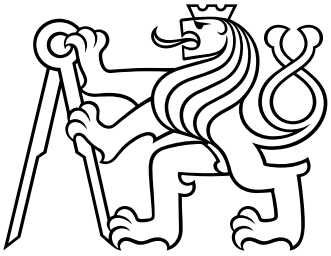

Czech Technical University in Prague

Curricula 2021-2022

Faculty of Nuclear Sciences and Physical Engineering

FACULTY OF NUCLEAR SCIENCES AND PHYSICAL ENGINEERING CZECH TECHNICAL UNIVERSITY IN PRAGUE

The Faculty of Nuclear Sciences and Physical Engineering (FNSPE) was established in 1955, as part of the Charles University, but in 1959 became a new special faculty of the Czech Technical University in Prague. The establishment of the Faculty was connected with the beginning of a new era of the peaceful use of nuclear energy. A complex approach to all nuclear branches was intended, so specialists from universities, technological institutions, and industry were brought together to comply with this task. Later, newly developed areas of physics application, e.g. plasma and solid state physics, lasers, cosmic research were included in the Faculty curricula.

The characteristics of the Faculty activities developed during its history, and the most advanced areas of technological progress have always attracted its attention. Students with a special interest in mathematics were taught individually, and, subsequently, the study of mathematical engineering was established. In the last fifteen years the rapidly developing branches of mathematical and software engineering, interdisciplinary application to ecology, medicine, economy, archeology have been also evolved. The Faculty is equipped with several large research facilities, such as the VR-1 training nuclear reactor, scanning electron microscopes, high power laser systems, computational and advanced radiochemical laboratories, and satellite laser ranging station (Helwan, Egypt).

ANNUAL ACADEMIC CALENDAR 2021 – 2022

Beginning of academic year	Sep 20 2021
End of academic year	Sep 18 2022

Enrollment

Aug 25 – 27 2021	1st year of bachelor's program
Aug 31 – Sep 2, Sep 7 – 9, 14 - 16 2021	higher years
Sep 13 – 16 2021	preparatory week for new bachelor students

Winter semester

Oct 11 2021	Commencement Ceremony for new students
Sep 20 2021 – Dec 17 2021	scheduled classes (13 weeks)
Dec 20 2021 – Jan 2 2022	winter holidays
Jan 3 2022 – Feb 13 2022	examination period
until Nov 30 2021	applications for February final examinations
until Jan 5 2022	theses submission for February final examinations
until Jan 20 2022	closure of results for February final examinations
Jan 31 – Feb 11 2022	February final examinations

Summer semester

Feb 1 – 10 2022	enrollment to summer semester
Feb 14 – May 13 2022	scheduled classes (13 weeks)
May 16 – Jun 26 2022	examination period
Jun 27 – Aug 31 2022	summer holidays
Aug 29 – Sep 18 2022	extended examination period
until Mar 31 2022	applications for June final examinations
until May 2 2022	theses submission for June final examinations
until May 19 2022	closure of results for June final examinations
until May 31 2022	applications for September final examinations
until Jul 7 2022	theses submission for September final examinations
until Aug 10 2022	closure of results for September final examinations
May 30 – June 10 2022	June final examinations
Aug 29 – Sep 9 2022	September final examinations
May 11 2022	Rector's Day

LIST OF DEPARTMENTS

department	abbreviation	code
Department of Mathematics	KM	01
Department of Physics	KF	02
Department of Human Sciences and Languages	KJ	04
Department of Solid State Engineering	KIPL	11
Department of Physical Electronics	KFE	12
Department of Materials	KMAT	14
Department of Nuclear Chemistry	KJCH	15
Department of Dosimetry and Application of Ionising Radiation	KDAIZ	16
Department of Nuclear Reactors	KJR	17
Department of Software Engineering	KSI	18

DEGREE PROGRAM STRUCTURE

ACCREDITED BACHELOR'S DEGREE PROGRAMS

program	code	abbreviation	time extent
Mathematical Engineering	B0541A170022	P_ MIB	3
Applied Mathematical Stochastic Methods	B0541A170024	P_ AMSMB	3
Nuclear and Particle Physics	B0533A110015	P_JCF	3
Physical Engineering	B0533A110016	P_FIB	3
Nuclear Chemistry	B0531A130028	P_JCHB	3
Decommissioning of Nuclear Facilities	B0588A110002	P_VJZPB	3
Quantum Technologies	B0533A110024	P_QTB	3
Applied Analysis and Algebra	B0541A170025	P_AAAB	3

ACCREDITED MASTER'S DEGREE PROGRAMS

program	code	abbreviation	time extent
Mathematical Engineering	N0541A170028	P_MIN	2
Mathematical Informatics	N0541A170031	P_MINFN	2
Mathematical Physics	N0533A110032	P_MFN	2
Applied Mathematical Stochastic Methods	N0541A170029	P_AMSMN	2
Nuclear Engineering	N0533A110041	P_JIN	2
Nuclear and Particle Physics	N0533A110030	P_JCFN	2
Physical Electronics	N0533A110043	P_FEN	2
Solid State Engineering	N0533A110038	P_IPLN	2
Physical Engineering of Materials	N0533A110036	P_FIMN	2
Plasma Physics and Thermonuclear Fusion	N0533A110034	P_FPTFN	2
Nuclear Chemistry	N0531A130039	P_JCH	2
Decommissioning of Nuclear Facilities	N0788A110002	P_VJZPN	2
Quantum Technologies	N0533A110047	P_QTN	2
Applied Analysis and Algebra	N0541A170035	P_AAAN	2

MASTER'S DEGREE PROGRAMS

open in the academic year 2021 - 2022

NUCLEAR AND PARTICLE PHYSICS

Area of education: Physics 100 %

Program coordinator: doc. Dr. rer. nat. Mgr. Jaroslav Bielčík

Specializations of the study program:

- ***The program has no specialization***

Goals and Outcomes:

The master´s degree course is oriented towards nuclear and elementary particle physics, these are the fields of study that bring fundamental knowledge about the structure of matter and basic interactions that are happening in the microworld. Many discoveries and knowledge from physics are already in our daily life and are used in many fields that are not just physics. The study plan that this programme offers is mainly based on advanced modules, such as quantum field theory, particle physics and system of modern detectors together with data analysis and data processing. These modules were chosen due to the needs of modern research in the field of nuclear and elementary physics, students then may further specialize by choosing one of the compulsory elective courses. Students can choose to do theoretical or experimental or accelerators.

The fundamentals of the specialized study are the following common theoretical modules. Such as Quantum field theory 1 and 2, Introduction to Theory of Electroweak Interactions and Introduction to Quantum Chromodynamics. These subjects are then supplemented by subjects of profiling basis such as Modern Detectors, Detector Systems and Data Acquisition together with the Statistical Data Analysis 1 and 2, which will acquaint students with modern technology and the industry. Students will attend a series of seminars 1-4 where they will be presenting their research together with talks about the latest news in physics. Students can specialize by choosing one of the three groups of compulsory elective courses. In the experimentally focused group E they complete the subjects Extreme states of matter and Physics of Ultrarelativistic Nuclear Collisions, in the theoretically focused group T they complete the General Theory of Relativity and in the instrumentally focused group I where they complete Accelerators 1 and 2.

The program emphasizes on modern methods of obtaining experimental data and their processing using computer technology, machine learning, and physical interpretation of experimental results, which is then formulated into theoretical models and possible practical applications for acquired data. Teaching is represented by the form of choice of optional subjects, work in specialized laboratories. There are preferred individual forms of teachings under a supervisor together with seminars. Students are involved in ongoing researches projects where they can contribute to their problem-solving skills and are slowly being prepared for modern collective forms of scientific work in an international group. Teaching takes place in close cooperation with non-faculty workplaces such as (Academy of Sciences of the Czech Republic, CERN Geneva, Brookhaven National Laboratory, GSI Darmstadt, etc.). It is, therefore, a comprehensive study program with interdisciplinary content, the aim of which is to prepare graduates for work in academia and industry.

Graduate Profile:

Knowledge: Graduate will gain the most comprehensive possible knowledge of modern nuclear and particle physics, which will enable him to creatively participate in solving new interdisciplinary scientific and technical problems. The acquired knowledge covers all areas of nuclear, particle and quantum physics, detection methods, ionizing radiation detectors and accelerators. The graduate may directly continue in a follow-up doctoral study in the same or a related field.

Skills: Graduate will gain skills in the application of methods of modern physics in solving problems. The acquired skills will consist of preparation and implementation of experiments and subsequent processing of measurement results which then can be interpreted, this includes a comprehensive analysis of statistical and systematic errors. The graduate will also gain experience working in large international collaborations and the ability to present, communicate and defend the results obtained and, last but not least, will gain skills to participate in the preparation and construction of accelerators.

