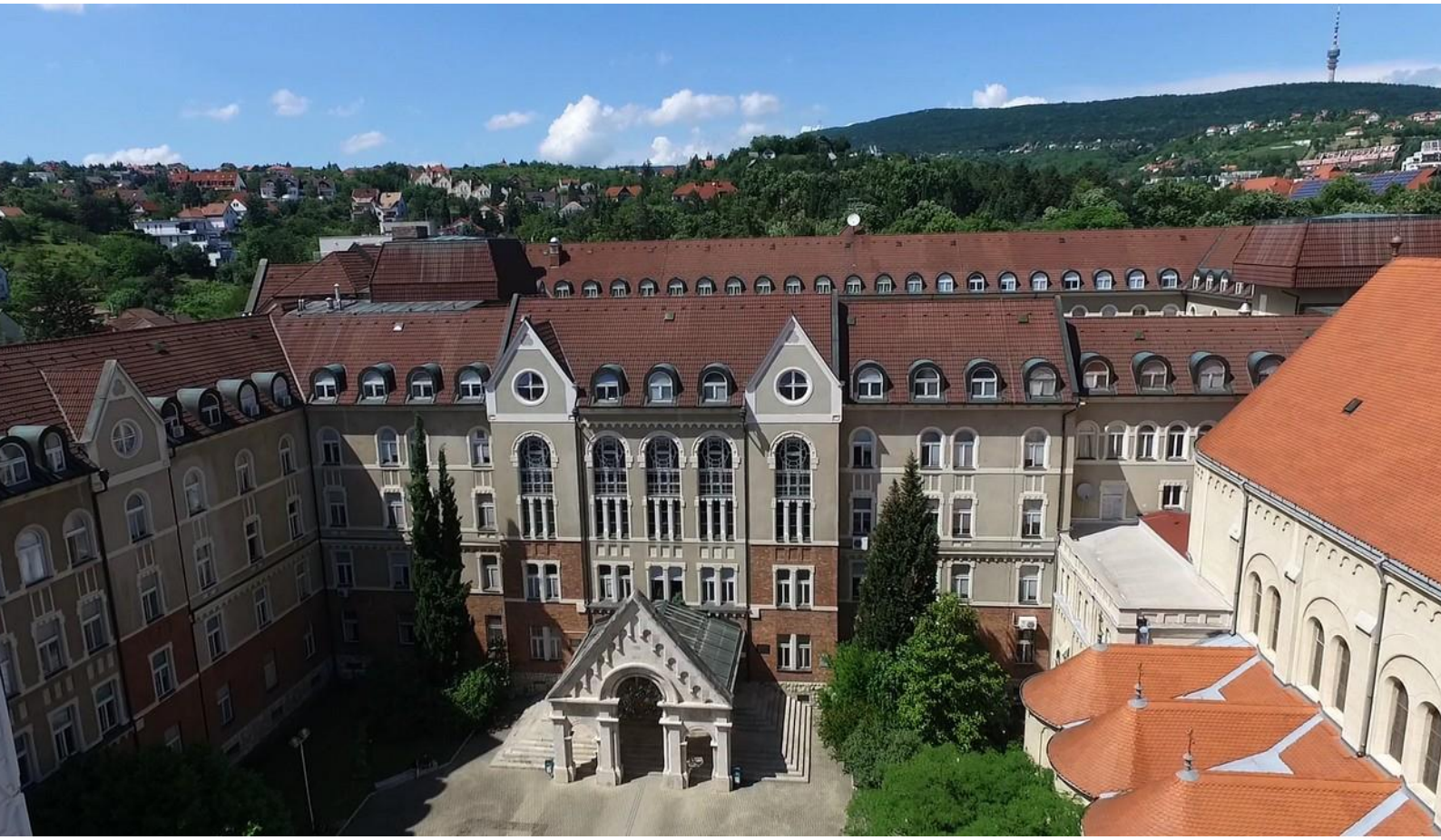

Erasmus Study Guide
2021-22

Faculty of Sciences

University of Pécs

Welcome

Dear Prospective Erasmus Student!

Let me be the first one welcoming you at the Faculty of Sciences, University of Pécs. My name is Ms Sarolta Kapitány, your faculty Erasmsus coordinator if you decide to study at our faculty and make it part of your higher education program. Experience of international exchange programs are one of a lifetime opportunities and we are excited to support you throughout your time here, in Pécs to help you make the most of it.
We are all delighted to share useful information with you regarding the courses you can choose from for your Erasmus studies.

In the first part of this study guide you can learn about the Faculty of Sciences and its six institutes. You can get familiar with our doctoral schools as well.

In the second part, we would like to introduce our full time programs and the courses you can choose from. Here you can read detailed information about each and every courses available for you as an Erasmus student. All our offered courses are run in English.

The last section of this study guide is a summary table of all courses we offer for our incoming Erasmus students. Here, you can find information in which semester the course is available, how many ECTS credits you can earn on completion of the course, how many hours/per week/semester the courses is built up on and also the responsible instructor in charge.

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Introduction

The six institutes constituting the Faculty of Sciences are engaged in teaching and research in classical natural sciences as well as in computer and sport sciences.
After the period of university-level education, bachelor- level education (BSc) was launched in 2006, while master programs started in 2009 belonging to the fields of natural science, information technology, physical education and sports.
High numbers of students are enrolled in the four doctoral schools offered by the Faculty (Biology, Chemistry, Geography and Physics DS).
The teaching and research staff of the Faculty play an important role in the intellectual life of Southern Transdanubia and contribute to the scientific development of the region. Their achievements in research are valued highly both in Hungary and in international circles.
The high quality of research and teaching is also illustrated by the success achieved by students of the Faculty at the National Students Scientific Conferences. The Faculty has its own library, computer centre and several computer and GIS labs. The public procurement procedure of PTE-NIIF supercomputer has been successfully closed in 2010. With its conference hall, lecture auditoria, session rooms, central hall, spacious dining facility and modern technical background, the faculty is a perfect site for prestigious scientific events.
The Institute of Physical Education and Sport Sciences is responsible for the operation of the Recreation Centre and the management of sporting life at the university. The new Sports Centre comprising the sports hall, gymnasium and modern swimming pool was opened in 1997. Together with this recreational centre, the outdoor facilities in the campus park and Botanical Garden provide an inspirational setting for the Faculty of Sciences.

Institutes of the Faculty of Sciences

Insitute of Biology

The institute consists of seven departments covering several important fields of biology: ecology, plant biology, genetics and molecular biology, microbiology, comparative anatomy and developmental biology, cell biology and neurobiology. The main tasks of the staff (over 30 people) are to teach different disciplines of biology to BSc and MSc students and to do an outstanding scientific research work.

Research topics include: comparative research of plant taxa on anatomical, histological and molecular levels, national and regional survey of weed communities, descriptive and comparative analyses of plant communities, induced systemic acquired resistance in plants during plant – pathogen interactions, pathogenesis-related genes and the regulation of their expression, molecular biology and genetics of the Agrobacterium resistance in grapevine, molecular background of stress processes, isolation of the biosynthetic gene cluster for antibiotic production in the family of Pseudonocardiaceae, detection and characterization of viral zoonotic diseases in Hungary, population biology and community ecology of small mammals, nest predation studies, analysis of microevolutionary processes, chemical neuroanatomy, development and regeneration of peptidergic structures of the nervous system in model invertebrates (earthworms, cockroach and Drosophila), sensory and cognitive function in animal models, the chemical neuroanatomy of the retina, neuroimmune interactions.

Publications from the institute appear in prestigious journals, such as Ecology, Preslia, Weed Research, Biochemica Biophysica Acta, J Bacteriology, J Clinical Virology, Physiologia Plantarum, J Plant Physiology, Molecular Plant-Microbe Interactions, Cell Tissue Research, J Comparative Neurology, J Neuroscience, J Mol Neurosciences, Regulatory peptides, J Experimental Biology, Environmental Science and Technology.

Institute of Chemistry

The first predecessor of the University of Pécs was founded in 1367, but the Institute of Chemistry is much younger than that. Our staff is dedicated to maintaining the highest standards both in teaching and scientific research. We offer chemistry training at the BSc, MSc and PhD level. The Institute is composed of three departments: the Department of Analytical and Environmental Chemistry, Department of General and Physical Chemistry, and the Department of Inorganic Chemistry. If the visitor misses a Department of Organic

Chemistry, that is because it is located at the Medical School for historical reasons and is currently not part of the Institute of Chemistry despite the very close ties both in teaching and research.

Although researchers at the Institute have not yet been awarded an IgNobel or a real Nobel prize, we believe we can transmit our passion about science and chemistry to all students we teach.

Institute of Geography and Earth Sciences

The Institute of Geography and Earth Sciences of the University of Pécs was founded in 1998. It had been preceded by a unit for the teaching and research into geographical problems from the beginning of modern higher education in the city (1922). The department has developed into the largest institute of the Faculty of Sciences, and is also among the largest geographical workshops throughout Hungary. Due the evolution of the last decades, its profile has been extended significantly. In addition to Bachelor (BSc), Master (MSc) in Geography and teacher of geography (MA) training, it also offers BSc in Earth Sciences () and both BSc and MSc in Environmental Sciences. The Doctoral School of Earth Sciences is also an integral part of the institution with various possibilities to proceed post-graduate education in this field of research. Totally, there are about 350 Bachelor, 80 Master and 40 postgraduate students taking part in the institute's training programs. With offering some English-language courses, individual consultations and research possibilities, ERASMUS fellowship holders and other foreign students are especially welcome.

The institute has a staff of more than 40 geographers, geologists, meteorologists and other professionals, and about 20 people in postgraduate and postdoctorate education. The structure embraces six departments and three transdisciplinary research centres. The departments are organised to cover the main, priority research fields of the institute – see the pages of the departments for further information.

Institute of Mathematics and Informatics

The institute consists of four departments covering the fields of theoretical and applied mathematics, informatics and biorobotics. The academic staff consists of over 25 people on permanent positions, most of them with PhD degrees, 8 with Habilitation and 3 are Doctors of the Hungarian Academy of Sciences. They are teaching different disciplines of mathematics and informatics to BSc and MSc students and are doing a significant scientific research work.

The main research topics are related to algebra, number theory, mathematical analysis, geometry, combinatorics and graph theory, mathematical logic, applied mathematics, as well as certain fields of informatics and biorobotics.

Publications from the institute appear in prestigious journals, such as Journal of Fourier Analysis and Applications, Journal of Mathematical Analysis and Applications, Journal of Number Theory, Acta Arithmetica, The Ramanujan Journal, Results in Mathematics, Acta Mathematica Hungarica, Studia Logica, Journal of Chemometrics, Publicationes Mathematicae Debrecen, Mathematics, Mediterranean Journal of Mathematics, Linear Algebra and Its Applications, Colloquium Mathematicum, International Journal of Intelligent Technologies and Applied Statistics, Analysis Mathematica, Discrete Applied Mathematics, Journal of Algebra and Its Applications, International Journal of Wavelets Multiresolution and Information Processing.

Department of Mathematics and Applied Mathematics

The members of Departments of Mathematics and Applied Mathematics are involved in the Bachelor (BSc) programmes of Mathematics and Computer Science and the Master (MSc) programme of Applied Mathematics.

The research topics include: group theory, algebraic and analytic properties of arithmetic functions, harmonic and wavelet analysis, finite geometry, code and graph theory, and their applications.

Several English-language courses, individual consultations and research possibilities are offered to ERASMUS fellowship holders and other foreign students.

Department of Informatics and IT and Biorobotics

These two departments keep its focus on several very important aspects of informatics teaching:

- modernatisation of courses
- emphasise research and study publications
- offering practical, market-conform courses
- teaching of biorobotics based on state-of-the-art technologies; modelling and measuring movements of the human body

The main direction of research is biorobotics related to science and IT training. On the one hand, biorobotics is responsible for applying knowledge about the natural regulation

of biological systems (neural motion control) in the control of artificial structures, e.g. robots. On the other hand, the use of robots in the rehabilitation of the movement of biological systems, e.g. human limbs, if the control of movement has changed or been eliminated due to neurological injury (e.g. stroke or spinal cord serenity). We use experimentation, IT and mathematical methods to understand and teach about movement control.

Institute of Sport Science and Physical Education

The Institute of Sport Sciences and Physical Education has a long and rich tradition in both teaching and research. The physical educator teacher programme was established in 1946 at the Institutes predecessor the Pedagogical College of Pécs. The Institute and its programmes is one of the most influential educational organisation in the field of sport and physical education. The Institutions mission today is to provide Bachelor and Master programmes in sport scientific related fields. The students can obtain Physical Educator-Trainer or Sport Manager Bachelor Degree and Recreation Expert at Masters Degree. In our Physical Educator-Trainer BSc and Recreation Expert MSc both full and part time (correspondent) trainings are available. Above these programmes the Institution is also active as Higher-level vocational training centre. We are offering NTR (National Training Registry) programmes in the fields of coaching, pedagogy training and further training, and we also contribute in many doctoral programmes aiming for scientific renewal.

The Institute of Physical Education and Sport Sciences is responsible for the operation of the Recreation Centre and the management of sporting life at the university. The new Sports Centre comprising the sports hall, gymnasium and modern swimming pool was opened in 1997. Together with this recreational centre, the outdoor facilities in the campus park and Botanical Garden provide an inspirational setting for the Faculty of Sciences.

Institute of Physics

The Institute of Physics comprises departments of Experimental Physics, Theoretical Physics, Computational Physics, a joint department of Astronomy in Baja and the MTA-PTE High-Field Terahertz Research Group.

The stuff runs Physics BSc, MSc and PhD programmes both in Hungarian and in English and a Physics teacher training course in Hungarian.

Besides education, the Institute's groups are active in different research fields. The High-Field Terahertz Research Group is highly recognized worldwide and unique in its field within Hungary. They run research projects on generation of high-field terahertz radiation, terahertz and femtosecond nonlinear optics, and application of the high energy terahertz field for particle acceleration. The group of quantum optics and quantum informatics studies periodic single photon sources, and the realization of nonclassical states of light with propagating wave excitation. Another group focuses on X-ray soft lasers and plasma waveguides. The laser applications group has run projects in laser cleaning an materials analysis on different art's objects.

Doctoral Schools of the Faculty of Sciences

Doctoral School of Biology and Sportbiology

The Doctoral School of Biology and Sportbiology provides PhD studies in wide range fields of biology and sportbiology including genetics, microbiology, plant biology, ecology, regulatory biology, fitness, stress, sport and immune system. Excellently equipped laboratories are available in the biology departments and at the Szentágothai Research Center of UP, as well as at the Balaton Limnological Institute. By international contacts we give opportunity to our PhD students to mobility.

Doctoral School of Chemistry

The Doctoral School of Chemistry offers a 4-year postgraduate training focused on individual research supervised by one of the reserachers of the School. Applicants must hold an MSc degree in a natural science or a similar degree in science teaching.

The curriculum offer postgraduate training and a PhD Degree in a wide range of fields in chemical sciences, Analytical Chemistry, Bioorganic Chemistry, Homogeneous Catalysis, Chemistry of Coordination Compounds, Electrochemistry, Synthetic Organic Chemistry, Theoretical Chemistry, Environmental Chemistry, Biochemistry, and Separation Science.

