of the course takes into account the following student workload: self-study (2 credits), evaluation - presentation of an interim report on the preparation of the dissertation (1 credit). The minimum threshold for completing the course is to obtain at least 50% of the total score, using the following rating scale: passed (50-100%), failed (0-49%).	
Learning outcomes: The student will master the methods and procedures for solving scientific problems and demonstrate the ability to solve them independently and creatively in accordance with current scientific methods and procedures used in astrophysics. The student is also able to critically approach the analysis of possible research tasks and the creation of models. After completing the course, the student will be able to evaluate the progress of preparing the dissertation thesis and based on comments and recommendations will be able to modify the next steps in its preparation.	
Brief outline of the course: Study of assigned problems, acquisition of literary sources and observational data. Processing and analysis of observational data, physical interpretation of results. Processing and presentation of achieved partial results of the dissertation thesis. Consultations of the processes and results of dissertation thesis.	
Recommended literature: Current papers in astronomical and astrophysical journals. According to the topic of particular dissertation thesis.	
Course language: Slovak, English	
Notes:	

Course assessment
Total number of assessed students: 5

N	P
0.0	100.0

Provides: doc. RNDr. Rudolf Gális, PhD., doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 11.07.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SASTd/15	**Course name:** Seminar in astrophysics
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: III.	
Prerequisities:	
Conditions for course completion: To successfully complete the course, the student must demonstrate progress in the preparation of the dissertation thesis and present the partial results. The credit evaluation of the course takes into account the following student workload: self-study (2 credits), evaluation - presentation of an interim report on the preparation of the dissertation (1 credit). The minimum threshold for completing the course is to obtain at least 50% of the total score, using the following rating scale: passed (50-100%), failed (0-49%).	
Learning outcomes: The student will master the methods and procedures for solving scientific problems and demonstrate the ability to solve them independently and creatively in accordance with current scientific methods and procedures used in astrophysics. The student is also able to critically approach the analysis of possible research tasks and the creation of models. After completing the course, the student will be able to evaluate the progress of preparing the dissertation thesis and based on comments and recommendations will be able to modify the next steps in its preparation.	
Brief outline of the course: Study of assigned problems, acquisition of literary sources and observational data. Processing and analysis of observational data, physical interpretation of results. Processing and presentation of achieved partial results of the dissertation thesis. Consultations of the processes and results of dissertation thesis.	
Recommended literature: Current papers in astronomical and astrophysical journals. According to the topic of particular dissertation thesis.	
Course language: Slovak, English	
Notes:	

Course assessment
Total number of assessed students: 5

N	P
0.0	100.0

Provides: doc. RNDr. Rudolf Gális, PhD., doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 11.07.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SLAA/15	**Course name:** Solar activity

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, it is necessary for the student to demonstrate a sufficient degree of understanding of the relationship between the solar interior and cycles of solar activity and understand the influence of the magnetic field on the activity and energy transfer in the Sun's atmosphere. Lectures are organized in blocks and the course ends with a final oral exam. The credit evaluation of the course takes into account the following student workload: direct teaching (2 credit), self-study (3 credits), individual consultations (2 credit), and exam (1 credit).

Learning outcomes:
After completing the lectures, the student will have knowledge of the physical properties of plasma in the solar interior and in the solar atmosphere, the influence of the magnetic field on the active areas. Gain knowledge about the cycle of solar activity and energy transfer between the layers of the solar atmosphere.