Competence: Graduates will find employment in industry, basic and applied research and the private sector thanks to the analytical way of work, the systematic approach given by the acquired knowledge and the ability to work with modern computer technology and machine learning methods. They can work in nuclear research institutions, healthcare or the automotive industry. They acquire the qualification of a physicist - researcher with a wide range of possible applications in research (basic, applied, strategic) and in development for technical practice. They will be prepared to solve physical problems using modern experimental techniques, process large-volume data and operate accelerators.

State final examination:

- defence of the diploma project
- oral examination in the general subject
  Particle Physics
- oral examination in the profile subject
  Experimental Methods
- oral examination in the profile subject with optional choice:
  General Theory of Relativity
  Heavy Ion Physics
  Accelerators

PHYSICAL ELECTRONICS

Area of education: Physics 100 %

Program coordinator: doc. Dr. Ing. Ivan Richter

Specializations of the study program:

- ***Laser Physics and Technology***
- ***Photonics***
- ***Computational Physics***

Goals and Outcomes:

The master´s degree multidisciplinary program of *Physical Electronics* is oriented towards classical and modern areas of physics, mathematics, and informatics. Specifically, these includes the fields that bring fundamental knowledge about, following the three specializations, laser physics and technique, photonics, and computer physics. The program leads graduates to applications of physical methods in natural-science and engineering practice, often with the help of modern computer technique. The program enables deeper focus in one of the following three specializations of modern applied physics. In the specialization *Laser physics and technology*, students are prepared in the areas and technical applications of coherent laser and charged particle beams and plasma physics. In the specialization *Photonics*, students are prepared in the modern areas of optics, photonics, and photonic nanostructures, including theoretical design, analysis, realization, characterization, and applications. In the specialization *Computational Physics*, students are equally acquired with knowledge of physical backgrounds of high-tech state-of-the-art technologies and modern informatics and computer systems. Deeper interconnection of modern physics, mathematics, and informatics, enables the program graduates to further increase their qualification to higher study degrees, and thus acting in the physical, natural-science, and technical practice, or application in science, research, and technical practice. Many discoveries and knowledge from these areas of applied physics are already applied in our daily life and are used in many surrounding fields. The study plans this program are based on advanced modules, either general or specific to each specialization, such as classical electrodynamic, physical optics, quantum electronics, quantum optics, nonlinear and statistical optics, laser technique, etc. These modules were chosen due to the needs of modern research in the fields of laser physics and technique, photonics, and computer physics.

The program emphasizes on modern methods of obtaining both theoretical and experimental data and their processing using current computer technology, and physical interpretation of experimental results, which is then formulated into theoretical models and possible practical applications. Mandatory courses in each specialization are amended by the form of choice of optional subjects, and work in specialized practical laboratories. Students are involved in ongoing researches projects where they can contribute to their problem-solving skills and are slowly being prepared for modern forms of scientific work. Teaching takes place in close cooperation with non-faculty workplaces such as the Academy of Sciences of the Czech Republic. It is, therefore, a comprehensive study program with interdisciplinary content, the aim of which is to prepare graduates for work in academia and industry.

Graduate Profile:

Knowledge: A graduate will gain the most comprehensive knowledge of fundamental physical, mathematical, and informatics fields which are, in dependence on the particular specialization, deepened in the areas of most important experimental methods and theoretical models of current laser physics and technique, photonics, and computer physics. This will enable the graduates to creatively participate in

solving new interdisciplinary scientific and technical problems in the related areas. The graduates may directly continue in a follow-up doctoral study in the same or a related field (Physical Engineering, Quantum Technologies, and others).

Skills: A graduate will gain skills in the application of methods of modern physics and engineering in solving realistic problems, with the help of modern computer technique. The acquired skills, using the methods and techniques of mathematics and physics, will enable solving realistic research and engineering problems in the areas of laser physics and technique, photonics, and computer physics. The graduate will also gain experience and skills to follow new trends in given areas, and quickly orient in multidisciplinary problems, analyze them and synthesize the results, together with the ability to present, communicate, and defend the results obtained.

Competence: Master graduates will find employment in industry, basic and applied research, and the private sector thanks to the analytical way of work, the systematic approach given by the acquired knowledge and the ability to work with modern computer technology and machine learning methods. They will be prepared to solve physical problems using modern theoretical and experimental techniques. They acquire the qualification of a physicist - researcher with a wide range of possible applications in research (basic, applied, strategic) and in development for technical practice. They can either continue in their studies in doctoral programs, or work in research laboratories, in the development, and test and / or product certificate centers, in metrology, and in various applications of laser and photonic techniques and technologies.

State final examination:

- defence of the diploma project
- oral examination in the general subject
  Electrodynamics
- oral examination in the profile subject with optional choice:
  Optics and Quantum Electronics
  Computational Physics
- oral examination in the profile subject with optional choice:
  Laser Physics and Technology
  Photonics
  Numerical Methods in Applied Physics
  Physics of Laser Plasma and Inertial Fusion

MATHEMATICAL PHYSICS

Area of education: Physics 100 %

Program coordinator: doc. Ing. Libor Šnobl, Ph.D.

Specializations of the study program:

- ***The program has no specialization***

Goals and Outcomes:

The study of Mathematical Physics is focused on advanced areas of modern mathematical physics and applied mathematics. It leads its graduates to apply the acquired knowledge in the development of theoretical physics, with a particular focus on mathematically rigorous procedures and methods, as well as in theoretical analysis and description of physical models for more experimentally focused physics disciplines, in scientific and engineering practice, also involving modern computer technology.

The subjects of the study are focused on deepening the knowledge of the needed fields of physics and mathematics and provide sufficient overview of the current state of theoretical and mathematical physics. The programme also involves compulsory student projects designed to work on an individually assigned research topic. These projects allow each student a better orientation in the field of his specialization and usually lead to original research results publishable in international professional journals.

Students gain deeper insight especially in quantum mechanics and field theory, classical and quantum

theories of gravity, statistical physics, quantum information theory, and related modern fields of mathematics, e.g. in differential geometry and topology, theory of Lie groups, algebras and their representations, functional analysis and in the spectral theory of operators.

The programme is designed for particularly gifted students, with great motivation to study and with an inclination towards academic career.

Graduate Profile:

Knowledge: The graduates will gain a broad knowledge of the above mentioned advanced mathematical and physical disciplines, which depending on their particular specialization can be deepened in the fields of particle physics, applied mathematics or scientific and technical calculations.

Skills: Application of methods and procedures from various areas of mathematics and physics towards the solution of theoretical and application-oriented scientific, research and engineering problems. In addition to the special knowledge gained from the study, they also include typical sfot skills of students of the Mathematical Physics programme: adaptability, quick orientation in new interdisciplinary issues, analysis of problems and their computer processing, synthesis of results and good written expression.

Competence: Graduates will find employment in the academic sphere, applied research and industry thanks to their analytic and systematic approach to problems and their ability to work with modern computing technology. The primary focus of the study programme is to prepare its graduates to work at universities, in institutes of the Academy of Sciences and other research organizations. However, given the skills acquired, in particular analytical way of thinking, it is possible to successfully apply them in research, development and analytical departments of companies across the economy, including banks, insurance companies and consulting firms.

State final examination:

- defence of the diploma project
- oral examination in the general subject

  Quantum Physics
- oral examination in the profile subject

  Advanced Geometric Methods in Physics
- oral examination in the profile subject with optional choice:

  Quantum Field Theory

  Lie Algebras, Lie Groups and Their Applications

  Statistical Physics

SOLID STATE ENGINEERING

Area of education: Physics 100 %

Program coordinator: doc. Ing. Ladislav Kalvoda, CSc.

Specializations of the study program:

- ***The program has no specialization***

Goals and Outcomes:

Study in *Solid State Enginering* is oriented towards advanced parts of solid state physics and their practical applications in engineering and scientific practice. The aim of the study is to pass a graduate knowledge of the physical nature, theoretical description and interpretation of a variety of special phenomena and properties resulting from the diversity of the internal order of solids, explain and demonstrate the main methods of their experimental studies and computer modeling and give an overview of current and potential applications, which these phenomena and properties use, including interdisciplinary context. The study includes specialized laboratory courses and separate student projects for work on an individually assigned research topic. These projects allow students to asquire a deeper understanding the scientific nature of the given problem and to exercise the already acquired theoretical knowledge, and generally lead to the original results publishable in scientific journals or applicable in the development of new engineering technologies.

Graduate Profile:

Knowledge: The graduate will asquire a broad knowledge in physics, theory and properties of solids, become familiar with theoretical basics and practical implementation of the main experimental methods

applied in the study of solids and the basics of computer modeling of their structure and properties, and get sufficient relevant orientation in technical multi-discilinary applications of solid state structures.