Doctoral School of Physics

The Doctoral School of Physics covers the fields that are the subjects of research in the Institute of Physics; namely, laser physics, including THz and X-ray laser research, nonlinear optics, generation of ultrashort laser pulses, laser based acceleration of particles, quantum optics, quantum informatics, theoretical atomic and molecular physics. World-leading research on high-energy THz pulses and their applications has a strong tradition at the Institute. There is a close collaboration between the doctoral school and three institutes of the Hungarian Academy of Sciences: both the Institute for Solid State Physics and the Institute for Particle and Nuclear Physics of the Wigner

Research Center, and the Institute for Technical Physics and Material Science, further the Extreme Light Infrastructure (ELI-ALPS) institute in Szeged, as well as several international scientific collaborators and local industrial partners.

Students will be able to synthesize theoretical and empirical studies, conduct their own research, and present them both orally and in written form.

Doctoral School of Earth Sciences

The Doctoral School of Earth Sciences of the University of Pécs has evolved from the PhD programme „Spatial and Environmental Problems of Social and Economic Activities" launched in 1994, and became an accredited doctoral programme in 2001. Those participating in this scientific work can follow the programme in two basic forms: as full-time university students or as correspondent students besides a full-time job.

The actual scientific work and education in the doctoral school ramifies into different branches or disciplines. The selected topics, the fields of training, as well as the theoretical and applied research work also relate to these disciplines and their leading professors.

The Doctoral School of Earth Sciences was accredited by the Hungarian Accreditation Committee on 22 January 2010.

Erasmus+ programs

The foreign language courses offered under the ERASMUS program are very popular among the exchange students. The Faculty of Sciences cooperates with numerous international fellow Collages and Universities through framework contract. With the help of these partnerships the number of incoming students from other European countries is reasonably high, and at the same time our students are also living with the possibilities of abroad scholarship. The extensive domestic and international relationships allow a high range of collaborations with several professional partners in order to develop joint education and research programs or the organized exchanges of guest lectures.

The Faculty of Sciences has Erasmus+ bilateral agreements with a wide range of universities from all over Europe. The number of agreements counts up to 85.

All incoming exchange students should be officially nominated by the Home University before the students send the applications to the University of Pécs.

Details on the nomination and application process can be found by following the below link:

https://international.pte.hu/erasmus_application_and_dates

Courses available for Incoming Erasmus+ exchange students

In general, all our full time courses are available for Erasmus+ exchanges students as well, however some institutes are focusing on their most popular courses only.

We offer programs on BSc, MSc and PhD levels. Please check with your Erasmus coordinator, whether your home univesity has a bilateral agreement in your field and level of studies.

Available courses are selected from the following full time programs:

BSc Biology	MSc Biology	PhD Biology and Sport Biology
BSc Chemistry	MSc Chemistry	PhD Chemistry
BSc Physics	MSc Physics	PhD Physics
BSc Mathematics	MSc Applied Mathematics	
BSc Physical Training		
BSc Earth Science		Phd Earth Science
BSc Geography	MSc Geography	
BSc Computer Science		

Introduction of full time programs and courses available for Erasmus students

BSc Chemistry Course list and descriptions

The Chemistry BSc program offers a full 3-year education in chemistry. The study program offers a complete education in chemistry, with specialisation in inorganic, organic, analytical, environmental, and physical chemistry. Special courses cover instrumental analysis, advanced organic chemistry and physical chemistry measurements. Courses for profound knowledge in mathematics, chemometrics, theoretical chemistry and biochemistry complete the curriculum. The subjects are presented in lectures (theoretical background of the topics, with the aim to provide a wider view for chemical application), seminars with a discussion of the topics and practising chemical calculations, and laboratory work. The students will familiarise their knowledge with the most modern instrumentation. The program requires the completion of 180 credits.

KEMNA1101 General and Inorganic Chemistry I. lecture

Objectives: The aim of this course is to provide the basic ideas of general and inorganic chemistry.

The lecture intends to introduce students to basic concepts essential to further courses.

Learning outcomes: Students completing the course will have knowledge on the basics of general and inorganic chemistry. They will be able to classify major types of chemical compounds, analyse their bonding properties and physical properties.

They will have a competence of evaluating readings in general and inorganic chemistry. Their positive attitude towards innovative methods will increase significantly.

KEMNA1102 General and Inorganic Chemistry I. seminary

Objectives: The seminar intends to introduce the basic tools of solving calculation problems in general and inorganic chemistry.

Learning outcomes: students completing the course will have knowledge on solving problems related to concentrations, gas laws colligative properties and stoichiometric calculations. They will be able to solve individually chemical calculation problems. they will have a competence of solving new problems in the related fields of the above mentioned topics. Their positive attitude towards calculation problem methods will increase significantly.

KEMNA1103 General and Inorganic Chemistry I. laboratory

Objectives: Acquiring the knowledge of basic laboratory techniques, lab equipments, measurements and calculations.

Learning outcomes: Students will get acquainted with basic glasswares and lab equipments and will be able to carry out basic laboratory procedures.

KEMNA1104 General and Inorganic Chemistry II. lecture

Objectives: The lecture intends to introduce students to give an overview on the chemistry of the elements of the periodic table. A special focus is given on the bioinorganic chemistry issues especially in case of alkali, alkaline earth metals, as well as selected transition metals such as iron and copper.

Learning outcomes: Students completing the course will have knowledge on the compounds of metals and non-metals as well as their compounds.

They will be able to characterise basic compounds of metals and non-metals regarding their structure, bonding properties, chemical and physical properties. They will have a competence of evaluating readings in inorganic chemistry. Their positive attitude towards innovative methods will increase significantly.

KEMNA1105 General and Inorganic Chemistry II. seminar

Objectives: The seminar intends to introduce the basic tools of solving calculation problems in general and inorganic chemistry.

Learning outcomes: students completing the course will have knowledge on solving problems related to redox reactions, electrochemistry and pH calculations of strong acids and bases, as well as week acids and bases. They will be able to solve individually chemical calculation problems. they will have a competence of solving new problems in the related fields of the above mentioned topics. Their positive attitude towards calculation problem methods will increase significantly.

KEMNA1106 General and Inorganic Chemistry II. laboratory

Objectives: Preparation of the elements and their compounds; examination of their physical and chemical properties.

Learning outcomes: Students will be able to carry out basic experiments alone and will have acquired wide-ranging knowledge in the field of inorganic chemistry by the end of the semester.

ENKEMNA1501 Organic Chemistry I. lecture

This is a part of the ordinary freshman course for chemistry majors to teach the nomenclature, structure, reactions, synthesis and utilization of main classes of organic compounds.

ENKEMNA1502 Organic Chemistry I. Laboratory

The objective of laboratory practise is to introduce students to the main organic chemical experimental. They examine the specific reactions and characteristics of functional groups.

ENKEMNA1503 Organic Chemistry II. lecture

This is a part of the ordinary freshman course for chemistry majors to teach the nomenclature, structure, reactions, synthesis and utilization of main classes of organic compounds.

ENKEMNA1504 Organic Chemistry II. laboratory

The objective of laboratory practise is to introduce students to the main organic chemical experimental. They examine the specific reactions and characteristics of functional groups.

BSc Physics course list and descriptions

The Physics BSc line offers full 3-year-education in physics. The study program for the full-time training offers a complete education in physics, with special directions particularly in IT in physics and Applied physics (with a strong emphasis on laser physics). The curriculum is organized in modules covering the Introductory courses in nature sciences (24 credits) and Common courses (52 credits) for all physics students (basic courses in mathematics, physics and informatics). The courses related the specializations in Applied physics cover the advanced topics in experimental and theoretical physics, the necessary courses in mathematics and informatics. The focus of the specialization in Informatics in physics is data acquisition, signal processing in LabView, database management and programming in C# language. The students will familiarize themselves with the most modern instrumentation.

ENFIZNA1401 Mechanics lecture

The Mechanics lecture wants to provide an introduction to classical, non-relativistic mechanics focusing onto the mathematical aspect of it. In the frame of the Newtonian formalism, previously introduced special problems, like periodic motions, Kepler’s

problem, conservation laws, etc. will be analyzed with more profound mathematical details. Beyond the Newtonian approach, the Lagrangian and the Hamiltonian formalism will be also introduced. Concerning the latter two formalisms, the basic principles regarding the derivation of the equation of motion will be also discussed in detail.

ENFIZNA1402 Mechanics practical course

In the frame of the practice course students turn to be familiar in the usage of the different formalisms, which were mentioned during the lecture. Solving selected exercises, she / he can deepen his knowledge regarding the topics, which were discussed in a general way during the lecture.

ENFIZNA2101 Computer technology I. lecture

The course discusses the substantial knowledge for computer technology. Serves as a foundation of further, more advanced subjects.

Boolean algebra and binary arithmetic, number representations, Transformation and simplification of boolean functions. Canonical forms of boolean functions, systematic simplification methods. Hazards and their elimination. Sequential circuits, storage components. Design of sequential circuits, synchronous and asynchronous circuits. Microprogrammed sequential circuits.

ENFIZNAKV4301 Metrology lecture

Metrology lecture provides insight into the topics and methods of the main fields of metrology: measurement science, measurement technique and metrological services and regulations. The visualization of measurement data, the random nature of measurement results and basic statistical concepts and methods will be discussed. The students will be expected to apply these in everyday situations, like understanding press accounts on measurement results, or analysis of datasets in a report.

Those who have completed the course will know and distinguish the problems of scientific metrology, measurement technology, legal metrology know the main characteristics of random variables, be able to correctly understand measurement results, be able to apply the learned concepts in their later studies and be able to apply the learned concepts in their everyday life.

ENFIZNA3002 Metrology practical course

Objectives and scope: Introduction into the basic statistical interpretation of measurement data.

Practical problem solving on the basis of the lecture topics; Basic units of SI and their measurement; Measurement of on-electric signals; Calibration of the acquisition system, validation of measured data; Uncertainty of the measured data, systematic and random errors, propagation of errors.; Basic measurement statistics (normal distribution, expected value, standard deviation, confidence interval, statistical probes)); Digital data acquisition, sampling theorem; Fourier analysis; Correlation analysis; Interpretation of data (curve fitting, regression, linearization).

ENFIZNA0801 Electricity and magnetism lecture

Objectives and scope: Developing knowledge and understanding of the concepts of electricity and magnetism.

Electrostatics:

Electric field in vacuum, Coulomb's Law, Elementary charge and the most important special distributions of it, Work of the electric field, work and electric potential, determination of the elementary charge, electric capacitance, capacitors, electrostatic devices, Energy of the electric field, dielectrics, The electric polarization and field strength in dielectrics, The fundamental electrostatic laws in dielectrics

The laws of direct currents

Ohm's Law, Vrious forms of Ohm's Law, Kirchhoff's Law, Resistances in sries and parallel, current and voltage measurement devices, measuring resistances, Serial and parallel battery configurations, Electric work and power of direct current

Magnetostatics

Basic magnetic phenomena, magnetic field, flux of the magnetic field, forces in magnetic field, Biotlaw, Earth magnetism, Magnetic induction and field strength, magnetic properties of solids, magnetic circuits

Current conduction phenomena

Free electrons in metals, band theory of metals, Electron energy distribution in conductors, Thermionic electron emission and work function, contact potential, thermoelectric effects, semiconductors, different types of semiconductors, current in dielectrics, electrolytic dissociation and electrolysis, batteries, charge transport in vacuum, electron microscope, electron tubes, electric conduction in gases, gas discharges, natural electrostatic discharges.

Electromagnetic induction

Faraday induction, mutual induction, energy of the magnetic field, transient signals in dc circuits, electromagnetic oscillations, Impedance, forced oscillations in serial and parallel RLC circuits, Electric work and power of alternating currents, free electromagnetic oscillations in closed RLC circuits, coupled electromagnetic oscillations, measuring inductance and capacitance, high frequency oscillations.

ENFIZNA1901 Quantum mechanics lecture

Objectives and scope: to acquire knowledge of quantum behavior and of basic methods of quantum mechanics.

Quantum behavior: particles and waves, probability amplitudes. The wave function as probability amplitude. The time-dependent Schrödinger equations. Stationarya states and the time-independent Schrödinger equation, the Hamilton operator.

Motion in one-dimensional static potential: step potential, infinite well, potential barrier. Postulates of quantum mechanics: description of physical state with wave function or state vector, Hermitian operators as observables, possible results of measurements and outcome probabilities, collapse of wave function after a measurement. Mean value of an observable and the root-mean-square deviation. Evolution of the mean value, Ehrenfest theorems.

The linear harmonic oscillator. Solution of Schrödinger equation int he truncated series form, energy eigen-values. The creation and annihilation operator formalism. Angular momentum in quantum mechanics: definition, commutation relations, eigenvalues of the orbital angular momentum operators. Spin, bosons and fermions. The hydrogen atom. Conservation of angular momentum in central potential. Calculation of energy eigenvalues by seeking the solution of the Schrödinger equation in truncated series form.

ENFIZNA1902 Quantum mechanics practical course

Objectives and scope: to acquire basic knowledge of treating quantum mechanical problems.

Quantum behavior: particles and waves, probability amplitudes. The wave function as probability amplitude. The time-dependent Schrödinger equations. Stationarya states and the time-independent Schrödinger equation, the Hamilton operator.

Motion in one-dimensional static potential: step potential, infinite well, potential barrier. Postulates of quantum mechanics: description of physical state with wave function or

state vector, Hermitian operators as observables, possible results of measurements and outcome probabilities, collapse of wave function after a measurement. Mean value of an observable and the root-mean-square deviation. Angular momentum in quantum mechanics. Spin.

ENFIZN1001 Thermodynamics lecture

Objectives and scope: Mastering the basic thermodynamic concepts, and acquiring general skills in scientific reasoning through the subject of thermodynamics.

Thermal equilibrium and temperature: Zeroth law of thermodynamics, types of interactions, equilibrium; The ideal gas law; The density; Partial pressure

The kinetic theory of gases, basics of statistical mechanics: Average translational kinetic energy of a molecule; Equipartition theorem; Internal energy of ideal gas; Maxwell Boltzmann distribution. The thermal processes for an ideal gas, gas laws (Boyle's, Gay-Lussac's Law) - isothermal, isochoric, isobaric

First law of thermodynamics: Quasi-static processes; The work; Interpretation of the 1st law of thermodynamics, the heat; 1st law of thermodynamics for finite processes; 1st law of thermodynamics for differential (elementary) processes; Cycles (closed)

Analyses of different processes in the frame of the first law of thermodynamics: isochoric; isobaric; isotherm; adiabatic

Heat capacity, specific heat, molar heat: Specific heat; Measurement the specific heat capacity (calorimetry); The molar heat; The specific heat of an ideal gas (isochoric, isobaric); Molar isobaric, isochoric heat; Robert – Mayer's Law, Change of phase and latent heat.

The Van der Waals (real) gas: State equation of the Van der Waals gas; Derivation of the internal energy of the Van der Waals gas; Gay-Lussac Joule experiment with ideal gas and Van der Waals gas

Special processes by ideal gas: Point of analysis; Adiabatic process; Polytropic process of ideal gas

Introduction to 2nd law of thermodynamics: Reversible and irreversible process; Phenomenological approximations.

The exact mathematical formalism of the 2nd law of thermodynamics: Efficiency of cycles (engines); Carnot-cycle; The Clausius theorem; The Entropy; Second law of

thermodynamics for finite and infinitesimal process; Calculation of the entropy for special processes (Isochoric, isobaric, adiabatic, process passing through the origin of p V diagram, isothermal, calorimetry, change of phase).