Brief outline of the course:
Solar interior - solar activity cycles, Tachocline, solar atmosphere - energy transfer and radiation, magnetic field of the Sun and active regions, solar spots, eruptions, coronal mass ejections, Solar dynamics, Helioseismology

Recommended literature:
1. Aschwanden Markus, Physics of the Solar Corona: An Introduction with Problems and Solutions, Springer, 2006
2. Priest, E.R.: Solar Magnetohydrodynamics, Reidel, 1982.
3. Stix M.: The Sun, An Introduction, Springer, 2nd edition, 2002.
4. Sturrock, Holzer, Mihalas, Ulrich, Physics of the Sun I. II. III. Geophysics and Astrophysics Monorgaphs, Riedel Publ. Dodrecht 1968
5. Zirin, H., Astrophysics of the Sun, Cambridge Univ. Press, Cambridge, 1988

Course language:
Slovak, English

Notes:

Course assessment Total number of assessed students: 0	
N	P
0.0	0.0
Provides: RNDr. Aleš Kučera, CSc.	
Date of last modification: 07.07.2022	
Approved: prof. RNDr. Michal Hnatič, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SPKD/15	**Course name:** Spectroscopy

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
To successfully complete the course, the student must demonstrate sufficient understanding of the basics of acquisition, processing, and analysis of stellar spectra. Knowledge of different types of spectroscopic instruments and detectors is required, as well as knowledge of the practical determination of the properties of the stellar continuum and spectral lines. The condition for obtaining credits is preparation of seminar essay and passing an oral exam, which consists of three theoretical questions within the curriculum presented during the course. The credit evaluation of the course considers the following student workload: direct teaching (2 credits), self-study (3 credits), individual consultations (2 credits) 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: passed (50-100%), failed (0-49%).

Learning outcomes:
After completing the lectures, the student will master the basics of acquisition, reduction, and analysis of stellar spectra. It will also have sufficient physical knowledge and mathematical apparatus to independently solve a wide range of astronomical problems related to the analysis of stellar spectra, such as determining the properties of the stellar continuum and spectral lines.

Brief outline of the course:
1. Spectroscopic tools: spectrographs, diffraction and blazed reflection gratings. Shadowing, grating ghosts, satellites, and anomalies. Spectrograph cameras. Echelle spectrographs. Interferometers.
2. Detectors: Quantum efficiency and spectral response. Linearity, detector background output, noise, signal to noise ratio, dynamic range and well capacity. Spatial and spectral resolution.
3. The measurement and the behaviour of stellar continua: ultra-low resolution spectrographs and continuum scanners. Absolute calibration, photometric standard stars, measured continua. Continua from photospheric models. Line absorption. A comparison of models to stellar continua. Bolometric flux.
4. The measurement of spectral lines: The coude grating spectrograph, the Richardson image slicer, diffraction grating spectrographs. Instrumental profile, the reconstruction process, noise. The discrete Fourier transform. Measurement of the instrumental profile. Scattered light: measurement and correction.

Recommended literature:

1. Gray, D.F., The observation and analysis of stellar photospheres, Cambridge University Press, Cambridge, 1992;
2. Böhm-Vitense, E., Introduction to stellar astrophysics, Stellar atmospheres, Cambridge University Press, Cambridge, 1997;
3. Kipenhahn, R., Weigert, A., Stellar Structure and evolution, Springer-Verlag, Berlin, 1990;

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 5

N	P
0.0	100.0

Provides: doc. RNDr. Rudolf Gális, PhD.

Date of last modification: 11.07.2022

Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

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

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

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

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

Course language:

Notes:

Course assessment
Total number of assessed students: 187

abs	n
100.0	0.0

Provides: doc. RNDr. Marián Kireš, PhD.

Date of last modification: 08.11.2022
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

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

Course assessment
Total number of assessed students: 265

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

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

Course assessment
Total number of assessed students: 19

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VBP/04	**Course name:** Supervisor/consultant of bacelor thesis
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 6	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 44	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PPC/04	**Course name:** Teaching activities
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 1	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 268

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PPC/04	**Course name:** Teaching activities
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 1	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 268	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ POVK/04	**Course name:** Work in Organizing Committee of Conference
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 100	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PDS/18	**Course name:** Writing Dissertation Work
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 0	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 22	

N	P
0.0	100.0

Provides:
Date of last modification:
Approved: prof. RNDr. Michal Hnatič, DrSc.