Skills: The graduate is able to understand and analyze the physical and technical problems in the field of *Solid State Engineering*, formulate and solve new problems, and the achieved solutions transform to practically applicable results instrumental in solving real engineering, research and scientific problems. In addition to special knowledge acquired by studies, the typical skills of *Solid State Engineering* program graduates involve adaptability, fast orientation in new interdisciplinary issues, analysis of problems and their computer processing, synthesis of final knowledge and good written expression. The acquired features also include personal responsibility for the work done and decisions taken.

Competence: Graduates will find very good applications in industry, research and private sphere due to their working skills combining analytical and synthetic methods, a systematic approach to problems' solution based on the acquired knowledge and the ability to work with modern computing and experimental techniques and technologies. Engineer - Graduated in the Program – finds, due to the acquired widespread knowledge, good application in all academic and industrial workplaces dealing with research and development in one of the fields that use solid state physics, such as microelectronics, surface physics, thin films and low-dimensional systems, sensors, imaging techniques, photovoltaics, low temperature and superconductivity physics, applied photonics and telecommunications, and further in specialized analytical and development laboratories that utilize spectroscopic techniques, X-ray and neutron diffraction, electrical and magnetic measurements or advanced procedures of computer simulations and properties of solids / condensed matter. Due to the analytical and mathematical knowledge, the graduates also apply in the field of management and finance and succeed in leading functions.

State final examination:

- defence of the diploma project
- oral examination in the general subject
  Theory of Solids
- oral examination in the profile subject
  Physics of Solids
- oral examination in the profile subject with optional choice:
  Properties of Solids

QUANTUM TECHNOLOGIES

Area of education: Physics 100 %

Program coordinator: doc. Ing. Martin Štefaňák, PhD.

Specializations of the study program:

- ***The program has no specialization***

Goals and Outcomes:

Continuation master's study programme Quantum Technologies is a multidisciplinary study programme aimed at the education of the next generation of experts in the fields of quantum information, quantum communication, quantum optics, lasers physics and technology, condensed matter physics and nanomaterials, who will engage in research and development of modern technologies. The main part of the study is focused on advanced topics of quantum physics and its applications in solid state, light-matter interactions and quantum information. Studies foster independent analytical thinking skills of students and their ability to employ learned methods in various branches of physics and technology. Great emphasis is placed on preparation of students to conduct independent research. Part of the study is the individual student's research project culminating in the master's thesis. Results obtained in the master's thesis will be targeted for publication in a scientific journal.

Graduate Profile:

Knowledge: Graduates acquire a broad knowledge of modern parts of physics, especially of quantum theory, solid state physics and laser theory. Depending on the scientific focus of the graduate the education is further intensified in the fields of quantum optics, quantum information,

lasers or nanomaterials. Graduates can proceed with their studies in the follow-up doctoral study programme in the same or related field.

Skills: Application of methods and techniques from various fields of mathematics and physics to solve both theoretical and real-world engineering, research and scientific problems in the areas of quantum theory, classical and quantum optics, quantum information, condensed matter, physics and technology of lasers. Employment of modern computational and laboratory equipment. Ability to pursue modern trends in the respective field of the graduate. Rapid orientation in multidisciplinary issues, analysis of problems and synthesis of results. Responsibility at work and the ability to present the obtained results in a comprehensible way.

Competence: Graduates find application in higher education, research and industry thanks to the acquired knowledge, analytical skills, systematic approach and the ability to work with modern computational technologies. Graduates can work at universities, academic institutes and research and development centers in industry. Competence of graduates lies in the development of modern technologies e.g. in nanomaterials, metrology, informatics or secure communication. Apart from professional expertise the graduates have the ability to succeed in management.

State final examination:

- defence of the diploma project
- oral examination in the general subject
  Methods of Quantum Technologies
- oral examination in two profile subjects with optional choice:
  - Quantum Field Theory
  - Quantum Optics
  - Theory of Solid States
  - Quantum Generators of Optical Radiation
  - Quantum Information and Communication

Master´s Degree Program

Physical Electronics

Specialization Laser Physics and Technology 1st year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Electrodynamics 1, 2	12ELDY12	Limpouch, Richter	2+0 z, zk	4+0 z, zk	3	5
Computational Physics 1	12PF1	Klimo, Kuchařík	2+0 zk	-	2	-
Research Project 1, 2	12VUFL12	Šiňor	0+6 z	0+8 kz	6	8
Optical Physics 1	12FOPT1	Richter	3+0 z, zk	-	3	-
Quantum Electronics	12KVEN	Richter	3+1 z, zk	-	5	-
Open Resonators	12OREZ	Kubeček	2+1 z, zk	-	4	-
Nonlinear Optics	12NOP	Richter	-	3+1 z, zk	-	4
Laser Physics	12FLA	Šulc	-	4+0 z, zk	-	4
Solid-state, Diode and Dye lasers	12PDBL	Jelínková, Kubeček	-	2+0 z, zk	-	2
Computer Control of Experiment	12POEX	Čech, Vyhlídal	-	2+0 z	-	2
Optional courses:						
Statistical Optics	12SOP	Richter	2+0 z, zk	-	2	-
Geometrical Optics	12GOP	Dvořák	-	2+0 kz	-	2
Optical Spectroscopy	12OSP	Michl	-	2+0 kz	-	2
Quantum Optics	12KOP	Richter	-	3+1 z, zk	-	5
Physics of Detection and Detectors of Optical Radiation	12FDD	Pína	2+0 zk	-	2	-
X-ray Photonics	12RFO	Pína	2 zk	-	2	-
Electronics 3	12EL3	Pavel	2+0 zk	-	2	-
Advanced Practicum in Electronics 1, 2	12EP12	Pavel	0+2 kz	0+2 kz	3	3

(1) Enrollment of 12EP12 possible while 12EL3 is enrolled or passed.

Master´s Degree Program

Physical Electronics

Specialization Laser Physics and Technology 2nd year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Solid State Physics	11FYPL	Kalvoda	3+1 z, zk	-	4	-
Diploma Seminar 1, 2	12DSFE12	Jelínková	0+2 z	0+2 z	2	2
Master Thesis 1, 2	12DPFE12	Jelínková	0+10 z	0+20 z	10	20
Ultra-short Pulse Generation	12UKP	Jelínek, Kubeček	2+0 zk	-	2	-
Advanced Laser Technique Laboratory	12PPLT	Kubeček, Němec	0+4 kz	-	6	-
Gas and X-ray Lasers	12RGL	Jančárek	-	2+0 kz	-	2
Optional courses:						
Electronics for Lasers	12ELA	Pavel	2+0 zk	-	2	-
Advanced Laser Spectroscopy	12PLS	Michl	2+0 zk	-	2	-
Fourier Optics and Optical Signal Processing	12OZS	Kwiecien	3+0 z, zk	-	3	-
Laser in Medicine Practice	12PLM	Jelínková, Němec	-	4 kz	-	6
Advanced Optical Laboratory	12PPRO	Jančárek	0+4 kz	-	6	-
Fiber Lasers and Amplifiers	12VLS	Peterka	2+0 zk	-	3	-
Measurements Methods in Electronics and Optics	12MMEO	Pína	-	2+0 zk	-	2

Master´s Degree Program

Physical Electronics

Specialization Photonics 1st year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Electrodynamics 1, 2	12ELDY12	Limpouch, Richter	2+0 z, zk	4+0 z, zk	3	5
Computational Physics 1	12PF1	Klimo, Kuchařík	2+0 zk	-	2	-
Research Project 1, 2	12VUFL12	Šiňor	0+6 z	0+8 kz	6	8
Optical Physics 1	12FOPT1	Richter	3+0 z, zk	-	3	-
Quantum Electronics	12KVEN	Richter	3+1 z, zk	-	5	-
Statistical Optics	12SOP	Richter	2+0 z, zk	-	2	-
Selected Chapters of Modern Optics	12MODO	Kwiecien	2+0 z	-	2	-
Nonlinear Optics	12NOP	Richter	-	3+1 z, zk	-	4
Quantum Optics	12KOP	Richter	-	3+1 z, zk	-	5
Computer Control of Experiment	12POEX	Čech, Vyhlídal	-	2+0 z	-	2
Optical Spectroscopy	12OSP	Michl	-	2+0 kz	-	2
Optional courses:						
Measurements Methods in Electronics and Optics	12MMEO	Pína	-	2+0 zk	-	2
Physics of Detection and Detectors of Optical Radiation	12FDD	Pína	2+0 zk	-	2	-
Solid-state, Diode and Dye lasers	12PDBL	Jelínková, Kubeček	-	2+0 z, zk	-	2
Nanochemistry	12NCH	Proška	2+0 zk	-	2	-
Preparation of Semiconductor Nanostructures	12PN	Hulicius	-	2+0 zk	-	2
Laser Physics	12FLA	Šulc	-	4+0 z, zk	-	4
Atomic Physics	12AF	Šiňor	4+0 z, zk	-	4	-
Molecular Nanosystems	11MONA	Kratochvílová	2+0 zk	-	2	-
Computational Physics 2	12PF2	Klimo, Kuchařík	-	1+1 z, zk	-	2
Quantum Information and Communication	02QIC	Gábris, Štefaňák	3+1 z, zk	-	4	-
Open Quantum Systems	02OKS	Novotný	-	2+0 z	-	2
Nano-Materials - Preparation and Properties	11NAMA	Kratochvílová	-	2+0 zk	-	2