Third law of thermodynamics: Enthalpy, Free energy, Gibbs potential (Free enthalpy); Reversible process; Maxwell's Relations, Nernts Law, Consequences of the third law.

The fundamental state equation

Summary of interactions

ENFIZN1701 Electrodynamics lecture

Objectives and scope: Required course of Physics BSc studies. Its aim is to improve analytical and problm solving skills by placing treatment of electrodynamics ' phenomena on a more general foundation.

Electric charge and electric field, basic equations of electrostatics. Poincaré identities, the electrostatic potential.

Poisson equation and its solution. Gauss and Stokes theorem. Dipole moment and polarization, electrostatics ofdielectrics, metals. Magnetic field, Lorentz force, vector potential. Magnetostatics of polarizable media.

Law of induction, charge of conservation and displacement current. Maxwell's equation in vacuum and medium.

Wave equation and its plane wave solution. Dispersion, field energy, field momentum. Refraction Dispersion, field energy, field momentum. Refraction and reflection of monochromatic plane wave on the boundary of two dielectrics. Galilean and Einstein relativity. Lorentz transformation, time dilation, length contraction. Proper time, the twin paradox.

ENFIZN1702 Electrodynamics practical course

Objectives and scope: Required course of Physics BSc studies. Its aim is to improve analytical and problm solving skills by placing treatment of electrodynamics ' phenomena on a more general foundation.

Electric charge and electric field, basic equations of electrostatics. Poincaré identities, the electrostatic potential.

Poisson equation and its solution. Gauss and Stokes theorem. Dipole moment and polarization, electrostatics ofdielectrics, metals. Magnetic field, Lorentz force, vector potential. Magnetostatics of polarizable media.

Law of induction, charge of conservation and displacement current. Maxwell's equation in vacuum and medium.

Wave equation and its plane wave solution. Dispersion, field energy, field momentum. Refraction Dispersion, field energy, field momentum. Refraction and reflection of monochromatic plane wave on the boundary of two dielectrics. Galilean and Einstein relativity. Lorentz transformation, time dilation, length contraction. Proper time, the twin paradox.

ENFIZN1101 Waves and optics lecture

Objectives and scope: The major learning outcomes for this course are Problem Solving and Quantitative Reasoning.

Upon successful completion of the course, the student must be able to understand the basic concepts of oscillations, waves and optics. Students will have the basic understanding of both geometrical and wave optics. They will be able to solve simple problems by studying the appropriate equations describing optical and general wave phenomena.

Short description: Oscillations. Harmonic and anharmonic oscillations. Differential equation of harmonic motions. Mathematical pendulum, anharmonicity. Result of more harmonic motions, beating. Decomposition of oscillations. Fourierseries. Damped oscillations, forced oscillations, their differential equations. Resonance. Coupled oscillation.

Waves. Types of waves, polarization. Wavelength, traveling velocity. Function of a wave traveling along a line. Traveling velocity of longitudinal and transversal mechanical waves. One dimensional wave-equation and itssolutions. The principle of superposition. Interference of waves, constructive and destructive. Standing wave, resonant frequency. Wave-group. Phase- and group velocity. Reflection, refraction and interference of twodimensional waves. Huygens and Huygens-Fresnel principle. Wave-function of three dimensional waves. Plane-wave, spherical wave. Energy density in wave.

Sound. Production and sensing of sound. Properties of sound. Measuring of sound intensity, the decibel scale. Sensing of sound, the unit of phone. Measurement of the speed of sound. Doppler effect. Head-wave, Machnumber.

Geometrical optics. Propagation of light. Velocity of light. Reflection and refraction. Total reflection. Plane and spherical mirrors. Lenses and thick lenses. Lens systems. Aberration of lens. Camera, projectors. Magnifier, microscopes, telescopes. Eye. Colors.

Wave optics. Wave theory of light. Superposition and dispersion. Coherence condition and interference. Interferometers. Dielectric layers. Diffraction. Gratings. Atmospheric light phenomena. Holography. Polarization.

ENFIZN1102 Waves and optics practical course

See: Waves and optics lecture

ENFIZNS3101 LabView basics

Objectives and scope: The course introduces the students to LabVIEW. Besides being introduced in the main features of the software through presentations, the students are required to learn by solving simple problems. By the end of the course, students can write simple codes for modeling basic physical calculations, and should be able to use the built-in assistance tools (Help, Example files, etc.) to learn new features.

Short description: Definition, methods and instruments of measurement. Parts of a LabView monitor: front panel, block diagram, the structure of a vi. The elements of the G language. Data-flow based, parallel execution. The most important data types. Programming structures. Creating and including sub-vi-s. LabVIEW VI-library (.llb). Priorities. Timing and synchronization of different parts of the program. Local and global variables. File I/O. Implementation of small example codes. Usage of the assistance tools, reading example vi-s.

ENFIZNS3201 Physics and electronics laboratory II.

Objectives and scope: Acquiring experimental skills, interpretation of measurement data, proper documentation of measurements.

Short description: Examination of processes with ideal gas. Verification of the gas laws. Measurement of the linear thermal expansion coefficient of solids. Measurement of the thermal expansion coefficient of fluids. Measurement of the heat capacity of a calorimeter. Measurement of the specific heat of a solid body with calorimetry. Measurement of the latent heat of melting of ice. Measurement of the heat capacity ratio (cp / cv) of air. Examination of the pressure dependence of the boiling point. Measurement of the latent heat of boiling of water. Measurement of Joule-Thomson coefficient. Measuring of voltage and intensity of direct current and resistance. Method to measure the resistance.

Ohm’s law. Potentiometer. Resistence measurment by means Wheatstone’s bridge. Power supplies. The intensity of a coil's magnetic field, force between two current carrying wires. Electric heating. Calibration of temperature sensors. Temperature measurements by thermo-electric detectors (thermistor and thermocouples). Calorimetry.

Study of alternating current resistance. Impedance of R, L, C component.

RLC series circuit and resonance. Measurement of the RLC resonance curve.

BSc Mathematics course list and descriptions

The Mathematics BSc line offers full 3-year-education in mathematics. The program provides a general bachelor level education in mathematics, which can serve as a basis for further studies in mathematics or computer science. The basic courses include Logics, Computer science, Linear algebra, Number theory, Calculus, Geometry, Probability theory and statistics and Game theory. Advanced courses include Mathematical programming and Operations research, Group theory, Computer algebra, Numerical methods, and applied computer science. The courses usually constitute of two parts: a lecture and a problem-solving seminar, each worth 2 or 3 credits, depending on the nature of the topic. In addition to the 120 credits which have to be collected from the courses, 60 credits are awarded for the preparation of the thesis and this completes the 180 credits required for finishing the program. The bachelor program in mathematics is the basis for the Master (MSc) line of applied mathematics (with a special focus on operations research) available at the University of Pécs as well as other MSc courses.

ENMATNA1202 Analysis in Several Variables seminar

Objectives: The lecture intends to introduce students to the the concepts of line integral and the elements of complex analysis: complex derivative, complex integral, holomorphic functions, integral formulas of Cauchy and applications. The course helps the development of problem solving skills.

Learning outcomes: students completing the course will have knowledge on basic concepts and theorems of Multivariable Analysis. They will be able to apply the properties of these concepts. They will have a competence of evaluating readings in Analysis. Their positive attitude towards methods calculating limits will increase significantly.

ENMATNA1301 Abstract Algebra lecture

Objectives: The lecture intends to introduce students to the basic concepts and properties of abstract algebra.

Learning outcomes: students completing the course will have knowledge on abstract algebra, and vocabulary in the topic. They will be able to apply the algebraic and number theoretic properties, they will have a competence of evaluating new mathematical results. Their positive attitude towards innovative methods in mathematics will increase significantly

ENMATNA1302 Abstract Algebra seminar

Objectives: It is intended to solve exercises on the basic concepts and properties of abstract algebra.

Learning outcomes: students completing the seminar will have knowledge on abstract algebra, and vocabulary in the topic. They will be able to apply the algebraic and number theoretic properties, they will have a competence of evaluating new mathematical results. Their positive attitude towards innovative methods in mathematics will increase significantly.

ENMATNA0903 Geometry 2 lecture

Objectives: The main aim of the course is to introduce the theory of geometric transformations.

ENMATNA0904 Geometry 2 seminar

Objectives: The main aim of the course is to introduce the theory of geometric transformations.

ENMATNA1401 Probability Theory ans Statistics lecture

Objectives: The lecture intends to introduce students to the world of probability and statistics. The course gives an insight into the basic ideas and ways of thinking encountered in probability theory and statistics.

Learning outcomes: students completing the course will have familiarity with questions and methods related to probabilistic problems that they are likely to encounter in life and during their work.

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ENMATNA1901 Linear Algebra lecture

Objectives: The lecture intends to introduce students to the world of linear algebra and to deepen their knowledge in this range of Mathematics.

Learning outcomes: students completing the course will have knowledge on basic linear algebraic concepts and theorems. They will be able to apply the properties of these concepts. They will have a competence of evaluating readings in linear algebra. Their positive attitude towards linear algebraic methods will increase significantly.

ENMATNB1902 Linear Algebra seminar

Objectives: The lecture intends to introduce students to the world of linear algebra and to deepen their knowledge in this range of Mathematics.

Learning outcomes: students completing the course will have knowledge on basic linear algebraic concepts and theorems. They will be able to apply the properties of these concepts. They will have a competence of evaluating readings in linear algebra. Their positive attitude towards linear algebraic methods will increase significantly.

ENMATNA1601 Differential Equations lecture

Objectives: The lecture intends to introduce students to the world of differential equations. Learn to recognize and classify various types of ordinary differential equations. Get used to thinking about and working with functions as “variables”. Understand the qualitative nature of solutions to certain classes of differential equations, with emphasis on exponential growth, oscillations, and equilibrium solutions. Learn to solve certain types of elementary differential equations analytically, with an emphasis on first order differential equations and higher order linear differential equations.

Learning outcomes: students completing the course will have familiarity with questions and methods related to problems involving differential equations.

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Learning outcomes: students completing the course will have familiarity with questions and methods related to problems involving differential equations.

BSc Computer Science course list and descriptions

Supercomputer, great student-teacher ratio, valid degree all over the EU, highly qualified and internationally recognised professors, up to date knowledge, friendly classroom atmopshere, personal interactions with the teachers, flexible and high quality education – this is how we can describe our BSc Computer Science program.

What we can offer:

- Software-oriented thinking

- Strong mathematic and algorithmic basics (e.g. encryption, telecommunications, modern industry standards, etc.)
- Software and system design
- Modern technologies
- Backend / frontend
- Instructors from the industry
- Student-friendly environment
- Keeping group numbers low
- Optional one-on-one consultations with instructors

ENPTIA0301 Elementary linear algebra

Objectives: The aim of the course is to familiarize students whose curriculum involves higher mathematics with the basic concepts and methods of linear algebra.

Learning outcomes: students completing the course will have a knowledge on the basics of linear algebra and its terminology. They will be able to use elementary methods of linear algebra in solving certain simple problems. They will be open to follow simpler mathematical approaches to problems and intend to improve their problem solvig abilities. They will be able in a stand-alone way to recognize the applicability of basic methods of linear algebra in solving simple problems and solve them using the learned techniques.

ENTPIA0201 Calculus I lecture+practice

Objectives: The lecture intends to introduce students to the world of calculus. The purpose of the course is to provide the students with the basic tools necessary to start comprehending the foundation underlying modern science and technology.

Learning outcomes: students completing the course will have familiarity with questions and methods related to that segment of the calculus that they are likely to encounter in their professional life.

ENPTIA4101 Analysis I lecture an practice

Objectives: The lecture intends to introduce students to the basic notions of Mathematical Analysis 1: concepts of real numbers, convergence, limits of sequences and sum of series. The course helps the development of problem solving skills.

Learning outcomes: students completing the course will have knowledge on basic concepts and theorems of Mathematical Analysis. They will be able to apply the properties of these concepts. They will have a competence of evaluating readings in Analysis 1. Their positive attitude towards methods calculating limits will increase significantly.

ENTPIA0501 Probability and statistics

Objectives: The lecture intends to introduce students to the world of probability and statistics. The course gives an insight into the basic ideas and ways of thinking encountered in probability theory and statistics.

Learning outcomes: students completing the course will have familiarity with questions and methods related to probabilistic problems that they are likely to encounter in life and during their work.

ENPTIB0701 Mathematical logics

Objectives: The lecture intends to introduce students to the basics of Mathematical Logic (both the propositional and the predicate calculus) including basic definitions, results, and methodology. A further aim is to discuss the connections between Mathematical Logic and Mathematics, and between Mathematical Logic and Computer Science.

Learning outcomes: students completing the course will have knowledge on the basic notions and results of Mathematical Logic, along with the related specific terminology. They will be able to apply models of Mathematical Logic to practical problems, and to solve them. They will be open to incorporate models of Mathematical Logic into their problem-solving thinking. They will have a competence of representing available information into models of Mathematical Logic. Their positive attitude towards innovative methods will increase significantly.

ENPTIA0901 Numerical methods I lecture+practice

Objectives: The lecture presents the theoretical foundation of numerical algorithms the students will meet the most important methods for solving problems of scientific applications.

Learning outcomes: students completing the course will have knowledge on basic numerical computation and approximation, vocabulary, models and scholars. They will be able to evaluating readings in this topic. They will know the most important methods and they will be aware of its limitations.

ENPTIA0902 Numerical methods II practice

Students completing the course will have knowledge on basic numerical computation and approximation, vocabulary, models and scholars. They will be able to evaluating readings in this topic. They will know the most important methods and they will be aware of its limitations.

ENPTIA0601 Operations research

Objectives: The lecture presents the theoretical foundation of operations research the students will meet the most important methods for solving problems and their economical applications.

Learning outcomes: students completing the course will have knowledge on basic operations research and approximation, vocabulary, models and scholars. They will be able to evaluating readings in this topic. They will know the most important methods and they will be aware of its limitations.

ENMNAMA11 Discrete mathematics I lecture+seminar

Objectives: The aim of the course is to learn discrete structures, related algorithms, proof techniques in discrete mathematics.

Learning outcomes: students completing the course will familiar with the terminology, concepts and methods widely used in computer science.

ENPTIA0102 Discrete mathematics II lecture+practice

Objectives: The aim of the course is to learn discrete structures, related algorithms, proof techniques in discrete mathematics.

Learning outcomes: students completing the course will familiar with the terminology, concepts and methods widely used in computer science.

ENPTIA0801 Basics of computer science lecture+practice

The aim is to

- get to know the basic definitions, results, and methodology of Computer Science,

- get to know some nontrivial algorithms on pseudo code level

- get to know proofs of the correctness of some algorithms, along with the corresponding methodology.

ENPTIA1201 Elemetary programming

Objectives: The aim of the course is to obtain a very basic insight into the basics of programming in a procedural language in an interpreter environment. The course uses

the Python language. The main intention is to equalize the high-school level backround of entering students by establishing a common minimal knowledge and skill set expected from the students.

Learning outcomes: students completing the course will

have a knowledge on the most basic concepts of imperative-language programming such as, e.g. assignment, variable, control statements (conditionals, loops), arrays, etc. They use the suitable professional vocabulary of the topic.

They will be able to use the known concepts for implementing simple computer programs and solve basic programming problems.