Master´s Degree Program

Physical Electronics

Specialization Photonics 2nd year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Solid State Physics	11FYPL	Kalvoda	3+1 z, zk	-	4	-
Diploma Seminar 1, 2	12DSFE12	Jelínková	0+2 z	0+2 z	2	2
Master Thesis 1, 2	12DPFE12	Jelínková	0+10 z	0+20 z	10	20
Nanophysics	12NF	Šiňor	1+1 zk	-	2	-
Fourier Optics and Optical Signal Processing	12OZS	Kwiecien	3+0 z, zk	-	3	-
Advanced Optical Laboratory	12PPRO	Jančárek	0+4 kz	-	6	-
Geometrical Optics	12GOP	Dvořák	-	2+0 kz	-	2
Optional courses:						
Advanced Laser Spectroscopy (1)	12PLS	Michl	2+0 zk	-	2	-
Gas and X-ray Lasers	12RGL	Jančárek	-	2+0 kz	-	2
Advanced Laser Technique Laboratory	12PPLT	Kubeček, Němec	0+4 kz	-	6	-
Integrated Optics	12INTO	Čtyroký	2+0 z, zk	-	2	-
Optical Sensors	12OSE	Homola	-	2+0 zk	-	2
X-ray Photonics	12RFO	Pína	2 zk	-	2	-
Ultra-short Pulse Generation	12UKP	Jelínek, Kubeček	2+0 zk	-	2	-
Fiber Lasers and Amplifiers	12VLS	Peterka	2+0 zk	-	3	-
Computer Simulation of Condensed Matter	11SIKL	Kalvoda, Sedlák	2+2 z, zk	-	4	-
Physics of Surfaces and Interfaces	11FPOR	Kalvoda	2+0 zk	-	2	-
SEM and Methods of Microbeam Analysis	11SEM	Kopeček	2+0 zk	-	2	-

(1) Grading in 12PLS possible after grading in 12OSP.

Master´s Degree Program

Physical Electronics

Specialization Computational Physics 1st year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Electrodynamics 1, 2	12ELDY12	Limpouch, Richter	2+0 z, zk	4+0 z, zk	3	5
Computational Physics 1	12PF1	Klimo, Kuchařík	2+0 zk	-	2	-
Research Project 1, 2	12VUFL12	Šiňor	0+6 z	0+8 kz	6	8
Differential Equations on Computer	12DRP	Liska	2+2 z, zk	-	5	-
Parallel Algorithms and Architectures	01PAA	Oberhuber	-	2+1 kz	-	4
Inertial Fusion Physics	12FIF	Klimo, Limpouch	3+1 z, zk	-	4	-
Computational Physics 2	12PF2	Klimo, Kuchařík	-	1+1 z, zk	-	2
Finite Element Method	01MKP	Beneš	-	1+1 zk	-	3
Fundamentals of Laser-Plasma Physics	12ZFLP	Klimo, Pšikal	-	2+0 zk	-	2
Digital Image Processing	01DIZO	Flusser	-	2+2 zk	-	4
Optional courses:						
Object Oriented Programming	18OOP	Virius	0+2 z	-	2	-
Computer Simulations in Physics of Many Particles 1, 2	12SFMC12	Kotrla, Předota	3+1 z, zk	2+0 zk	4	2
Quantum Electronics	12KVEN	Richter	3+1 z, zk	-	5	-
Quantum Optics	12KOP	Richter	-	3+1 z, zk	-	5
Inertial Confinement Fusion	12PICF	Klír, Limpouch	-	2+0 kz	-	2
Variational methods	01VAM	Beneš	1+1 zk	-	3	-
Introduction to Mainframe	01UMF	Oberhuber	1+1 z	-	2	-
Mathematical Methods in Fluid Dynamics	01MMDY	Strachota	2+0 zk	-	2	-
Numerical Methods in Fluid Dynamics	01NMDT	Strachota	-	2+0 zk	-	2
Introduction to Computer Security 2	01ZPB2	Vokáč	1+1 z	-	2	-
Graph Theory	01TG	Ambrož, Pelantová	4+0 zk	-	5	-
Quantum Information and Communication	02QIC	Gábris, Štefaňák	3+1 z, zk	-	4	-

Master´s Degree Program

Physical Electronics

Specialization Computational Physics 2nd year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Solid State Physics	11FYPL	Kalvoda	3+1 z, zk	-	4	-
Diploma Seminar 1, 2	12DSFE12	Jelínková	0+2 z	0+2 z	2	2
Master Thesis 1, 2	12DPFE12	Jelínková	0+10 z	0+20 z	10	20
Atomic Physics	12AF	Šiňor	4+0 z, zk	-	4	-
Robust Numerical Algorithms	12RNA	Váchal	1+1 z	-	2	-
Optional courses:						
Monte Carlo Method	18MEMC	Jarý, Virius	2+2 z, zk	-	4	-
Mathematical Modelling of Non-linear Systems	01MMNS	Beneš	1+1 zk	-	3	-
Astrophysics	12ASF	Kulhánek	-	2+2 zk	-	4
X-ray Photonics	12RFO	Pína	2 zk	-	2	-
Mathematical Logic	01MAL	Cintula	2+1 z, zk	-	4	-
Laser Plasma as Source of Radiation and Particles	12LPZ	Nejdl	2+0 zk	-	2	-
Image Processing and Pattern Recognition 2	01ROZP2	Flusser	2+1 zk	-	4	-
Machine Learning 1	01SU1	Flusser	2+1 zk	-	3	-
Nonlinear Optics	12NOP	Richter	-	3+1 z, zk	-	4
Neural Networks and their Application	01NEUR1	Hakl, Holeňa	-	2+0 zk	-	2

Master´s Degree Program

Nuclear and Particle Physics

1st year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Quantum Field Theory 1, 2	02KTPA12	Jizba, Štefaňák, Zatloukal	4+2 z, zk	4+2 z, zk	8	8
Modern Detectors	02MTD	Adam	2+0 zk	-	2	-
Statistical Data Analysis 1, 2	02SZD12	Myška	2+2 z, zk	2+2 z, zk	4	4
Seminar 1, 2	02SE12	Bielčík	0+3 z	0+3 z	3	3
Research Project 1, 2	02VUJC12	Bielčík, Petráček	0+6 z	0+8 kz	6	8
Detector Systems and Data Acquisition	02SDSD	Broz	-	2+0 zk	-	2
Required optional courses type A (1)						
Extreme States of Matter (2)	02EXSH	Bielčík, Šumbera	2+0 zk	-	2	-
Physics of Ultrarelativistic Nuclear Collisions (2)	02FUJS	Křížková-Gajdošová	-	2+0 zk	-	2
Accelerators 1, 2 (3)	02UC12	Krůs	2+0 zk	2+0 zk	2	2
General Theory of Relativity (4)	02GTR	Tomášik	2+2 z, zk	-	4	-
Optional courses:						
Workshop 2	02VS2	Bielčík	1 týden z	-	1	-
Special Practicum 1, 2	02SPRA12	Čepila	0+4 kz	0+4 kz	6	6
Seminar on Quark-Gluon Plasma 3, 4	02ROZ34	Bielčík, Bielčíková, Tomášik	2+0 z	2+0 z	2	2
Physics of Atomic Nuclei	02FAJ	Adam, Veselý	-	4+0 zk	-	4
Topics in Theory of Probability for Physists	02PRF	Šumbera	2+0 z	-	2	-
Astroparticle Physics 1, 2	02ACF12	Vícha	2+0 zk	2+0 zk	2	2
Monte Carlo Method	18MEMC	Jarý, Virius	2+2 z, zk	-	4	-
Selected Topics on Relativistic Nucleus-Nucleus Collisions	02VPJRS	Karpenko, Trzeciak	-	2+1 z, zk	-	3
Object Oriented Programming	18OOP	Virius	0+2 z	-	2	-
Advanced C++	18PCP	Virius	-	2+2 z, zk	-	4
Neural Networks and their Application	01NEUR1	Hakl, Holeňa	-	2+0 zk	-	2

(1) At least one of the groups E, I or T must be enrolled.
(2) Courses Experimental (E)
(3) Courses Instrumental (I)
(4) Courses Theoretical (T)

Master´s Degree Program

Nuclear and Particle Physics

2nd year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Fundamentals of Electroweak Theory	02ZELW	Bielčíková, Tomášik	3+2 z, zk	-	6	-
Seminar 3, 4	02SE34	Bielčík	0+3 z	0+3 z	3	3
Master Thesis 1, 2	02DPJC12	Bielčík, Petráček	0+10 z	0+20 z	10	20
Quantum Chromodynamics	02ZQCD	Bielčíková, Tomášik	-	3+2 z, zk	-	6
Optional courses:						
Workshop 3	02VS3	Bielčík	1 týden z	-	1	-
Seminar on Quark-Gluon Plasma 5, 6	02ROZ56	Bielčík, Bielčíková, Tomášik	2+0 z	2+0 z	2	2
Materials in Experimental Nuclear Physics	02MAT	Škoda	2+0 zk	-	2	-
Nuclear Spectroscopy	02JSP	Wagner	-	2+2 z, zk	-	5
Physics behind Standfard Model	02BSM	Hubáček	2+0 z	-	2	-
Computer Control of Experiments	17PRE	Kropík	2+1 z, zk	-	3	-
Matrix Lie Group Representations	02REP	Hrivnák	2+0 z	-	2	-
Applied Quantum Chromodynamics at High Energies	02AQCD	Nemčík	-	2+0 zk	-	2

Master´s Degree Program

Mathematical Physics

1st year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Geometric Methods in Physics 2	02GMF2	Šnobl, Vysoký	-	2+2 z, zk	-	5
Finite Groups and Representations	02GR	Chadzitaskos, Motlochová	2+1 z, zk	-	3	-
Quantum Physics	02KFA	Jex, Potoček	-	4+2 z, zk	-	6
Quantum Field Theory 1, 2	02KTPA12	Jizba, Štefaňák, Zatloukal	4+2 z, zk	4+2 z, zk	8	8
Lie Algebras and Lie Groups	02LAG	Šnobl	4+2 z, zk	-	7	-
Research Project 1, 2	02VUMF12	Šnobl, Štefaňák	0+6 z	0+8 kz	6	8
Winter School of Mathematical Physics (1)	02ZS	Hrivnák	1 týden z	-	1	-
Optional courses:						
Quantum Information and Communication	02QIC	Gábris, Štefaňák	3+1 z, zk	-	4	-
Quantum Programming	02QPRG	Gábris, Yalcinkaya	-	1+1 z	-	2
Functional Analysis 3	01FAN3	Šťovíček	2+2 z, zk	-	5	-
Theory of Random Processes	01NAH	Vybíral	3+0 zk	-	3	-
Variational methods	01VAM	Beneš	1+1 zk	-	3	-
Advanced Topics of Quantum Theory	02PPKT	Exner	-	2+0 zk	-	2
Graph Theory	01TG	Ambrož, Pelantová	4+0 zk	-	5	-
Solvable Models of Mathematical Physics (2)	02RMMF	Hlavatý	-	2+0 z	-	2
Introduction to Strings 1, 2 (2)	02UST12	Hlavatý	2+1 z	2+1 z	3	3
Quantum Optics 1, 2	02KO12	Jex, Potoček	2+2 z, zk	2+2 z, zk	4	4
Open Quantum Systems	02OKS	Novotný	-	2+0 z	-	2

(1) For students of this field only.
(2) These courses alternate with each other.

Master´s Degree Program

Mathematical Physics

2nd year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Algebraic Topology	02ALT	Vysoký	2+2 z, zk	-	4	-
Master Thesis 1, 2	02DPMF12	Šnobl, Štefaňák	0+10 z	0+20 z	10	20
Diploma Seminar	02DSMF	Hrivnák	-	0+2 z	-	1
Selected Topics in Statistical Physics and Thermodynamics	02VPSFA	Jex, Novotný	4+2 z, zk	-	7	-
Optional courses:						
Relativistic Physics 1	02REL1	Bičák, Semerák	4+2 z, zk	-	6	-
Relativistic Physics 2	02REL2	Bičák, Semerák	-	4+2 z, zk	-	6
Quantum Information and Communication	02QIC	Gábris, Štefaňák	3+1 z, zk	-	4	-
Quantum Groups 1	01KVGR1	Burdík	2+0 z	-	2	-
Mathematical Modelling of Non-linear Systems	01MMNS	Beneš	1+1 zk	-	3	-
Quantum Circle 1, 2	02KVK12	Exner	0+2 z	0+2 z	2	2
Solvable Models of Mathematical Physics (1)	02RMMF	Hlavatý	-	2+0 z	-	2
Introduction to Strings 1, 2 (1)	02UST12	Hlavatý	2+1 z	2+1 z	3	3
Gemoetrical Aspects of Spectral Theory	01SPEC	Krejčiřík	-	2+0 zk	-	2
Coxeter Groups	02COX	Hrivnák	2+0 z	-	2	-
Asymptotical Methods	01ASY	Mikyška	2+1 z, zk	-	3	-
Symmetry Groups of Quantum Systems	02GSKS	Tolar	2+0 zk	-	2	-
Seminar in Quantum Field Theory	02SKTP	Jizba	-	2+1 z	-	3

(1) These courses alternate according to regulations of the department.

Master´s Degree Program

Solid State Engineering

1st year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Solid State Theory 1	11TPL1	Hamrle, Kalvoda	4+0 zk	-	6	-
Physics of Metals	11FKOV	Seiner	2+0 zk	-	2	-
Semiconductor Physics	11POLO	Potůček	4+0 zk	-	4	-
Seminar and Excursions 1	11SMEX1	Drahokoupil, Kolenko, Zajac	2+2 z	-	4	-
Research Project 1	11VUIP1	Kalvoda	0+6 z	-	6	-
Solid State Theory 2	11TPL2	Hamrle, Kalvoda	-	2+0 zk	-	3
Seminar in Solid State Theory	11STPL	Sedlák, Seiner	-	0+2 kz	-	2
Physics of Dielectrics	11FDEL	Bryknar, Potůček	-	2+0 zk	-	2
Physics of Magnetic Materials	11FMGL	Hamrle, Zajac	-	2+0 zk	-	2
Seminar and Excursions 2	11SMEX2	Drahokoupil, Kolenko, Zajac	-	2+2 z	-	4
Research Project 2	11VUIP2	Kalvoda	-	0+8 kz	-	8
Required optional courses (1)						
Practical Exercises from Solid State Structure Analysis	11PSPL	Čapek, Kučeráková	0+4 kz	-	4	-
Practical Training in Electronics	11EP	Jiroušek	0+4 kz	-	4	-
Laboratory Trainings in Solid State Physics	11PPOL	Levinský	-	0+4 kz	-	4
Optional courses:						
Real Time Software	11RTSW	Dráb, Jiroušek	-	2+0 z	-	2
Superconductivity and Low Temperature	11SUPR	Janů, Ledinský	4+0 zk	-	4	-
Chemical Aspects of Solids	11CHA	Knížek	2+0 zk	-	2	-
Metallic Oxides	11KO	Hejtmánek	-	2+0 zk	-	2
Physics of Solid State Phase Transitions	11FPPL	Hlinka	-	2+0 zk	-	2
Neutron Diffractometry	11AND	Kučeráková, Vratislav	2+0 zk	-	2	-
Diffraction Methods of Structural Biology	11DMSX	Dohnálek	-	2+1 z, zk	-	3
Quantum Optics	12KOP	Richter	-	3+1 z, zk	-	5
Molecular Nanosystems	11MONA	Kratochvílová	2+0 zk	-	2	-
Optical Spectroscopy of Inorganic Solids	11OSAL	Potůček	-	2+0 zk	-	2
Selected Topics in Structure of Condensed Matter	11VPSX	Drahokoupil	-	1+1 z, zk	-	2
Nano-Materials - Preparation and Properties	11NAMA	Kratochvílová	-	2+0 zk	-	2
Resonance Spectroscopy of Solid State	11RSPL	Buryi	2+0 zk	-	2	-

(1) At least one course must be enrolled.