They will be open and intend to significantly increase their programming abilities and skills.

They will be able in a stand-alone way to create simple programs in Python.

ENPTIA1601 Programming I practice

Students will know basic programming structures, software development methodology, and more important programming environments. They will be introduced to C++ programming language and the basics of programming.

With the help of acquired methods students lay down the foundation for their further studies in programming. They will be able to practice algorithmic thinking, programming basic algorithms, and designing, coding, testing and managing individual programming tasks.

The bases for next semester's Programming II. are developed in this course.

ENPTIA1602 Programming II practice

Students will know basic programming structures, software development methodology, and more important programming environments. They will be introduced to C++ programming language and the basics of programming.

With the help of acquired methods students lay down the foundation for their further studies in programming. They will be able to practice algorithmic thinking, programming basic algorithms, and designing, coding, testing and managing individual programming tasks.

ENPTIA1701 Compilers and assemblers practice

Students are introduced to the operation of compilers, different analytical methods. They will have knowledge of low-level programming of processors and microcontrollers. They will know the basics of Assembly programming language, and will be familiar with elementary (binary) algorithms.

ENPTIA1001 Algorithms, data structures

The aim of the subject is that students may know the basic data structures, and their general algorithms, along with the most commonly used algorithm design paradigms.. Students, completing the course: know the basic principles of the commonly used two families of data structures, namely the linear data structures (vectors, lists, collections), and the graphs, and they own the ability to represent them in computers, and to create appropriate algorithms for the most common tasks over them.

Able to express and implement such algorithms, able to understand an algorithmic problem, and to decide the necessary algorithm creational paradigm, and to implement the algorithm.

ENPTIB1101 Formal languages and automata

Objectives: The lecture intends to introduce students to the basics of formal languages and automata theory including the basic definitions, results, and methodology.

Learning outcomes: students completing the course will have knowledge on the basic notions and results of the theory of formal languages and automata, along with the related specific terminology. They will be able to solve problems related to generative grammars and finite state machines.

ENPTIA2301 Distributed systems, parallel programming

This is an introductory course to the problem of distributed systems. It also gives an insight into the theory and practice of parallel programming.

After taking this course the students will know the architecture and management of distributed systems; are able to use the knowledge gained during their IT learnings in the special field of distributed systems.

ENPTIA1401 Relational databases

Objectives: The aim of the course is to develop skills and basic professional knowledgeof designing, implementing and using relational databases.

Learning outcomes: students completing the course will have a knowledge on the basic concepts of relational databases (schema, dependencies, normal forms, transactions,

design techniques, etc.), on the sql language, on the role of relational databases in software systems. They use the suitable professional vocabulary of the topic. They will be able to use relational databases, recognize design and implementation issues in relational database systems. They will be open to apply relational datbases and develop special knowledge on particlular relational database management software, they will intend to use the obtained knowledge in professionally solving database-related problems. They will be able in a stand-alone way to design, implement and use small-sized relational databases and perform basic tasks of database administration.

ENPTIA1301 Methodology of programming I lecture+practice

Main purpose of the course is that students own the methodology and usual approaches of programming and algorithm constructions, based primarily on C/C++ as a programming language.

Students, completing the course: know the basic elements of C programing language, they own the basic approach for algorithm design, able to express and create algorithms in the basic imperative approach, using C as a programming language.

Able to choose and to decide the methodology to be used for a given problem, and they are also able to apply it for the problem, and finally to implement the algorithm in a computer.

ENPTIA1501 System engineering

The purpose of the course is to explain the paradigm of „programming in large”. Students may get a view of the software production and project management technologies, with special emphasis on the UML/RUP methodology. They are expected to be able standalone to design a medium size software. Students completing the course: know the basic concepts of software design, they own the concerned word and concept sets.

Able to design steps and phases of software production, and to supervise such a software project, able to create the necessary products and diagrams, expressed in OMG UML graphic design language and able to lead an industry project that applies the RUP methodology for software design.

ENPTIA1801 Professional communication

Objectives: The aim of the course is to familiarise the students with the techniques of obtaining information in science and technology and with the basics of scientific and technical writing.

Learning outcomes: students completing the course will have a knowledge on various types of scientific and technical publications and their style. They will be able to read proefessional text, query the literature of topics, prepare a proper bibliography, and prepare simple scientific or technical documents, and perform short presentations. They intend to adopt a proper attitude in scientific and technical communication.

ENPTIA2101 Operating systems

A The theoretical part of the course introduces the methods and tools of design and development of operating systems. The practical part establishes practical skill related to operating systems, illustrates the concepts and methods learned in the lectures in practice.

ENPTIA1901 Computer architectures

The course introduces the basic concepts of computer architectures.

ENPTIB2001 Computer networks

The lecture intends to introduce students to the basics of computer networks. Students completing the course will have knowledge on the layer concept, the roles and devices of the OSI and TCP/IP layers, and the main standards. They will be able to understand the basic operation of computer networks and Internet, and comprehend the most important Internet services.

ENPTIA2201 Information and data security

Objectives: The aim of the course is to understand the importance, basic concepts and techniques of information and data security, cybersecurity and cryptography.

Learning outcomes: students completing the course will have a knowledge on the basic concepts of information and data security, cybersecurity and cryptography. They use the suitable professional vocabulary of the topic. They will be able to apply and evaluate solutions related to the topic. They will be open and intend to extend their knowledge in the field, respect the rules of cybersecurity.

ENPTIB2401 Operation of IT systems

Objectives: To make this topic more manageable, boundaries will be defined. First, because of the vast number of activities relating to management information systems, a total review is not possible. Those discussed here is only a partial sampling of activities, reflecting the author's viewpoint of the more common and interesting developments. Likewise where there were multiple effects in a similar area of development, only selected ones will be used to illustrate concepts.

Learning outcomes: Upon successful completion of this module, candidates will be able to demonstrate their competence in, and their ability to:

• Understand types of MIS applications in organisations

• Discuss the development of management information systems in organisations.

• Select and design MIS systems appropriate to meet management requirements.

• Critically evaluate MIS contributions to the strategic management of organisations

ENPTIB4001 Control technology
For further information on this course please contact:

Dr Gábor PAULER (pauler@t-online.hu)

BSc Biology course list and descriptions

The Biology BSc line offers full 3-year-education in biology. The study program for the full-time training offers a complete education in biology, with special directions particularly in neurobiology, genetics, microbiology, animal and plant ecology, botany, zoology, and plant physiology. Special directions in the second year have two modules: infra-individual (means more laboratory practice and cellular biology) and supra-individual (means more ecology) courses. Each module has 5-8 subjects with lectures, seminars and laboratory practices. The basic subjects are presented in lectures, seminars and laboratory work. The program provides a wider view of the related scientific fields (chemistry and physics). The students will familiarize their knowledge with the most modern instrumentation in our new research centre. It covers all aspects of education, research and innovation in the fields of biomedical, natural and environmental sciences. It also provides an opportunity to join the research work in 22 different research groups operating in the building. The program requires completion of 180 credits.

ENBIOB0101 Mathematics lecture

The aim of the course is to obtain the necessary knowledge and the ability to use certain mathematical techniques for those students who use mathematical analysis in biology/chemistry because of the nature of their curriculum or their interests.

ENBIOB0102 Mathematics practice

The aim of the course is to obtain the necessary knowledge and the ability to use certain mathematical techniques for those students who use mathematical analysis in biology/chemistry because of the nature of their curriculum or their interests.

ENBIOB0301 Fundamental Physics

Introduction to most important fields of physics at basic level.

Course objectives and/or learning outcomes:

Compulsory course for students in biology, geography, mathematics.

The major learning outcomes for this course are Problem Solving and Quantitative Reasoning.

Upon successful completion of the course, the student must be able to understand the basic concepts of Experimental Physics. Students will be able to solve simple problems by studying the appropriate equations.

ENBIOB0201 Fundamental Chemistry I lecture

During the course students get familiar with the most important fundamentals of material world, atoms and their electron structures. It also turns out how it is possible that basically unlimited number of compounds exists from the finite number of elements found in Earth. It is also higlighted that how the molecules may interact with each other and determine the physical and chemical properties of the given material. It is as well presented how the chemical reactions may be classified.

ENBIOB3001 Biological Laboratory Fundamentals practice

Course objectives and/or learning outcomes:

The course intends to introduce students to basic glassware, laboratory equipment and methods used in biochemical, comparative anatomy, animal physiology and microbiology laboratory practice. Laboratory rules and safety are also emphasized.

Learning outcomes:

By the end of this course students will have:

- experience with using basic laboratory skills and apparatus and follow the protocols;

- knowledge to prepare solutions (concentrations, pH, buffers, serial dilutions);

- experience with using light and stereo microscope;

- be aware of the definition of biological signal, data and information, also will understand the composition and principles of basic electronic devices;

- be able to use fundamental monitoring devices (e.g. pH meter, blood pressure monitor, glucometer)

- experience with observation, data recording and data processing in own manual-book;

- acquisition with the most basic microbiological laboratory appliances and sterile technics;

- experience with using the terms of laboratory skills and methods;

They have transferable knowledge required in biochemical, microbiological, animal physiology and anatomy laboratory work.

ENBIOB1103 Comparative Anatomy I lecture

Basic course that designed to provide the students with knowledge related to animal body plan, organs and systems.

ENBIOB1104 Comparative Anatomy I laboratory

Part of laboratory specialization that designed to provide the students with knowledge related to animal organs'histology and understanding of organ systems' histological organization.

ENBIOB2101 Plant Anatomy and Morphology lecture

This lecture is a part of the basic professional module, introduces into the histological and morphological structure of plant body. This lecture serves as a foundation for other botanical courses in main professional module and specialization. Plant cell and histology course is offered prerequisite or parallel taking up.

ENBIOB2102 Plant Anatomy and Morphology laboratory

This practice is a part of the basic professional module, serves as a foundation for other botanical courses, introduces into the histological and morphological structure of plant body.

ENBIOB1301 Cell Biology lecture

Basic course that designed to provide the students with knowledge related to cell structure and function. The knowledge of this course is needed for to study Comparative anatomy I, II, Basic developmental biology, Comparative physiology, Molecular biology and Basic genetics.

ENBIOB1302 Cell Biology laboratory

Practical aspects of cell biology.

ENBIOB0401/ ENBION0501 Organic Chemistry lecture

This is a part of the ordinary freshman course for non-chemistry majors transferring organic chemistry knowledge through problem solving competencies. It helps understanding the molecular level of biochemical processes.

ENBIOB1201 Zootaxonomy lecture

Students who successfully complete the course are: aware of the principles of taxonomy, have knowledge of the terms of the discipline and correctly apply them, able to recognize and characterize individual taxa, and able to produce presentations and summaries on their own taxonomic subjects open to finding out more about the disciplines of taxonomy, for which they have suitable knowledge.

ENBIOB1202 Zootaxonomy practice

Students who successfully complete the course are: aware of the principles of taxonomy, have knowledge of the terms of the discipline and correctly apply them, able to recognize and characterize individual taxa, and able to produce presentations and summaries on their own taxonomic subjects open to finding out more about the disciplines of taxonomy, for which they have suitable knowledge.

ENBIOB0501 Introduction into the scientific Bibliography seminar

The aims are to search and process the literature. Publication requirements for the disciplines of biology. Rules for preparing a BSc thesis.

ENBIOB0801 General Ecology lecture

The lecture intends to introduce students to ecology. The aims of the course are to provide up-to-date, general ecological knowledge and approach, to give an insight into the organization of the nature on a supraindividual basis, to introduce the conceptual, structural elements and community organizing processes. The acquired knowledge provides the basis for the specialization courses of ecological courses in the Master`s degree program.

ENBIOB3301 Microbiology lecture

ONFOL1-0202 Introduction to geology

Geology is the core discipline of the earth sciences and encompasses many different phenomena, including plate tectonics and mountain building, volcanoes and earthquakes, and the long-term evolution of Earth’s atmosphere, surface, and life.

Because of the ever-increasing demand for resources, the growing exposure to natural hazards, and the changing climate, geology is of considerable societal relevance. This course introduces students to the basics of geology. Through a combination of lectures, labs, and field observations, we will address topics ranging from mineral and rock identification to the origin of the continents, from geologic mapping to plate tectonics, and from erosion by rivers and glaciers to the history of life.

ENBIOB3201 Basic Genetics lecture

Objectives: part of the proficiency standard. Aim at introducing the most important concepts of genetics

Learning outcomes: Students completing the course will know the origin and development of the concepts of the field, and have a proficiency in using them. Are able to interpret and explain the nature of biological variability and genetical processes. The aforementhioned students should be open minded to the scientific fields in intimate relation to genetics, with special emphasis on genomics and evolution, and disciplines based on genetics, are able to study and master the results of these, and have the basic information for that, are determined to apply the genetical approach in their further studies. They are able to interpret and present basic experimental results, related to genetics.

ENBIOB1601 Human biology

Objectives: The lecture intends to introduce students to the characteristics of the human body. An overview is provided in the phenotypic variations of human kind, morphological features of the head/skull and body. The course gives an insight into the biological, anthropological differences between sexes, or before and after puberty. Description of the primate and human evolution, similarities and tendencies in evolution. Races of humankind.

Learning outcomes:

1. Describe factors determining a person’s phenotype
2. Determining factors of body structure and body composition
3. Phases of human development, delineating the hormonal and structural changes of the body, especially around puberty
4. Description of primates. Species, behavioral factors
5. Evolution of Homo species

6. Possibility of a later specialization towards these disciplines. Requires skills in problem solving and synthesis of concepts.

ENBIOB1701 Biogeography lecture

Objectives: Biogeography is the study of the spatial patterns of biological diversity and its causes, both in the present and in the past. Biogeographers synthesize information from a very broad range of fields, including ecology, evolution, paleontology and climatology. This course will provide a historical background for the field of biogeography and the ecological foundations needed to understand the distribution and abundance of species and their changes over time.

Learning outcomes:

The students are familiar with proceses of speciation, distribution and extinction of species, with natural lows of species area dynamics; have a knowledge of the terminology and correct using of technical terms; They are able to link a natural lows which governs changes in time (evolution) with those controling changes in space (e.g. continental drift); open to accept of the knowledge of closely related biological disciplines, strive to synthesize the diferent knowledge subjects. They are able to independently interpret, depict and present basic dynamic processes individually and to produce presentations and summaries independently from the knowledge of the subject.

ENBIOB2001 Nature conservation and Environmental Protection

Objectives: The purpose of the seminar is to form a general and critical eco-conscious and nature conseravtion view. The acquired knowledge will facilitate to understand different branch of studies and use them profitably (e.g. Biogeography, Phytosociology, General, Plant and Zoo Ecology, Physiology, Chemistry, Physics).

Learning outcomes:

Students will know the main topics of Environmental Protection and Nature Conservation,

Students will be able to distinguish, recognize and describe the main purposes, methods and tools of Environmental Protection and Nature Conservation,

Students are open to accept and/or criticize new results of different approaches on Environmental Protection and Nature Conservation,

Students will be able to form their own opinion on different topics of Environmental Protection and Nature Conservation.

ENBIOB3202 Genetics laboratory

The aim of the Genetics practice is to put into practice and deepen theoretical concepts, get acquinted with the most important experimental systems, substantiate experimentally and in practice the basic genetical knowledge, to demonstrate the basic and derivated genetical patterns and, mainly through problems, to improve the problemsolving ability of students.