Master´s Degree Program

Solid State Engineering

2nd year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Computer Simulation of Condensed Matter	11SIKL	Kalvoda, Sedlák	2+2 z, zk	-	4	-
Optical Properties of Solids	11OPTX	Bryknar, Potůček	2+0 zk	-	2	-
Physics of Surfaces and Interfaces	11FPOR	Kalvoda	2+0 zk	-	2	-
Intrinsic Dynamics of Materials	11VDM	Seiner	2+0 zk	-	2	-
Seminar and Excursions 3	11SMEX3	Drahokoupil, Kolenko, Zajac	2+2 z	-	4	-
Master Thesis 1	11DPIP1	Kalvoda	0+10 z	-	10	-
Seminar and Excursions 4	11SMEX4	Drahokoupil, Kolenko, Zajac	-	2+2 z	-	4
Master Thesis 2	11DPIP2	Kalvoda	-	0+20 z	-	20
Optional courses:						
Theory and Construction of Photovoltaic Cells	11PCPC	Pfleger	2+0 zk	-	2	-
Diffraction Analysis of Mechanical Stress	11DAN	Ganev, Kraus	2+0 zk	-	2	-
Neutronography in Material Research	11NMV	Kučeráková, Vratislav	-	2+0 zk	-	2
Smart Materials and Their Applications	11SMAM	Potůček, Sedlák	2+0 zk	-	2	-
Principles and Applications of Optical Sensors	11PAO	Aubrecht	2+0 zk	-	2	-
Magnetic Materials	11MAM	Heczko	2+0 zk	-	2	-
Laboratory in Macromolecular Crystallography 1, 2	11PMK12	Koval	0+4 kz	0+4 kz	4	4
SEM and Methods of Microbeam Analysis	11SEM	Kopeček	2+0 zk	-	2	-
Practical Aspects of Point Defects Study	11PASD	Buryi	2+0 zk	-	2	-
Physics of Detection and Detectors of Optical Radiation	12FDD	Pína	2+0 zk	-	2	-

Master´s Degree Program

Quantum Technologies

1st year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Quantum Information and Communication	02QIC	Gábris, Štefaňák	3+1 z, zk	-	4	-
Quantum Optics 1, 2	02KO12	Jex, Potoček	2+2 z, zk	2+2 z, zk	4	4
Quantum Field Theory 1, 2	02KTPA12	Jizba, Štefaňák, Zatloukal	4+2 z, zk	4+2 z, zk	8	8
Quantum Generators of Optical Radiation 1	12KGOZ1	Jelínek, Jelínková, Němec	2+0 zk	-	2	-
Quantum Generators of Optical Radiation 2	12KGOZ2	Šulc	-	2+2 z, zk	-	4
Theory of Solid State 1	11TPLA1	Hamrle, Seiner	2+2 z, zk	-	4	-
Research Project 1, 2	00VUQT12	Sedlák, Štefaňák, Šulc	0+6 z	0+8 kz	6	8
Optional courses:						
Information Theory	01TIN	Hobza	2+0 zk	-	2	-
Graph Theory	01TG	Ambrož, Pelantová	4+0 zk	-	5	-
Quantum Programming	02QPRG	Gábris, Yalcinkaya	-	1+1 z	-	2
Open Quantum Systems	02OKS	Novotný	-	2+0 z	-	2
Matrix Lie Group Representations	02REP	Hrivnák	2+0 z	-	2	-
Statistical Data Analysis 1, 2	02SZD12	Myška	2+2 z, zk	2+2 z, zk	4	4
Accelerators 1, 2	02UC12	Krůs	2+0 zk	2+0 zk	2	2
Advanced C++	18PCP	Virius	-	2+2 z, zk	-	4
Object Oriented Programming	18OOP	Virius	0+2 z	-	2	-
Monte Carlo Method	18MEMC	Jarý, Virius	2+2 z, zk	-	4	-
Superconductivity and Low Temperature	11SUPR	Janů, Ledinský	4+0 zk	-	4	-
Molecular Nanosystems	11MONA	Kratochvílová	2+0 zk	-	2	-
Nano-Materials - Preparation and Properties	11NAMA	Kratochvílová	-	2+0 zk	-	2
Statistical Optics	12SOP	Richter	2+0 z, zk	-	2	-

Master´s Degree Program

Quantum Technologies

2nd year

Course	code	lecturer	win. sem.	sum. sem.	cr	cr
Compulsory courses:						
Quantum Field Theory 3	02KTPA3	Jizba, Zatloukal	4+2 z, zk	-	8	-
Theory of Solid State 2	11TPLA2	Hamrle	-	2+2 z, zk	-	4
Diploma Thesis 1, 2	00DPQT12	Sedlák, Štefaňák, Šulc	0+10 z	0+20 z	10	20
Optional courses:						
Selected Topics in Statistical Physics and Thermodynamics	02VPSFA	Jex, Novotný	4+2 z, zk	-	7	-
Seminar in Quantum Field Theory	02SKTP	Jizba	-	2+1 z	-	3
Physics of Detection and Detectors of Optical Radiation	12FDD	Pína	2+0 zk	-	2	-
Open Resonators	12OREZ	Kubeček	2+1 z, zk	-	4	-
X-ray Photonics	12RFO	Pína	2 zk	-	2	-
Ultra-short Pulse Generation	12UKP	Jelínek, Kubeček	2+0 zk	-	2	-
Selected Chapters of Modern Optics	12MODO	Kwiecien	2+0 z	-	2	-
Nanophysics	12NF	Šiňor	1+1 zk	-	2	-
Nonlinear Optics	12NOP	Richter	-	3+1 z, zk	-	4
Quantum Chromodynamics	02ZQCD	Bielčíková, Tomášik	-	3+2 z, zk	-	6
Fundamentals of Electroweak Theory	02ZELW	Bielčíková, Tomášik	3+2 z, zk	-	6	-
Computer Simulation of Condensed Matter	11SIKL	Kalvoda, Sedlák	2+2 z, zk	-	4	-
Physics of Surfaces and Interfaces	11FPOR	Kalvoda	2+0 zk	-	2	-
Optical Properties of Solids	11OPTX	Bryknar, Potůček	2+0 zk	-	2	-

EXPLANATORY NOTES

for notations in the curriculum

The curriculum contains in each row

- course name
- shortcut used in the university database KOS
- name of the lecturer
- extent in the winter and summer semester
- credits in the winter and summer semester

In case the course spans over two semesters with different parts denoted by numbers, they can be contained in one row.

The extent of the course is indicated by number of teaching hours of the lecture + number of teaching hours of the lecture together with the indication of the grading (see later i nthis text). In case the teaching hours of the lecture and exercise are not distinguished, the course extent is indicated by one number.

POLICIES AND PROCEDURES FOR THE BACHELOR COURSES AND CONTINUATION MASTER COURSES AT THE FACULTY OF NUCLEAR SCIENCES AND PHYSICAL ENGINEERING (FNSPE) OF THE CZECH TECHNICAL UNIVERSITY (CTU) IN PRAGUE

ACADEMIC YEAR 2021-2022

The Policies and Procedures of the FNSPE of the CTU in Prague represent the fundamental document for the study programmes offered by this institution, complementing and specifying the requirements of the CTU Academic and Examination Statute. This document is binding on all academics and students. Study programmes of FNSPE are structured, an comprise the bachelor and master studies. The study programme or its degree may comprise various specializations.

Compliant with the CTU Academic and Examination Statute, Sec.4, the undergraduate and master programmes study plans of fields and specialisations specify the required compulsory courses as well as optional courses recommended for the respective field of study.

Section 1

Bachelor Programme (BP)

1. Curricula in the Bachelor´s Degree Programme contain compulsory, optional, and core-elective bachelor courses.
2. In the Bachelor Programme, it is not allowed to register for courses of the Continuation Master Programme with the exception given by Sec. 2, Par. 4 a.

Section 2

Continuation Master Programme (MCP)

1. Curricula in the Master´s Degree Programme contain compulsory and optional master courses. In the Master Programme, it is not allowed to enrol into courses of the Bachelor´s Degree Programme.
2. To be eligible for the MCP, (in terms of conditions set by law and by the rules of the admission procedure), all applicants are required to have completed a Bachelor Programme in a related or identical field of study as well as to have successfully passed the entrance examination. However, student may be exempt from the examination on the Dean´s recommendation.
3. If necessary, for the first two years, student on the MCP will have an individual curriculum, so as to attain the competences required for the completed Bachelor´s Degree Course.
4. To transfer from the Bachelor Programme to the MCP, the following rules are imposed:
   a. In the Bachelor´s Degree Programme, it is possible to register for the courses in the recommended 1st year MCP programme provided the credits obtained do not exceed the total number of 30. Such credits must be obtained beyond the limit of 180 credits obtained in the Bachelor´s Degree Course.
   b. Provided student has graduated from a Bachelor Course at FNSP and transfers to the MCP, on application, courses listed in the recommended 1st year MCP curriculum can be counted for up to 30 credits if obtained beyond the mandatory minimum of 180 credits as required for the Bachelor Programme by the CTU Academic and Examination Statute.
   c. The MCP will not recognize courses taken within the Bachelor Programme beyond those recommended by the programme of a given field/specialisation.

Section 3

Registration

1. Bachelor and Master Degree student will register for the winter semester prior to its beginning. The prerequisite for passage to summer semester is the fulfilment of conditions given by the CTU Academic and Examination Statute, and, upon doing so, student can register for the summer semester, prior to its beginning.
2. Students of higher Bachelor and Master Programmes will register for the following academic year courses upon having fulfilled conditions for passage to the following academic year given by the CTU Academic and Examination Statute.
3. To be eligible for registration to the following academic year, student will have obtained all the required end-of-unit assessments ("zápočet" in Czech , i.e. recognition of the current semester coursework and responsibilities) and passed all examinations in the re-registered (i.e. registered a second time) obligatory courses.
4. Student will register for each course in the electronic information system of the CTU and also enter the list of courses in their course record book ("index"in Czech), in order that they may function as their semester/year study schedule according to Par.1 and 2, respectively, in agreement with these procedures and the CTU Academic and Examination Statute. To register, the following rules are to be observed:
   a. all students of respective fields, specialisations, or years of study will register for compulsory courses (see Sec. 4 and 5)
   b. student will register for optional and core-elective courses according to their choice, taking into account the rules of the study schedule, in particular the sequence of courses, sometimes subject to and required by the field/specialisation study plans.
   c. bachelor students of a given study programme may register for optional courses of other fields in the same programme. Registration of courses from other bachelor study programmes can be granted by the dean upon request. Upon this, these courses are regarded as an optional part of student´s respective field of study curriculum.
   d. master students of a given study programme may register for optional courses of other fields in the same programme. Registration of courses from other master study programmes can be granted by the dean upon request. Upon this, these courses are regarded as an optional part of student´s respective field of study curriculum.
5. Student must not register for the same course a second time if they have concluded it by examination or obtained a "zápočet", as the case may be.
6. The number of years at university will be counted from the first registration for a given degree programme, including any deferrals. If, however, student has discontinued their study in the immediately preceding semester, conditions to be fulfilled are postponed towards the next registration.
7. Details on registration are gradually specified by notices of the Department of Student Affairs.

Section 4

Compulsory Courses

1. If in the course of their programme, a compulsory course is removed from the list, student is not required to complete it; if, however, the respective course is replaced by another compulsory course (and its title or extent is changed, its contents remaining unaltered), the student is obliged to take the new course (unless they have completed its previous version).

2. When included into the course list , the new course must be completed only by students studying no longer than the year of the recommended study plan. The decision as to which course to take and pass is made by the head of the respective department guaranteeing the corresponding field of study..

Section 5

Measuring and Assessing Student´s Academic Attainment

1. The main means for assessing and measuring student´s academic attainment include the end-of-unit-assessment ("zápočet"), graded assessment ("klasifikovaný zápočet"), and examinations. The term "end-of-unit assessment only" ("samostatný zápočet") is used if the course is not concluded by an examination. Obtaining a "zápočet" is a prerequisite to be admitted to an examination preceded by such a "zápočet".
2. Examinations are usually administered during the respective semester examination period. Adequate number of evenly spread examination dates will be announced by the tutor in order that students may take the examination within the examination period. -
3. End-of-unit assessments and examinations may not be administered before student has completed the respective course. If registered for the course a second time , student may take the end-of-unit assessment or examination any time in the course of the academic year provided they have fulfilled all academic obligations to finish the course and the tutor gave their agreement..
4. Winter semester examinations and end-of-unit assessments may be administered during the summer semester or summer semester examination period. No examinations and tests for the end-of-unit assessment for the past academic year will be administered after commencement of the next academic year.
5. To take an examination, student will have registered for it and gained the end-of-term assessment (if required by the curriculum). If student has registered for an examination date and cannot be present for the examination on the chosen date, an apology must be made in advance. A belated apology is accepted for serious reasons of absence (mainly on health), but no later than 2 days after the examination date. The examiner will judge whether the excuse is legitimate. If student failed to be present for the examination and no apology was made in advance or was not accepted, the examination term expires and the examination is graded as "failure".
6. If student has not registered for any examination in the respective course within the examination period and has not made any arrangements as to the examination term with the examiner, the examination is graded as "failure".
7. The tutor´s/examiner ´s obligation is .to enter immediately the result/grade into the CTU electronic information system, student´s course record book ("index") , and department´s non-electronic registers. If student requests recognition of a course on the list of some other degree course or in cases given by notices concerning student on Bachelor or Continuation Master Courses, such entries may be the responsibility of the Department of Student Affairs.
8. The succession of courses is stated in the recommended time schedule of the programme and student will adhere to it for course registrations. Provided the courses run for more semesters or in succession, student cannot obtain an end-of-unit assessment only ("samostatný zápočet") or take an examination in a course scheduled for a later semester unless they have satisfied the

requirements of the previous course. The eligibility requirements are specified by the head of the department responsible for the course.

9. Courses marked A or B are understood to comprise one course, as given by the Academic and Examination Statute of the CTU.

Section 6

Languages

1. As part of the Bachelor Programme, student will register for and pass examinations in two of the foreign languages offered in the curriculum. Foreign students – with the exception of Slovak students and those who passed an examination in Czech as part of their school-leaving examination - will register for Czech as their second foreign language.
2. Language courses, according to Par. 1 are offered in three to five semester cycles, the exception being students of Applied Informatics. The time schedule of these courses is part of the study programme.
3. According to Par. 2, each semester is a self-contained unit concluded by a "zápočet". If student is admitted to the Bachelor Course again (i.e. registers for it a second time), the "zápočet" is not recognized; however, student does not have to register for the parts of cycle he had already passed successfully. Semesters of the cycle follow the course sequence stated in Section 5, Par.8. Each semester is concluded by a "zápočet" only if student had obtained a "zápočet" for the previous semester course. The language programme cycle is concluded by an examination.
4. Language courses can be offered in several groups according to language competence. The level of course to be chosen rests with the student and takes into account their previous language training and results achieved. Transfers between courses are possible solely on tutor´s recommendation or student´s application, within two weeks of language course commencement, but not later.
5. Applied Informatics programme follows an extended language programme targeted at professional oral and written communication and includes also a second foreign language course of student´s choice. The time schedule of these courses is part of the curriculum of the specialisation. The bachelor project is submitted and defended in English. Upon choosing, and supposing they have satisfied criteria defined by the Department of Social Sciences and Languages, after 5 semesters of the Applied Informatics programme student can register for a state language examination.
6. Exceptions to compulsory training in more than two foreign languages are judged by the Department of Social Sciences and Languages on individual basis. Student can choose and register for a third language only if they had concluded the cycle of two languages as stated in Par.1 of this Section.
7. Details for language training are given in the binding regulations for language courses issued by the Department of Social Sciences and Languages.

Section 7

Courses in Calculus, Linear Algebra, and Mathematics

1. Fundamental courses in mathematics within the Bachelor Course curriculum are offered at three levels of difficulty marked A, B, and C, their course structure being given by the Bachelor Course curriculum. Level C is offered in the Mathematics course.

2. In the study programme Applications of Natural Sciences the transfers from course Calculus A to Calculus B, or from course Linear Algebra A to course Linear Algebra B are subject to the recommendation of the examiner after the A level examination. The examiner can inform student that their attainment satisfies the knowledge required for course B only. In such case, on student´s agreement with the offer, the examiner has the right to enter the grade for course level B instead of the grade for course A into student´s course record book and the electronic system..
3. On student´s application and the Dean´s consent, student can register for course A instead of course B.
4. Courses assigned A or B and the course Mathematics must be seen as two parts of one course, inclusive of the form they are concluded (according to the Academic and Examination Statute of the CTU, Sec.6) and of the number of retakes (according to the Academic and Examination Statute of the CTU, Sec.10) given by the sum of course A and course B passages. Student who has passed a course A examination may not register a second time for the same course B. After one registration for and successful passage of course B examination student may register for the same course A examination.
5. On student´s application and the Dean´s consent, student can transfer from course level A or B to course level C.

Section 8

Bachelor Project, Research Project, and Master Thesis

1. A compulsory part of the the Bachelor´s Degree Course is the bachelor project defended by student as part of the State Final Examination. A compulsory part of the Continuation Master Course is a research project and master thesis. Student may not register for them while still registered for the Bachelor Course. The research project is defended before the board nominated by the respective department. Defence of the master thesis is part of the State Final Examination. The research project can be assigned only after student has defended their bachelor project .. The degree thesis can be assigned only after student has completed and successfully defended Research Project 2.
2. The administrators will announce topics of bachelor projects, research projects, and master theses no later than end of the previous academic year. Bachelor projects and master theses are assigned to students by the Dean; research projects are assigned to students by the head of the department. The assignments can be used for two years.
3. The bachelor project, research project as well as master thesis assignment will include the title (both in Czech and English), the outline, recommended literature, the supervisor´s name and affiliation, date of assignment, and date of submission. Contents of the assignment must be in agreement with the domain of education to which the study programme belongs. The assignment is assigned for two years.
4. The bachelor project, research project, and master thesis are assigned to student at the beginning of the winter and/or summer semester. It is the student‘s obligation to accept the work assignment within 30 days from the beginning of semester. If student fails to do so, the assignment is postponed until the next semester. Assignment of the bachelor project and master thesis at an extraordinary term is a prerogative of the Dean, whereas assignment of the research project at an extraordinary term is a prerogative of the head of the department.