ENBION2201/ ENBIOB2301 Evolution lecture

Objectives: part of the proficiency standard. Aims at introducing the most important concepts of evolution from the perspectives of life sciences, creating the outlines of evolutionary paradigm for the systematic approach to the knowledge mastered in frames of other fileds and subject matters

Learning outcomes: Students completing the course will know the origin and development of the evolutionary paradigm, the biological importance of this paradigm, know the concepts of the field, and have a proficiency in using them. Are able to interpret and explain the nature of biological variability and evolutionary processes, are able to systematize and interpret facts related to life on Earth. The aforementhioned students should be open minded to the scientific fields in intimate relation to evolution, with special emphasis on genetics-genomics, and disciplines based on molecular biology, are able to study and master the results of these, and have the basic information for that, are determined to apply the evolutionary approach in their further studies. They are able to interpret and present basic experimental results, and argue for the facts of evolution

ENBIOB1901 Ethology practice

Objectives: During the course the students will get some insight on the huge variation in animal behaviour, investigate how mechanisms within individual (e.g. physiology, neuroendocrine system or genetics) can generate this behavioural variation and we will study the evolutionary factors shaped this variaton.

Learning outcomes: The students are familiar with variation in animal behaviour and with their role in evolution; have a knowledge of the terminology and correct using of technical terms; They are able to distinguish the innate and learned behaviour; open to accept of the knowledge of closely related biological disciplines, strive to synthesize the diferent knowledge subjects. They are able to independently interpret, depict and present the learned knowledge individually and to produce presentations and summaries independently from the knowledge of the subject.

ENBIOBSV0601 Applied Biotechnology

Objectives: The aim of the course is to acquaint the students with the biotechnological application of microorganisms, to learn the principles of research and industry fermentation systems, and to demonstrate the practical application of microbial fermentation and biotransformation systems. Learn about the basics of environmental, medical, food and agricultural biotechnology. Career guidance.

Learning outcomes:

The students will be able to know and use

- the main correlations of applied biotechnology,
- the basic vocabulary of the field and use their terminology;
- the basic methods of the discipline and the tools presented.

They become open to the scientific fields related to the different disciplines of biotechnology, to the directed synthesis of information gained during their previous studies and to understand the contexts. They can independently interpret the basic literature of the field.

They are receptive to the use of innovative technologies, seek innovative solutions.

ENBIONSV0302 Microtechniques practice

Principle of operation, structure and types of optical examination devices (light microscope, phase contrast, fluorescence and polarization microscope, scanning laser microscope, transmission and scanning electron microscope). Microscopic measurements.

Preparation of microscopic slides: Vital samples, vital stains, fixed samples. Principle of fixation, practical tricks. Processing of fixed samples. Possibilities of contrast enhancement of light microscopic sections: general staining, impregnations. Special staining methods (indication of granular structures of cytoplasm and connective tissue fibers).

Contrast of electron microscopic sections.

The principle and practical parts of autoradiography.

Methodological problems and special methods of histochemistry. Classical histochemical methods: detection of nucleic acids, amino acids and proteins, carbohydrates, lipids. Principle and practical tricks of enzyme histochemistry. Characterization and

histochemical reactions of the most important enzymes that can be detected histochemically.

Biological basis of immunocytochemistry, applicable antibodies and labeling molecules. Advantages and disadvantages of direct and indirect immunocytochemical methods. Background reduction, specific signal amplification. Principle and practice of double and plural designations. Methodological problems of electron microscopic immunocytochemistry. Lectin histochemistry.

In situ hybridization.

Neuronal tracer molecules: fluorescent and non-fluorescent labels.

Classic and digital photography.

ENBIONSV0303 Microtechniques laboratory

Equipment, devices, chemicals and their use in histological and cytological laboratories.

Parts and use of light microscopes. Microscopic measurements (length, thickness, area) and calculations. Parts and use of electron microscopes (demonstration).

Preparation, native examination and painting of smear, peel, macerate (Giemsa painting, May-Grünwald and Giemsa staining).

Immersion and perfusion fixation. Washing, dewatering and embedding of fixed samples in paraffin and synthetic resin. Preparation of paraffin sections. Hematoxylin-eosin staining. Indication of connective tissue fibers (Van Gieson, orcein staining). Indication of neurons (Nissl staining, Golgi-Cox impregnation).

Staining of nucleic acids with gallocyanine, DNA staining by Feulgen reaction. Detection of carbohydrates and carbohydrate-containing structures by periodic acid-Schiff reaction. Detection of neutral fats by Sudan staining. Detection of catalase activity. Indication of peripheral neurons by NADH-diphorase reaction. Use of the NADPH reaction to detect nitric oxide synthase enzyme activity. Detection of acid phosphatase activity by the Gömör method.

Dilution and storage of antibodies. Compilation of antibody diluents. Staining of GABA-containing neurons by direct and indirect immunocytochemical methods.

Microphotography. Develop black and white negatives and paper images. Determining the useful magnification. Learn the basics of digital photography.

ENBIONSV0502 General toxicology practice

Objectives: This seminar covers the study of toxicology at infra- and supra-individual levels. It presents the toxic effects, the emerging symptoms and the possibilities of measuring the toxicity at the cellular and organic levels. Systematically introduces the important processes that affect the subject of environmental toxicology, the groups of contaminants and natural toxins.

Learning outcomes:

Upon completion of this course, the student will demonstrate basic knowledge in the following:

- tools and important techniques used in the Toxicology Laboratory,

- basic terminology of the scientific field.

- the toxic effects in their environment,

- local and global environmental problems

Students will have a more environmentally conscious approach than the average, and encourage people living in their surroundings to do so.

They will become open to the knowledge of toxicology-related fields understand the interrelations between them.

The seminar emphasizing the student's ability to critically read and evaluate papers in the areas of toxicology, evaluate and interpret directed experimental work.

ENBIONSV1502 Models in neurobiology practice

This cours intends to give special information on preferred models in modern experimental neurobiology. Participating students will freely pick a topic and present it to the audience. The rest of the students will ask related questions and initiate a conversation, discussion on the presented topic. Therefore, besides giving new/additional knowledge on neurobiological topics, this course will train students to articulate their opinion, to form questions driven by their curiosity and to be able to introduce their own knowledge on (or overlapping with) the particular topic.

ENBIONSV0902 Functional histology

Special course for experimental biologists that synthesises knowledge of cell biology and histology, comparative anatomy and physiology, further biochemistry.

ENBIONS0602 Fundamentals in limnology seminar

Objectives: The students will have got knowledge on aquatic environment and aquatic life form, and the relationships between aquatic organisms and their environment. The main objectives: fundamental physical, chemical, biological processes in the hydrosphere; the spatio-temporal distribution of populations of different organisms in aquatic habitats and wetlands; the abiotic and biotic environmental factors that influence the distribution of organisms.

Learning outcomes:

The students will know the characteristics of the aquatic environment and aquatic life forms, and the fundamental processes, relationships and rules in aquatic ecosystems. They will have knowledge on and be able to use the specific terms in limnology.

The students will be able to explain the experienced phenomena in aquatic ecosystems, and they will know the basic methods to collect environmental and biotic data. They will be able to show the results in oral or written presentations and reports.

Due to having fundamental knowledge on limnology the students will be able to specialize themselves in specific fields of limnology (to learn specific ideas and methods of subfields) during their future studies and works.

ENBIOBSV1101 Plant identification

Observation, preparation and identification of macroscopic lichens, mosses and vascular plant species of ferns, conifers and angiosperms related with morphological and habitat diversity.

Identifying and application of diagnostic features (e.g. organization types, bud, leaf, root, stem, bark, spores, flowers, fruits, etc.) by the eye and the use of transmission and binocular microscope on native plant material.

Practice is held in laboratory and outdoor localities in natural habitats of South-Hungary (Mecsek Mts. and the sorroundings) in late spring.

ENBIOBSV1201 Animal identification and ecology

The course will help in widening of taxonomic knowledge and ecological approach to the other fundamental and special courses (e.g. zootaxonomy, systematics, ecology,

biogeography, zoological monitoring, and applied zoology); identification of species and sampling procedures; the widening of knowledge about model species and animal groups frequently used in ecological modelling; learning of sampling methods and data processing.

ENBIOBSV1301 Biomonitoring seminar

Students get acquainted with theoretical bases of biodiversity monitoring and with the principles of planning and implementing long-term biodiversity monitoring studies

ENBIOBSV1401 Soil science

Course objectives: The Soil Science course is an review course which provides an overview of the fundamental concepts of soil science. The main objectives of the seminar are to perform properties of the soils: abiotic properties, soil microorganisms, fungi, animals, plants and their biological properties.

Learning outcomes: Students understand the following content areas in soil science: general definitions of soil; soil anorganic matter; forming factors; mineralogy; physics; water content; chemistry; soil biota; soil organic matter; nutriens; pedogenic processes; soil classification systems; the main soil types in Hungary and in Europe; soil degradation, contamination and protection. They have the knowledge of specific terminonolgy of Soil Science and apply these. They have the knowledge of properties, structure and function of the soil and recognize concepts and theories that explain processes of the soil. They understand and evaluate results of experiments, make presentations and abstracts in subject matters of the Soil Science. Students recognize concepts and theories that explain processes involved in the functioning of plants and relate this understanding to real-world occurrences. They understand and evaluate experimental design, use common techniques and equipment in physiological studies, organize and record experimental data by keeping a laboratory notebook, and report results in a scientific manner.

ENBIONV0201 Fundamentals in plant sociology

Those students who pass the course will know the main methods and limitation of Phytosociology, will be able to distinguish, recognize and describe the main phytosociological classes of the Hungarian syntaxa, are open for accepting new results of different phytosociological methods and approaches (dynamic outlook). They will be able to form their own opinion on different topics of Phytosociology.

ENBIOBSV1601 Conservation of flora and fauna seminar

Objectives: The purpose of the seminar is to form a general and critical botanical and zoological view that can be an useful tool in Nature Conservetion practice. The acquired

knowledge will give a comprihensive view on Hungarian and general biotic values that should be protected. Upon these skills, this knowledge give them an opportunity to use and understand the results of other scinces (e.g. Biogeography, Phytosociology, General, Plant and Zoo Ecology, Taxonomy, Physiology).

Learning outcomes:

Students will know the main methods, local and global objects, diversity hot spots and branches of plant and animal conservation,

Students will be able to specify the main problems, duties and mission of plant and animal conservation,

Students are open for accepting and/or criticize new results of different approaches on plant and animal conservation,

Students will be able to form their own opinion on different topics of plant and animal conservation.

ENBIOBSV1701 Introduction to applied ecology seminar

Objectives: The course introduces the students to scientific principles and different fields of science of applied ecology. It is a practice-oriented course by integrating knowledge of general ecology, zoology and conservation biology. Another objective is to develop students' analytical and synthetic ecological approaches. The subject forms the basis of further subject studies and specialization (e.g. professional core material, supraindividual MSc subjects).

Students who successfully complete the course:

know the principles of applied ecology, have knowledge of the terms of the discipline and correctly apply them,

acquire an ability to apply ecological theory and methodologies in applied ecologically-based problem-solving, by reading and interpreting literature, exploring scientific approaches to answering questions, examining case studies, and applying ecological approaches

are open to finding out more about applied ecological principles and their practical application in solving real problems, which they have suitable knowledge of.

MSc Biology course list and descriptions

The Biology MSc line offers full 2-year-education in biology. The study program for full-time training offers a complete education in biology, with special directions particularly in molecular biology (neurobiology, genetics, microbiology), and animal and plant ecology. Special directions from the second semester offer more laboratory practice in molecular biology or more courses in ecology. The basic subjects are presented in lectures, seminars and laboratory or fieldwork. The program provides a wider view of the related scientific fields (biophysics, biological chemistry). The students will familiarize their knowledge with the most modern instrumentation in our new research centre. It covers all aspects of education, research and innovation in the fields of biomedical, natural and environmental sciences. It also provides an opportunity to join the research work in 22 different research groups operating in the building.

ENMNBIOA0101 Biophysics

Biophysical aspects of physiology and the use of physics based research equipments in biological research.

To present biophysical aspects of physiology as well as physical phenomena applications in research equipments. In addition to establish basic knowledge of biophysical concepts expected of students with a Masters degree in science, the focus of students activities is based on the methods and theories applied in biology research.

Upon completing the course, students are expected to understand how the basic principles of natural sciences (as learnt in BSc physics and related courses) are realized in biological organisms; how biomolecules interact with electromagnetic radiation. Students are expected to acquire the understanding of research equipments utilized in their diploma projects.

ENMNBIOA2501 Biostatistics

Demonstration of the application of basic statistical knowledge and methods that are necessary to answer biological research questions. Meanwhile, to help students to acquire skills to use a free statistical program.

To develop problem oriented statistical approach in students.

Learning outcomes:

• understanding of the basic statistical terminology

• familiarity with the basic and frequently applied statistical methods

• basic statistical knowledge that form basics for learning of advanced statistical methods (e.g. m ultivariate analyses).

ENMNBIOA1601 Biotechnology

Information on this course is available from the academic coordinator of the program.

Please contact Prof Dr László MOLNÁR (molnar@gamma.ttk.pte.hu)

ENMNBIO13 Developmental and stress physiology of plants

Regulation of the plant cell cycle, meristem and leaf primordium definition, induction. Patterns, totipotency and polyploidy.

Induction of flowering, the ABC model of flower development. Gametogenesis, male and female sterility. The molecular background of self-sterility in Solenaceae and Brassicaceae.

The role of Programmed Cell Death (PCD) in plant development, senescence and stress responses. Constitutive and inducible defence responses. R genes and the gene-to-gene model. Signal perception and transduction in plant defence. Systemic Acquired Resistance (SAR) and Induced Systemic Resistance (ISR). The molecular background of priming. Gene silencing in virus resistance.

The molecular background of plant abiotic stress responses. Defence against water stresses (flood, drought, osmotic, salt): membrane transport, osmoregulation, gene induction. Acclimation in cold and heat stress tolerance, the role of chaperons in the protection of the proteins.

Molecular signalling in plant hormone perception and action.

ENMNBIO2901 Ecological fundamentals in environmental protection and nature conservation

Information on this course is available from the academic coordinator of the program.

Please contact Prof Dr László MOLNÁR (molnar@gamma.ttk.pte.hu)

Those students who pass this course will know the main ecological aspects of Environmental Protection and Nature Conservation, will be able to distinguish, recognize and describe the main purposes, methods and tools of Environmental Protection and Nature Conservation, and are open to accept and/or criticize new results of different approaches on Environmental Protection and Nature Conservation. They will be able to form their own opinion on different topics of Environmental Protection and Nature Conservation.

ENMNBIO2801 Evolution of the structure and function in the living being

The purpose of the subject is to put evolutionary and zoological knowledge into the system of ultimatic and proximative analysis from a different perspective, and to develop

an EVO-DEVO (evolutionary evolutionary biology) approach. 1. Study of the organic relationship between evolution and evolution before Darwin: Cuvier, Lamarck, Geoffroy Saint-Hilaire 2. Darwin and his followers: Evolutionary Embryology 3. Experimental embryology, Roux: fracture 4. -5. Old and new ideas: the works of von Baer, Haeckel, and what was built on it: philotipical stage, recapitulation, heterochromia, phylogenetics 6. Golden age of experimental embryology: Spemann and his successors, organizors 7. Pattern formation, Homeosis, homeotic mutants, molecular toolkit 8. Monitoring of phylogenetic and morphological changes in organ systems 9. Evolution of the circulatory system during phylogenesis 10. Development of limbs, general physiological changes in vertebrates on land 11. Evolution of the visual organs 12. Development of the nervous system during phylogenesis.

ENMNBIO2701 Molecular cell biology

The origin of the eukaryotic sell, its compartments and organelles. The monophyletic and polyphyletic origin of the eukaryotic cells. Compartmentalization and genome reorganisation in the mitochondria and chloroplasts.

The structure of the eukaryotic genome and chromosomes and their role in gene expression regulation.

The structure and function of the nucleus and nucleolus. Nuclear transport and signalling.

The central role of the RNA as an evolutional relict in the gene expression and its regulation.

Cell cycle and programmed cell death and their role in the regulation of the ontogenesis of the multicellular organisms.

The structure and inheritance of the cell membrane. Membrane transport, endo- and exocytosis, plasmodesmata, apoplast. Endoplasmic reticulum and translation, signalpeptids, posttranslational modifications and vesicular transport.

The functional network of the Golgi-apparatus, lysosomes and peroxisomes. Regulation of membrane fusion during endo- and exocytosis.

Cytoskeleton, microtubules, microfilaments and intermediate filaments, cilia, flagella, molecular motor proteins.

Signal transduction in the cell: signal molecules and receptors, F-box proteins and proteasome.

ENMNBIOA0601 Proposal preparation and scientific communication

Information on this course is available from the academic coordinator of the program.

Please contact Prof Dr László MOLNÁR (molnar@gamma.ttk.pte.hu)

Objectives: Students will aquire skill related to knowledge dissemination at different levels. They become aware of scientometric principles and integrate these new knowledge elements into their battery that has been aquired during their BSc studies. They will be informed about the logics of project generation and project writing and they will also learn some practical hints.

Learning outcomes: Students will become armored to collect information related to their scientific projects, conceptuating and writing simple papers and abstracts. They will be able to integrate into teams generating and writing projects.

ENMNBIO3001 Regulatory biology

Objectives: Students will acquire knowledge on regulatory processes of the body at both molecular and systems level. They will understand the most important know scientific results and integrate these with the former knowledge obtained during their BSc studies. They will understand the basics of the newest brain research methodologies.

Learning outcomes: The student will be able to collect information through different media and to plan experiments related to the topics discussed. They will be adept in joining research laboratories which study homeostatic control processes at different levels.

BSc Geography course list and descriptions

During this 6-semesters long Bachelor degree program students can learn and acquaint themselves with: the most important relations between geography and related disciplines; the analysis and adequately interpreting the problems and challenges of geographical space from a physical and human geographical approach; and the methodological fundamentals essential for the complex and integrated analysis of environmental spatial problems in classrooms, labs and fields.

Applied geography specialization is offered for all international students and combines environmental geography, regional development, GIS and tourism. The program includes a six-week professional practice at self-selected private and public businesses and companies, however, the practice is also available at the university and IGES. By completing the professional practice, you will gain a broad range of practical and project

management skills and knowledge to explain, analyse, interpret and execute various planning programs.

ONFOL1-2501 Introduction to Geography

The aim of this course is to prepare first grade students for their university studies in geography. For this reason, during the course they learn the basic definitions, proper nomenclature and important topographical phrases of geography, ensuring their successful progress during their studies. At the end of the semester, students are able to understand the university level geography theories, compare and evaluate the basics of physical and human geography. They are also aware of the most important geographical knowledge based on cartography and maps. The course has two components: the lectures and the seminars. With the lectures, students learn basic geographical theories, at seminars they practice and implement their basic knowledge.

AFOLNA0201 Introduction to Office-related applications

One of the main aims of this course is to refresh and systematize the existing computer-related knowledge of the students. The other is to enable them to perform text-, data table- and presentation based works on an expected quality level. For this aim the course is separated into four larger module, as: word processing, spreadsheet works and data visualization, presentation making and basic of operating systems.

AFOLNA3101 Road to Geography

The aim of the course is to give an introduction to our first year students about the structure, goal, offers and overall requirements of our bachelor programs. We present an overlook about the host institution, including the specialities and research focus of the departments. We also provide information about the higher education system in Hungary, and about the University of Pécs, as long as meets the interest and daily routine of the students. In the other hand, we draw a general picture about the geography as a discipline and as a profession.

Students will be able to plan their study carefully, regarding their own interest and goals. They will have a proper knowledge about the career-possibilities internationally, and get motivated to join the research programs the institute offers. The course will help students to build up the complex spatial-sensible and complex attitude geographers usually own.

AFOLNA0101 Geomathematics and Geostatistics

Aims:

1. To provide an understanding and knowledge of basic mathematical and statistical methods

2. To provide a routine in the solution of the simpler mathematical and statistical problem related to the earth sciences

Knowledge:

On successful completion of this course students are able to apply basics mathematical and statistical tools.

Subject-specific skills:

On successful completion of the course students are expected to be able to solve simpler mathematical problems and accomplish statistical analysis at basics level.

(EN)AFOLNA0901 Introduction to Physics

Introduction to most important fields of physics at basic level.

AFOLNA0301 Social Studies for Geographers

Aims:

1. To provide students with insight into the geography-related economic, demographic and sociological knowledge forming an important basis for the later interpretation and the geographical approach of their subjects.

2. To give insight into some research topics and methodological issues of social sciences, particularly economics.

3. To give insight into regional/practical appearance and the cause-effect relationships of specific issues in social sciences.

On successful completion of this course students are expected to be familiar with the epistemological and methodological foundations of social sciences, learn the basic skills of social research, basic concepts and theories necessary for understanding the problems and conflicts of our society, the main directions of the observed changes and the possibilities of interventions needed.

ONFOL1-0501 Meteorology and Climatology

Aims: To provide an understanding of the structure of the atmosphere, the physical processes impact the weather and the climate

Knowledge: On successful completion of this course students are expected to understand the basic concepts about the atmosphere and they be familiar with phenomena occur in the atmosphere

Subject-specific skills: On successful completion of the course students are expected to be able to give explanation about the different atmospherical phenomena. They are able to involve critically in the debates about the climate changes. They are able to apply their knowledge in the other fields of the earth sciences.

AFOLNA0701 Introduction to Astronomy

Planet Earth is part of the Solar System, the Milky Way and the entire universe. Mankind has known this celestial body for thousands of years, defined its shape, movements and structure. However, with the development of astronomy and space exploration, we have also found completely different types of planets and moons in the Solar System. During the course we will get to know the life and death of the Sun and other stars, and the elements and structure of Milky Way or other galaxies.

To know the fundamentals of the astronomy: The history of the development of astronomy, the basics of the astronomical geography: like orientation and navigation star constellation. Coordinate systems; About the solar system: planet Earth shape, size, and movements, terrestrial and Jovian planets characteristics, the origin and the development of Solar System, small celestial bodies, moons, asteroids, comets. The Sun as a star basics about other stars, galaxies. The origin of the Universe.

ONFOL1-0402 Astronomical Geography and Cartography

The course develops the geographical skills, optimises the capabilities of the orientation on the Earth surface and on the sky.

ONFOL1-0202 Introduction to Geology lecture

Geology is the core discipline of the earth sciences and encompasses many different phenomena, including plate tectonics and mountain building, volcanoes and earthquakes, and the long-term evolution of Earth’s atmosphere, surface, and life. Because of the ever-increasing demand for resources, the growing exposure to natural hazards, and the changing climate, geology is of considerable societal relevance. This course introduces students to the basics of geology. Through a combination of lectures, labs, and field observations, we will address topics ranging from mineral and rock identification to the origin of the continents, from geologic mapping to plate tectonics, and from erosion by rivers and glaciers to the history of life.

The subject matter examined in the course covers the basics of geology and the objectives of the course are to provide students with a general understanding of this discipline. The course will focus on the chemistry and properties of minerals, the composition of igneous, sedimentary and metamorphic rocks and some of the earth processes responsible for rock and mineral formation.

- Students will be better able how to observe and think about landscapes and other aspects of Earth;
- Students will better understand the relevance of geology to their local geologic setting and the larger societal issues, like resources;
- Students will understand main geologic concepts and demonstrate an ability to apply geologic concepts;
- Students will become more informed citizens and leave class with an interest in learning more.

AFOLNA0402 Introduction to Geology practice

Aims:

1. To provide an understanding of the visible properties of minerals, rocks, and fossils.

2. To provide an understanding of the geological map and its usage.

2. To apply applied geological concepts to illustrate their own measurements.

Knowledge:

On successful completion of this course students are expected to be able to identify the most common minerals, rocks and fossils. Able to use geological compass and able the illustrate the measured data.

Subject-specific skills:

On successful completion of the course students are expected to be able to: present basic geological data, and understand the basics of geology in practice.

AFOLNA1001 Introduction to GIS I. laboratory

Aims:

To provide an understanding of the basics of GIS and digital cartography.

To provide information about vector graphic tools of the Inkscape software and to introduce technical steps of digital mapping.

Knowledge:

On successful completion of this course students are expected to be able to map geo data using the Inkscape software, to have an understanding of special terms and fundamentals of cartography, to be familiar with tools of vector graphics.

Subject-specific skills:

On successful completion of the course students are expected to be able to evaluate formerly prepared data for cartographic purposes and map physical and human geographic cases. They are able to understand, interpret and present spatial data and accomplish basic cartographic tasks using Inkscape.

AFOLNA1002 Introduction to GIS II. laboratory

Aims:

1. To provide an understanding of geoinformatics and Qgis software.

2. To provide a quantitative discussion of basic nomenclature of geoinformatics and methods of data analysis.

Knowledge:

On successful completion of this course students are expected to be able to comprehend fundamental concepts of GIS, to have an understanding of GIS techniques, to be familiar with Qgis software and vector and raster geo data processing.

Subject-specific skills:

On successful completion of the course students are expected to be able to evaluate georeferencing tool of Qgis, to able to digitize vector data and present thematic maps. Student comprehend basic field survey techniques and able to collect data.

AFOLNA1301 Introduction to Scientific Work

The aim of this seminar is to prepare students to create their own scientific works. Step by step, the major elements of a research project, based on an example of a bachelor thesis will be introduced and each element will be practised. Course topics will include the principles of the scientific investigation, basics of scientific ethics, and fundamentals of geographical methodology.

Students finishing this course will be able to recognise spatial-related scientific problems, to form relevant hypothesis or research questions. They have the skill to use databases, including publication databases and search engines (WoS, Scopus, Google Scholar) and also reference manager programs (Mendeley). They will be able to read and analyse scientific papers critically. They know some of the possible data sources of geographical researches, and have the basic competence to download and handle statistic data. With knowing their own skills and preferences, they will be able to create a research plan for bachelor level. They know the overall structure of the scientific works/papers, and are able to cite and create list of references.

(EN)AFOLNA1401 Geomorphology

Why is it important to know about the evolution of landforms on the Earth's surface? What are the major processes which shape them? What kind of landforms are typical products of fluvial, eolian, glacial, karst, coastal etc. agents? How does gravity contribute to the removal and accumulation of material? Where can we find the most beautiful landforms on Earth?

On successful completion of this course students are acquainted with the landscape of the Earth, the laws, interactions, processes which influence geomorphic evolution and are familiar their dynamics.

On successful completion of the course students are expected to be able to:

interpret the impact of physical geographical processes on the Earth’s surface,

recognize surface landforms on which the everyday activities of humanity take place,

reveal their origin and to evaluate environmental changes (climate change, human impact) from a geomorphological perspective.

In addition to have an understanding of phenomena and interrelationships, students in teacher training become able to apply the logic of transmitting geomorphological information, its variability and the incorporation of geomorphological knowledge in teaching geography.

Subject-specific skills:

Students in earth sciences become capable of finding topics of contact between geology and geomorphology, recognizing and explaining the impact of geological processes on the Earth’s surface.

ONFOL1-2701 Historical Geology and Paleontology

Objectives:

The aim of the course is to present the history of planet Earth, namely introducing into the periods and milestones of Earth history, describing the major events and eras, periods, epochs, ages; introducing the dynamic Earth concept and its continuously changing model; understanding the mutual dependencies of bio- and geodiversities and presenting the best examples; Presenting the evolution of life on Earth and its major steps. Learning that the evolutionary steps are not accidental but always based on the previous developments and always understandable from the previous developments of life.

Learning outcomes:

Students successfully performing the course should know the geologic time scale, the major moments/milestones of evolution of life on Earth. They should know the basics and principals of stratigraphy, faciology, and evolutionary theory; they should know the methods of geological timing, the names and durations of geologic eons, periods and epochs (only for Cenozoic). They should know the appropriate nomenclature and terms and are able to use them in right context. They should know the scientists and their achievements who contributed the most to geology and palaeontology. They should able to know them and refer their scientific results/contributions. They should be able to understand the interrelationships of these sciences and their dependencies on each other. Based on the acquired knowledge they should be able to understand and explain the development of Earth and its life forms and put the milestones of the development in right order. They should able to explain the evolution on Earth and recognize the turning points in evolution. On the field they are able to recognize and understand the litho- and biofacies. They are able to understand and explain the Darwinian evolutionary theory and are able to cite examples from the fossil record. They know the micro- and macroevolution and able to cite examples for both from the fossil record. They are able to explain the big five extinction events of the Phanerozoic and their possible causes and are able to explain their impacts on the further developments of life in Earth.

ONFOL1-2601 Introduction to Pedology

This course will introduce students to the wonderful world of soils that exist, often forgotten, beneath our feet. Soils are one of the most fundamental ecological constraints on patterns and processes such as plant distribution, nutrient cycling, and cycling of

water between terrestrial ecosystems and the atmosphere. Soils are also an important component of many current and historical environmental problems.

We will begin with the fundamentals of soil science and then apply this knowledge to characterize soils in the field and work through complex environmental problems. The course format includes a mixture of lectures and hands-on activities in the lab and field. A 45- minute lecture and a 90-minute lab are scheduled per week. The lab is scheduled immediately after class in the late afternoon, and we will occasionally use this entire block of time to sample soils at local field sites.

Students will complete weekly lab and field-based assignments aimed at critical thinking about fundamental concepts in soil science.

The general goal of the course is to provide an insight into the complex zonal knowledge on climate-vegetation-fauna-soil relations and soil management, which may generate a sound foundation for the subsequent global geographical studies. Students will also be expected to understand the basic models and nexus of soil science and pedology, and the role of soils on agriculture, crop production and global economy, as well as human welfare.

Students who successfully complete the course will have an understanding of the methodological and theoretical basis of pedology and soil sciences. On successful completion of the course students are expected to be able to understand the basic processes in the pedosphere. They also will be able to collect relevant data to analyse and identify the role of soils, soil physical, chemical and biological processes on global systems, including human society and economy. They also will be able to critically evaluate and judge the problems and issues related to soil health, soil contamination and the general condition of soils as integral parts of the global ecosystems. They also work independently on soil-related ecological and interdisciplinary problems and present them to decision makers and stakeholders. They will be able to assess and comprehend data and literature related to soil science, pedology and ecosystem analysis.

ONFOL1-1301 Biogeography

The general goal of the course is to provide an insight into the complex zonal knowledge on climate-vegetation-fauna-soil relations, which may generate a sound foundation for the subsequent global geographical studies. Students will also be expected to understand the basic models and nexus of biogeography.