5. The bachelor project and master thesis will include items required for bibliography (in Czech: the title, author's name field of study, type of work, supervisor, consulting tutor, abstract, and key words; in English : the title, author's name, abstract, key words), as well as work assignment in compliance with the principle of public access to bachelor projects and master theses according to the given standard.
6. Student will submit the bachelor project or master thesis to the respective department in three hard copies, bound, and electronically. If a proposal is presented to postpone public access to the bachelor project or master thesis (pursuant to Sec. 47b, par.4 of Act N.111 1998 Coll. on Higher Education as altered and amended), student will submit one copy more. The language of the thesis is English.
7. The bachelor project and the master thesis are assessed by the supervisor and reviewed by at least one reviewer. In their reviews they also suggest the final grade.
8. Bachelor projects and master theses are submitted by the date given in the time schedule of the academic year, taking also into account the dates of the State Final Examination, i.e. at least four weeks prior to the first day of the State Final Examination of the given field of study or specialisation.
9. If student fails to submit the bachelor project or the master thesis at the time agreed, which is usually one year, the assignment can still be used for the time period it is valid, as given in Par. 3, which is two years. If, however, student fails to observe the scheduled deadline as given in Par. 3 and the bachelor project or master thesis is submitted after the assignment validity has come to an end , a new assignment has to be given.
10. Supervisor´s and reviewer´s reports must be made available to student at least 5 days prior to the date of State Final Examination.
11. Technicalities of submitting the research project and defending it, as well as administering the "zápočet" are within responsibility of the head of the department, as well as the defence of the research project, usually held at two ordinary dates, namely after the end of the winter/ summer semester courses of the academic year. In case the student fails to defend his research project at an ordinary date, he can defend it (within the same registration) at an extraordinary date located in the prolongated examination period ot the academic year.
12. Courses Research Project 1 and 2 and Master Thesis 1 and 2 run for two semesters. Thus, student cannot register for courses Research Project 1 and Research Project 2 in the same semester, and, likewise, for Master Thesis 1 and Master Thesis 2. These courses can be passed provided student meets the requirements given in the valid work assignment. The student obtains the work assignment in the semester they register for the first part of the course for the first time. Student may not register for the Master Thesis 1 course before the semester following their successful defence of Research project 2.

Section 9

Study Visits Abroad

1. As part of their Bachelor and MasterPprogramme, student may spend some time on a study visit or bilateral agreement exchange programme abroad. These activities, as e.g. ERASMUS+ programme or ATHENS, are organized by the International Office at the CTU Rector´s Office.
2. All study visits of Bachelor and Master Programme students follow the rules and regulations of the CTU and are recorded by the Department of Student Affairs of the FNSPE CTU in Prague.

These rules also include conditions for study visits to be satisfied by students of the FNSPE CTU:

a. student on any type of degree course is eligible for 1 longterm sojourn abroad not exceeding 2 semesters
b. the last semester spent abroad must not be the last semester of student´s standard length of degree programme (except for the visit given in Par. 2c. below), supposing that they have met all academic obligations
c. MCP student´s intention to work on some part of the master thesis or complete it abroad within their sojourn is to be confirmed by their department´s consent given in writing and including the name of the assigned deputy supervisor of the thesis from the respective host institution, a statement confirming that both parties agreed on details concerning thesis supervision, and a written consent of the supervisor to the procedures agreed
d. student sojourning abroad can be signed in for the semester without being registered for a specific course

3. In compliance with the CTU‘s rules, arrangements for a study visit abroad comprise:
   a. student´s study schedule approved of and recommended by the respective department and submitted to the Department of Student Affairs of the FNSPE CTU prior to the stay
   b. assessment and evaluation of the study visit and programme taken abroad, credit and course transfer approved by the respective department and Department of Student Affairs of the FNSPE CTU in Prague
   c. fulfilment of general requirements set by the CTU Academic and Examination Statute (i.e. gaining at least 20 credits transferred from the host university per semester).

Section 10

Completion of Study Programme

1. In compliance with the Academic and Examination Statute of the CTU in Prague, student will conclude their studies by having finished their study programme and passed the State Final Examination including defence of their master thesis or bachelor project.
2. To complete the Bachelor Degree study programme, student must have passed examinations in all compulsory courses of their respective programme (see Sections 4 and 5), having gained at least 180 credits.
3. To complete the Continuation Master Programme (MCP), student must have passed examinations in all compulsory and core-elective courses as stated in the respective programme (see Sec.4 and 5 and Sec.2, Par.1) and gained at least 120 credits (however, at least 180 credits in the three-year course in Radiological Physics).

Section 11

State Final Examination

1. Student is eligible to take the State Final Examination only if they have completed their study programme, gained the required number of credits, and submitted by the given date their bachelor project or master thesis.
2. State Final Examinations of the Bachelor´s Degree Programme may be held at two terms, usually in September or in February, which is in accordance with the time schedule of the

academic year, or at an extraordinary date subject to the respective department´s request. Each department will announce the subjects set for the State Final Examination in the Bachelor´s Degree Programme by September 30th for the February term, and by January 31st for the September term, or no later than four months prior to an extraordinary term of the State Final Examination.

3. State Final Examinations of the Master Programme are held at two terms (usually in June or February) according to the time schedule of the academic year, or on an extraordinary term subject to the respective department´s request. Each department will announce the subjects set for the State Final Examination in the Continuation Master Programme by September 30th for the February term, and by January 31st for the September term, or no later than four months prior to an extraordinary term.
4. Student's application for admission to the State Final Examination will include the optional subjects chosen for the examination. Applications for the February term are accepted by the end of November, and for the September term by the end of May, or no later than two months prior to the extraordinary term of State Final Examinations. The examination terms are given in the time schedule of the academic year. Applications submitted after the given date will not be considered.
5. If student did not take the State Final Examination in the academic year they had submitted the bachelor project or master thesis, the work submitted by student will be returned to them and respective review reports are no longer valid.
6. The examination follows the Rules of Procedure of the State Final Examination issued by the Dean.
7. The oral part of the State Final Examination in the Bachelor´s Degree Programme will consist of one core subject out of the package of field/specialisation courses (with a possible option), and a subject of more detailed specialisation (with a possible option).
8. The oral part of the State Final Examination in the Continuation Master Programme Applications of Natural Sciences consists of two core subjects out of the package of field/specialisation courses (with a possible option) and a subject of more detailed specialisation (with a possible option).
9. The oral part of the State Final Examination in the newly accredited Continuation Master Programmes consists of one core subject out of the package of field/specialisation courses and two subjects of more detailed specialisation (with a possible option).
10. In accordance with the Academic and Examination Statute of the CTU in Prague, student must take the State Final Examination, and, if such is the case, retake it, within one year and a half of the date they have satisfied all the other requirements of the study programme. The date is understood to be the last day of examination period of the last semester student was registered for courses of the programme of their field. Afterwards, this student still remains enrolled as a student until they have passed the last part of the State Final Examination; however, this period must not exceed one and a half year.

Section 12

Termination of Studies

1. By virtue of Sec. 56, Par. 1, Letter b) of Law No. 111/19898 of Coll., as amended, and Sec.34, Par. 7, Letter b) of the Academic and Examination Statute of CTU, these documents state the following conditions for terminating studies due to failure to satisfy the requirements and

academic obligations following from the study programme and Academic and Examination Statute of the CTU in Prague:

- failure to fulfil academic responsibilities and gain 15 credits after the first semester on the Bachelor Programme and 20 credits after the first semester on the Master Programme
- failure to gain "zápočet" after second registration for a compulsory course
- failure to pass examination on second retake after second registration for a compulsory course
- failure to pass examination after last registration for a compulsory course by the end of academic year
- failure to satisfy eligibility conditions to register for the next academic year (semester)
- failure to pass the State Final Examination within one and a half year of completing studies
- failure to pass the State Final Examination within the maximum study period
- failure to pass retaken State Final Examination

2. Other reasons for terminating studies:
   - failure to register for academic year within given period without accepted excuse
   - failure to register for courses after period of deferral
   - transfer to other faculty
   - withdrawal from studies
   - expulsion from the CTU

Section 13

Temporary rules

1. Within the transfer to the newly accredited fields of study programmes, in academic year 2021-2022 the first and second-year course structure of the recommended study programmes of the Bachelor and Continuation Master courses follows the new study programmes; however, the higher courses follow the course structure of the previously accredited fields.
2. All special cases related to this transfer to newly accredited programmes will be subject to the Dean´s decision.

Professor Ing. Igor Jex, DrSc.

Dean