Students who successfully complete the course will have an understanding of the methodological and theoretical basis of biogeography. On successful completion of the course students are expected to be able to understand the basic processes biogeography and ecology. They also will be able to collect relevant data to analyse and identify the role of ecosystems, biomes and biogenic factors on global systems, including human society and economy. They also will be able to critically evaluate and judge the problems and issues related to populations and communities. They will also comprehend independently ecological and supraindividual problems of the members of any ecosystem and present that to decision makers and stakeholders. They will be able to assess and comprehend data and literature related to biogeography and ecosystem analysis.

ONFOL1-0801 Hydrogeography

The course combines theoretical and experimental elements aimed at

providing practical experience in the measurement and analysis of hydrological processes;

methods of analysis applicable to solving practical problems related to environmental, land use, low input management problems. Aims:

1. To provide an understanding of the water cycle

2. To provide a quantitative discussion of water bodies

3. To apply water concepts to contemporary problems in water resources management

This course familiarizes students with selected hydrological measurement and analytical techniques. Learning outcomes: Students are going obtain skills on different kind of investigation procedures.

ONFOL1-1101 Introduction to Human Geography

The aim of the course is to function as an introductory class, guiding the students into the world of geography and human geography, providing an insight into its structure, research topics, current issues, and methods. Its primary goal is to introduce those new global disciplines, which are in sharp contrast with their former studies in public education. It is also among the missions to introduce the practical, applied aspect of human geography, in order to make practical sense of the introduced topics, issues.
This course familiarizes students with selected fields of human geography, up-to-date global issues, and with its practical application in planning. Learning outcomes: students

are going to obtain a basic overview and a useful vocabulary in the discussed disciplines of human geography.

ONFOL1-2801 Population, Place and Identity

Objectives of the course are to help the students acquire basic knowledge and skills used in modern population geography and adjacent disciplines.

Students visiting the course:

will know the basic definitions and concepts of population geography, can use the basic terminology of the field.

Are able, with the knowledge of the context of population geography, to collect data, analyse demographic datasets, understand and prepare age structure diagrams etc.;

are open to cultures and histories of different cultures and nations, have the basic knowledge to do so. pursue to analyse and evaluate the major concepts of population geography;

are able to individually analyse, understand and represent basic demographic processes, are able with the help of relevant data, to prepare figures, presentations, briefings and supporting materials for decision makers.

AFOLNA3301 Urban Geography

The aim of the course is to give an introduction of the fundamental terms, concepts and models regarding the spatiality of human settlements. Students will have an overlook about the differences and similarities in the urbanisation of the different regions around the globe. In the seminars supporting the course students will improve their skills in the field of spatial analysis. They will be able to recognise analyse and interpret the spatial processes, patterns of functions, morphology and social groups in urban and in rural space. They will be able to use databases to support these analysis, classify and evaluate settlements. During the course the students' skills in individual reading and interpreting scientific papers will be improved, and also their abilities in team-based problem solving, presentation and scientific writing. The curricular goal of the course is to lay down fundamentals to the course of "Urban planning and development".

AFOLNA2201 Economic Geography

The aim of the course is to introduce the students into the world of economic geography, providing an insight into its structure, research topics, current issues and methods. Its primary goal is to present the structure and the historical background of nowadays

economies. It is also important to give an insight about the new global disciplines of economic geography. After the successful completion of the course, students are expected to be able to understand many of the models of economic geography and its theory. It is also among the missions to introduce the practical, applied aspect of economic geography, in order to make practical sense of the topics. The student will be able to collect data, make economic geographic analyses and understand the literature of the economic geography independently.

Learning outcomes: students are going to obtain a basic overview and a useful knowledge in the discussed disciplines of economic geography. They can make basic analysis of the economy and understand the relationship of its fields. On successful completion of the course students are expected to be able to comprehend the main trends and models of economy and compare the countries by many dimensions of their economic activity. Students will be able to present the economic structure of a country.

ONFOL1-2301 Physical Geography of Europe

On successful completion of this course students are acquainted with the landscape of Europe, the laws, interactions, processes which influence geologic, hydrologic, and climatological geomorphic evolution and are familiar their dynamics.

On successful completion of the course students are expected to be able to:

interpret the impact of physical geographical processes on the surface of Europe,

recognize surface landforms on which the everyday activities of humanity take place,

reveal their origin and to evaluate environmental changes (climate change, human impact) from a physical geographical perspective.

In addition to have an understanding of phenomena and interrelationships, students in teacher training become able to apply the logic of transmitting geographical information, its variability and the incorporation of physical geographical knowledge in teaching geography.

Subject-specific skills: Students in earth sciences become capable of finding topics of contact between geology, hydrology, climatology and geomorphology, recognizing and explaining the impact of geological processes on the surface of the European continent.

ONFOL1-2401 Human Geography of Europe

A versatile analysis of the regions and countries of Europe is one of the most unique tasks in geography. The aim of the course is to give a thorough understanding on what is

Europe. Its evolving concept, its political context, population characteristics, economic structures, ethno-national and cultural variety etc. The lectures are problem oriented and follow an up-to-date analysis of current issues besides the investigation of the deeply embedded regional characteristics. Seminars are attached to the lectures, which focus on oral and written presentations as well as readings and tests based on the material of the lectures and other sources.

The students successfully completing the course:

know the basic concepts of regional geography of Europe, possess the basic professional vocabulary in the field;

are able to make data collection and analysis with the background knowledge of regional human geographical processes of Europe; are open to get to know the cultures of the difference nations of Europe and possesses basic information for this.

The competence areas to be developed during the seminar: The student should possess such a complex point of view which involves the physical, social, cultural and economic environment and the aspects of the local, regional and global geographical and environmental thinking.

ONFOL1-1901 Physical Geography of the Carpathian Basin

Although this course focuses on the area of Hungary, it also looks at the whole Carpathian Basin. When and how was the Carpathian basin formed? What kind of landscape-forming forces and factors was affected its development? We also look at how the physical geographic situation shapes the characteristics of each natural element. What sort of climate, soils or wildlife characterize this region? What natural or artificial pattern dominates the physical landscape? And of course, we also look at the landscape-shaping effect of man.

Goal of this course to have skills in physical geographical analysis of a region/location, e.g. Carpathian Basin. Students will develop depth, breadth, and integration of learning in physical geography.

Upon completion of the course on physical geography of Carpathian Basin students:

- will be able to be familiar with fundamental concepts on physical geography of Carpathian Basin and its principles at the level of macro regions;
- will be able to list and identify on blank maps core geographical names of Carpathian Basin;

- will have an understanding of core concepts around physical geography of Carpathian Basin.

Upon successful completion of this course students are expected to be able

- to evaluate existing data in the context of physical geography;
- to analyse with a thematic guide physical macro regions of Carpathian Basin;
- to recognise individual types of landscapes and to assess their core properties;
- to analyse the impact of Quaternary climate variations on Carpathian Basin and to assess its role in the landscape development;
- to interpret and present the effects of society on natural factors.

Upon completion of this course students

- will be able to identify diverse viewpoints, including different geo-disciplinal perspectives;
- will be able to identify scientific issues underlying global, national, local, and personal decisions and communicating positions that are scientifically and technologically informed;

ONFOL1-1801 Human Geography of Hungary

Aims:

1. To give insight into population and settlement geography of Hungary and the rapidly changing regional characteristics in the primary, secondary and tertiary sectors of economy.

2. To explain the factors behind Hungarian regional structure, through the basic characteristics of socio-economic system.

3. To enable the students to understand the processes shaping the regional structure.

4. To build relationships between physical and human geographical knowledge.

5. To give insight into current social geographical problems, analysing the trends over the last few decades of regional economic development.

On successful completion of this course students are expected to be familiar with the economic historical antecedents of Hungary's regional processes, analyse trends over the last few decades and outline present and future directions of development trends, as well as the underlying correlations of the regional economic development after the turn of millennium and the subsequent period.

to be aware of the underlying structural and regional development trends, contexts and have a theoretical knowledge of physical and social geography,

to able to collect, organize and interpret social and economic geography data, create presentations, pointing out the practical problems arising from the current social, economic and regional processes and their potential solutions as well;

to be open to learn about Hungarian social and regional inequalities;

to be able to (building on the social sciences and the general human and economic geographical knowledge) evaluate the country's role and place in the world realistically, and show the practical problems arising from the current economic and social trends.

to be able to interpret and discuss special content related to the human geography of Hungary.

ONFOL1-0901 Field Trip

The purpose of the course is to synthetize the students' knowledge about physical geography, social geography, departmental and regional geography that they learned during four semesters. During the field trip, the students explore the physical and social geographical characteristics of the travelled landscape and settlements with the help of the teachers' lectures and they develop their geographical approach. The field trip serves the alignment of the student' knowledge with preparations, making of field diary and the ending report. The students who complete the course know the basic physical, social and regional geographical implications of the selected area. They know and use the characteristics of the geographical thinking and they use the terminology. They can see through the coherence of the physical, environmental, social and economic processes. The students are able to make field observations first with the guidance of the teachers then independently and they interpret the informations obtained there. They are prepared to draw up logical and geographical statements about the observed phenomenons.

During the field trip the eco-conscious approach of the student get a confirmation based on facts. The known phenomenons and processes make their commitment towards

sustainability more pronounced and conscious. On the track of the strengthening of knowledge, they are able to raise their knowledge to a higher level and they are able to cooperate and be acquainted with the opinion of their teachers and teammates.

BSc Earth Science course list and descriptions

The IGES offers you a general and fundamental scientific knowledge to understand the mutually interrelated processes of Earth Sciences. You may familiarize yourself with a wide array of disciplines including the principles of geology, meteorology, astronomy, climatology and hydrology. And, you will learn the methods used in Earth Sciences, and you will make connections with laboratory microscopes, geology hammers in the field and computer models in the office.

You may specialize yourself in the field of geology to explore the deeper correlations of subsurface dynamics and how recent landforms have evolved over geologic timescales. This is all done and conveyed to you by a young and dynamic team of faculty in a custom-designed and student-specific training algorithm.

(EN)AFOTNA0101 Mathematics basics practice

AFOLNA0201 Introduction to Office-related applications

One of the main aims of this course is to refresh and systematize the existing computer-related knowledge of the students. The other is to enable them to perform text-, data table- and presentation based works on an expected quality level. For this aim the course is separated into four larger module, as: word processing, spreadsheet works and data visualization, presentation making and basic of operating systems.

ONFOL1-0202 Introduction to Geology lecture

Geology is the core discipline of the earth sciences and encompasses many different phenomena, including plate tectonics and mountain building, volcanoes and earthquakes, and the long-term evolution of Earth's atmosphere, surface, and life. Because of the ever-increasing demand for resources, the growing exposure to natural hazards, and the changing climate, geology is of considerable societal relevance. This course introduces students to the basics of geology. Through a combination of lectures, labs, and field observations, we will address topics ranging from mineral and rock

identification to the origin of the continents, from geologic mapping to plate tectonics, and from erosion by rivers and glaciers to the history of life.

The subject matter examined in the course covers the basics of geology and the objectives of the course are to provide students with a general understanding of this discipline. The course will focus on the chemistry and properties of minerals, the composition of igneous, sedimentary and metamorphic rocks and some of the earth processes responsible for rock and mineral formation.

- Students will be better able how to observe and think about landscapes and other aspects of Earth;

- Students will better understand the relevance of geology to their local geologic setting and the larger societal issues, like resources;

- Students will understand main geologic concepts and demonstrate an ability to apply geologic concepts;

- Students will become more informed citizens and leave class with an interest in learning more.

AFOLNA0402 Introduction to Geology practice

Aims:

1. To provide an understanding of the visible properties of minerals, rocks, and fossils.

2. To provide an understanding of the geological map and its usage.

2. To apply applied geological concepts to illustrate their own measurements.

Knowledge:

On successful completion of this course students are expected to be able to identify the most common minerals, rocks and fossils. Able to use geological compass and able the illustrate the measured data.

Subject-specific skills:

On successful completion of the course students are expected to be able to: present basic geological data, and understand the basics of geology in practice.

(EN)AFOTNA0301 Chemistry basics I. lecture

During the course students get familiar with the most important fundamentals of material world, atoms and their electron structures. It also turns out how it is possible that basically unlimited number of compounds exists from the finite number of elements found in Earth. It is also higlighted that how the molecules may interact with each other and determine the physical and chemical properties of the given material. It is as well presented how the chemical reactions may be classified.

ENAFOTNA0901 Physics basics I. lecture

Understanding and applying the basic concepts, laws of general physics. The basics of classical mechanics and thermodynamics are covered.

ENAFOTNA1201 Biology basics lecture

The primary purpose of the course is to provide students with an insight into all aspects of biology. In addition, we aim to highlight connections between the natural sciences.

ENAFOTNA0302 Chemistry basics II. lecture

During the course students get familiar with the physicochemical properties of biologically and environmentally important elements and those of their compounds.

ENAFOTNA0303 Chemistry basics practice

The aim of the lab is to get familiar with the most important tools and measuring methods in chemistry. The practice also focuses to prepare the students how to perform the most important calculations for preparing proper labnotes.

ENAFOTNA0902 Physics basics II. lecture

Understanding and applying the basic concepts, laws of general physics. The basics of classical electromagnetism, optics, and atomic physics are covered.

ENAFOTNA0903 Physics basics practice

Problem-solving to understand more the relations between the quantities in physics basics. To develop task-solve skills and modeling.

ENAFOTNA0501 Meteorology lecture

The atmospheric processes affect our life directly and indirectly as well. Most of the people are eager to know the weather for next few days to plan a weekend or summer holiday. The accuracy of weather forecast, although their reliability is frequently criticized, improved significantly during the last decades. This lecture helps to understand the different weather phenomena and how the data are collected from the atmosphere to evolve more accurate weather forecast methods.

AFOLNA0701 Introduction to Astronomy lecture

Planet Earth is part of the Solar System, the Milky Way and the entire universe. Mankind has known this celestial body for thousands of years, defined its shape, movements and structure. However, with the development of astronomy and space exploration, we have also found completely different types of planets and moons in the Solar System. During the course we will get to know the life and death of the Sun and other stars, and the elements and structure of Milky Way or other galaxies.

ONFOL1-2601 Introduction to Pedology

This course will introduce students to the wonderful world of soils that exist, often forgotten, beneath our feet. Soils are one of the most fundamental ecological constraints on patterns and processes such as plant distribution, nutrient cycling, and cycling of water between terrestrial ecosystems and the atmosphere. Soils are also an important component of many current and historical environmental problems.

We will begin with the fundamentals of soil science and then apply this knowledge to characterize soils in the field and work through complex environmental problems. The course format includes a mixture of lectures and hands-on activities in the lab and field. A 45- minute lecture and a 90-minute lab are scheduled per week. The lab is scheduled immediately after class in the late afternoon, and we will occasionally use this entire block of time to sample soils at local field sites.

Students will complete weekly lab and field-based assignments aimed at critical thinking about fundamental concepts in soil science.

AFOLNA1001 Introduction to GIS I.

Aims:

To provide an understanding of the basics of GIS and digital cartography.

To provide information about vector graphic tools of the Inkscape software and to introduce technical steps of digital mapping.

Knowledge:

On successful completion of this course students are expected to be able to map geo data using the Inkscape software, to have an understanding of special terms and fundamentals of cartography, to be familiar with tools of vector graphics.

Subject-specific skills:

On successful completion of the course students are expected to be able to evaluate formerly prepared data for cartographic purposes and map physical and human geographic cases. They are able to understand, interpret and present spatial data and accomplish basic cartographic tasks using Inkscape.

ENAFOTNA1401 Geomorphology

Why is it important to know about the evolution of landforms on the Earth's surface? What are the major processes which shape them? What kind of landforms are typical products of fluvial, eolian, glacial, karst, coastal etc. agents? How does gravity contribute to the removal and accumulation of material? Where can we find the most beautiful landforms on Earth?

ONFOL1-2701 Historical geology and paleontology lecture

Objectives:

The aim of the course is to present the history of planet Earth, namely introducing into the periods and milestones of Earth history, describing the major events and eras, periods, epochs, ages; introducing the dynamic Earth concept and its continuously changing model; understanding the mutual dependencies of bio- and geodiversities and presenting the best examples; Presenting the evolution of life on Earth and its major steps. Learning that the evolutionary steps are not accidental but always based on the previous developments and always understandable from the previous developments of life.

Learning outcomes:

Students successfully performing the course should know the geologic time scale, the major moments/milestones of evolution of life on Earth. They should know the basics and principals of stratigraphy, faciology, and evolutionary theory; they should know the methods of geological timing, the names and durations of geologic eons, periods and epochs (only for Cenozoic). They should know the appropriate nomenclature and terms and are able to use them in right context. They should know the scientists and their achievements who contributed the most to geology and palaeontology. They should able to know them and refer their scientific results/contributions. They should be able to understand the interrelationships of these sciences and their dependencies on each other. Based on the acquired knowledge they should be able to understand and explain the development of Earth and its life forms and put the milestones of the development in right order. They should able to explain the evolution on Earth and recognize the turning points in evolution. On the field they are able to recognize and understand the

litho- and biofacies. They are able to understand and explain the Darwinian evolutionary theory and are able to cite examples from the fossil record. They know the micro- and macroevolution and able to cite examples for both from the fossil record. They are able to explain the big five extinction events of the Phanerozoic and their possible causes and are able to explain their impacts on the further developments of life in Earth.

AFOLNS-0201 Introduction to Remote sensing practice

Scope of the course is to present an overlook about the wide spectrum of the concept of remote sensing with a sort of practical exercises to deepen the knowledge. The students will get knowledge about the basic concepts of remote sensing, are able to use the specific terminology required, find and download optical and radar-based satellite images individually. They are also able to pre-process images and visualise them in certain software environment, to create composite maps and to interpret images visually.

Basic concepts in remote sensing, it objectives and historical evolution. Physical features of electromagnetic radiation, interactions in the Earth's atmosphere and on the surface. Passive and active methods in remote sensing. Managing archives, possibilities for downloading data. Creating composite images. Visual interpretations: specific questions of mapping water surfaces, settlements, vegetation, soils. utilizing satellite radar data in practice. Introduction to Google Earth Engine: basics, code editor, search, re-classification, filters other functions.

ENAFOTNA1301 Climatology

On successful completion of this course students are expected:

to be familiar with the most important processes impact the climate. They are able to interpret the climate changes occurred in the past.

to be able to understand the climate system and critically engaged in the debates about the interpretation of the climate change, they can couple the geological data to the history of the climate change.

ENAFOTNA0601 Mathematical methods in earth sciences

The aim of the course is to provid basic knowledge about math and statistics which is necessary to understand the physics and chemistry related to the earth sciences and to analyze the observed data from both laboratory a field observation.

AFOLNA1002 Introduction to GIS II. practice

Aims:

1. To provide an understanding of geoinformatics and Qgis software.

2. To provide a quantitative discussion of basic nomenclature of geoinformatics and methods of data analysis.

Knowledge:

On successful completion of this course students are expected to be able to comprehend fundamental concepts of GIS, to have an understanding of GIS techniques, to be familiar with Qgis software and vector and raster geo data processing.

Subject-specific skills:

On successful completion of the course students are expected to be able to evaluate georeferencing tool of Qgis, to able to digitize vector data and present thematic maps. Student comprehend basic field survey techniques and able to collect data.

ENAFOTNA1501 Introduction to hydrology and hydrogeology practice

The subject belongs to the modules of the basic earth sciences, giving basic knowledge for the methodical and differential modules. This course familiarizes students with selected hydrogeological measurement and analytical techniques. Learning outcomes: Students are going obtain skills on different kind of investigation procedures.

Aims:

1. To provide an understanding of the properties of subsurface water bodies

2. To provide a quantitative discussion of static and dynamic physical processes

3. To apply subsurface water concepts to contemporary problems in water resources management

ENAFOTNA1502 Introduction to hydrology and hydrogeology lecture

In this 2 x 45-minute course we will investigate the major processes of surface and subsurface hydrology and focus on key processes of water dynamics and interactions among water bodies in the surface, vadose zone and the phreatic zone. We also invetigate the impact of rock types properties on water chemistry and potential contamination of water bodies.

ENAFOTNA3601 Field work I.

This course will introduce students to the wonderful world of rocks. During the 4-5 field days we are going to visit four different places in the Mecsek Mountains. During whole

day long fieldwork (fieldtrip) the students are going to develop their field related skills. How to find and describe outcrops, and create a nice and neat fieldnotes. During the file days we will have the opportuntiy to examine sedimentary and igneous rock on the field.

ENAFOTNA2401 Field measurements, documentation, geological mapping practice

The course is cover all the detailed explanation of how to behave during a fieldwork, and how to work in a group during a geological mapping excersie. The first four classes are indoor, which followed by two whole fieldday practice. The whole day long fielddays will take place near the University and in the Mecsek.

With the successful completion of this course students will be able to:

understand geologic maps and cross sections;

use basic field measurement equipments;

collect geologic data, draw a measured section, interpret geological structures and geological maps.

ENAFOTNA2601 Analytical techniques in geology practice

Introduction to powerful analytical techniques used to characterize the composition, structure, and texture of Earth. Underlying physical/chemical principles, instrumentation, and application to real-world problems is covered for each technique. Students complete hands-on analytical projects on scanning-electron microscopy, x-ray diffraction, and PSA microanalysis. Laboratory time outside of scheduled lecture hours will be required.

ENAFOTNA2801 Introduction to hydrometeorology practice

In this 3 x 45-minute course we will investigate the relationship between hydrology and meteorology and focus on key processes including precipitation, evaporation, stream and ground water flow, flooding and water resources management.

A large component of the course will include familiarizing the students with various measurement and monitoring techniques and different devices used for the measurement of meteorological variables. We will also focus on data collection methods and data analysis using spreadsheets and graphic programs to monitor the temporal changes of hydrometeorological parameters.

ENAFOTNA1101 Physical geography of Hungary practice

Although this course focuses on the area of Hungary, it also looks at the whole Carpathian Basin. When and how was the Carpathian basin formed? What kind of landscape-forming forces and factors was affected its development? We also look at how the physical

geographic situation shapes the characteristics of each natural element. What sort of climate, soils or wildlife characterize this region? What natural or artificial pattern dominates the physical landscape? And of course, we also look at the landscape-shaping effect of man.

MSc Geography course list and descriptions

During this 4-semester Master degree program, our students will focus on GIS methods and remote sensing tool applied in surface geomorphology both in a classroom environment and in the field. They will have the opportunity to join in and participate in research and scientific projects run by IGES. The Institute has research collaborations with global companies like ESA and SARMap, and international relations with research groups from Switzerland, Poland, Spain, Slovenia, China and the US. These projects may provide internships for our students to experience the international atmosphere and scientific skills and knowledge.

The master program provides a broad spectrum of geography and related disciplines and combines environmental geography, geomorphology and GIS for all international students. The program also includes a six-week professional practice at self-selected private and public businesses and companies, however, the practice is also available at the university and at the IGES. By completing the professional practice, the student will gain a broad range of practical and project management skills and knowledge to explain, analyse, interpret and execute various planning programs.

ENMNGEO01/ MNFOTN0501 Modelling and simulations in Geography

Objectives:

1. To provide an understanding of the principles of GIS modelling methods.

2. To provide an understanding of the fundamentals of elevation, hydrological, and statistical geolocated datasets.

Knowledge:

On successful completion of this course students are expected to be able to solve a simple modeling problem with pre-collected data. Students will be able to design a database, collect, manipulate and visualize environmental data.

Subject-specific skills:

Students will be able to solve simple GIS modelling problems. They are able to use computer programs (ArcGIS Pro, ArcMap) to accomplish GIS analysis.

ENMNGEO02/ MNGEO14 Geographical Applications of GIS

Nowadays, Google Earth is a simple geoinformatics application available to everyone, which has shown hundreds of million people the importance of spatial information. 80% of the data can be positioned in space! That is why geographical information system (GIS) software is now used in many areas of life: public administration, regional development, registration of infrastructural elements, nature and environment protection, flood protection, etc.

Objectives:

1. To provide an understanding of the importance of GIS to social and urban development or to physical environment.

2. To provide a discussion of static and dynamic spatial processes, and a problem management with GIS software.

3. To apply concepts to contemporary spatial problems in geography.

Knowledge:

On successful completion of this course students are expected to have an understanding of contemporary spatial problems in geography and a problem management with GIS software.

Subject-specific skills:

On successful completion of the course students are expected to be able to: understand the spatial functions of GIS softwares, navigate between digital data modells, understand the functions of the data acquisition methods and the spatial analysis.

ENMNGEO03/ MNGEOA03 Research Methodology

Objectives:

1. To provide an understanding of complex, geographical researches

2. To provide skills both for social and nature sciences used in geographical researches

3. To apply new methods in his/her own research field

Knowledge:

On successful completion of this course students are expected to be able to

1. develop and complete a thorough research proposal, analyse its structure, and the questions of organisation,

2. view geographic research question in a complex form,

3. to prepare a reference list of relevant publications of a freely chosen field according to the international standards,

4. plan, create and design a scientific poster, and figures and images to present research results

5. analyse maps.

On successful completion of this course students are expected to have an understanding of

1. most important ethic issues in publication

2. the application of fundamental social science research methods in geography

Learning outcomes:

The course will provide students with a strong foundation in

- the conceptualisation and operationalisation of research,

- how to design a research project and practical skills in the utilisation of different research methods.

Students will be familiar with a wide range of research methods and will learn key principles of research design. Intellectual and methodological debates will be discussed in order to assist students to develop informed opinions and a critical appreciation for others' research. Students will be equipped with the knowledge and ability to undertake methodologically sound, original research projects and will develop a set of transferable workplace skills.

ENMNGEO04/ MNGEO09 Geomathematics

Aim

To provide basic knowledge about math and statistics which is necessary to understand the problems related to geographical sciences (social and physical geography) and to analyze the observed data from both laboratory and field observation.

Knowledge

The students knows the basics methods of algebra, calculus and statistics.

They are able to apply their knowledge to understand the physical processes related to the physical geography, and to analyze data collected by different type of observations (for example: questionnaires, etc.).

Subject-specific skills:

They are able to use computer programs (MAPLE, EXCEL, etc.) to accomplish mathematical and statistical analysis.

ENMNGEO05/ MNGEOA15 History and Schools of Geography

Objectives:

1. To provide an understanding of the development of the geographical principles.

2. To provide a qualitative discussion of historical processes.

Knowledge:

On successful completion of this course students are expected to be familiar with the changing approach to space and environment through history.

ENMNGEO06/ MNGEO19 Geographical Landscapes of the Carpathian Basin

Objectives:

1. To provide an understanding of the physical landscapes of the Carpathian Basin

2. To provide an understanding of the character of socio-historical activities and natural processes in the development of cultural landscapes

3. To interpret the mutual and multilateral relations of landscapes and regions in complex geographical systems

Knowledge:

On successful completion of this course students are expected to be familiar with the major cultural landscapes of Carpatho-Pannonian Region.

Subject-specific skills:

On successful completion of the course students are expected to be able to compare landscapes of the Carpatho-Pannonian Region, and to understand cultural landscapes of the Pannonian Basin, and to present selected natural values and main protected mesoregional areas of the Carpathian Basin.

ENMNGEO07/ MNGEO20 Landscape Ecology and Landscape Evaluation

What are the tradional trends in landscape research? How did landscape ecology develop on the border area of biology and geography? How did the ecological approach and the general systems theory revolutionize landscape research? What levels are there (global, regional, local) where the operation of ecosystems can be studied? What are the landscape metrics to be used to reveal landscape pattern? What kinds of processes are typical of the ecology of agricultural and urban landscapes?

Objectives:

1. To provide an understanding of the landscape, ecosystems and their importance for human society

2. To introduce ecosystems services and their manifestations in the different landscape types

3. To apply modern ecological concepts in natural resources management

Knowledge:

On successful completion of this course students are expected to be able understand the operation of ecological processes in the landscape. Students will be capable of evaluation natural resources for various types of land utilization.

Subject-specific skills:

Students will be able to interpret landscape pattern and the related functions, interaction between natural and human processes and impacts on the landscape, to use different land evaluation techniques to solve practical tasks in natural resources management.

ENMNGEO08/ MNGEO21 Geographical Approaches of Regional Development

Objectives:

1. To provide an understanding of the geographical and spatial basis of regional development

2. To provide an insight of different theoretical spatial approaches

3. To provide some international examples of geographical approaches of regional development

Knowledge:

On successful completion of this course students are expected to have an understanding of the different geographical approaches used in regional development both from a theoretical/historical and a geographical/spatial point of view.

Subject-specific skills:

On successful completion of the course students are expected to be able to: compare different approaches to regional development; understand the underlying spatial theories.

ENMNGEO09/ MNGEO22 Political Geography

Objectives:

1. To provide an understanding of the general concepts of Political Geography

2. To apply political geography concepts to contemporary geopolitical problems of the World

Knowledge:

On successful completion of this course students are expected to have an understanding of World political geography pattern.

ENMNGEO10/ MNGEOA17 Space, Society and Sustainability

This course is an advanced level course in human geography. After students have learnt the fundaments of several branches of geography, it's time to take care about some core questions of the connection between space and society. The course is organised about the abstract nature of space and the production of space.

Objectives:

1. To provide a more complex understanding of geographical space, including the concept of space production

2. To integrate the concept of sustainability into the discourse of space production.

3. To improve the students' skills in individual reading and processing papers in spatial sciences, including some classical reading of this field.

Knowledge:

On successful completion of this course students are expected to be familiar of the leading concepts and terms of the contemporary human geography, including space production, place and space, region and city, (uneven) development, segregation, exclusion, polarisation, gentrification, globalisation, sustainable development, resilience and so on. They will be able to read, process and understand theoretical papers in spatial sciences, construct presentation and individual study about spatial phenomenons, based on wide-range of readings.

ENMNGEO11/ MNGEO81 Practical Applications of the GIS

Objectives:

1. Students should be familiar with the main fields of application and tools of geoinformatics.

3. To be aware of the main forms and possibilities of data collection, build and use a database.

4. To be able to compile a map using GIS tools

5. To know the different possibilities of visualization and map editing.

5. Students should be familiar with major GIS procedures and operations.

Knowledge:

On successful completion of this course students are expected to recognize the applicability of the GIS. The student will be familiar with many applications, tools and elements of the software environment of GIS. The student can capture data from a certain channel and sort it into a database. They can perform the main database operations. They are capable of performing visualization of maps and producing outputs that make it possible to publish maps on print or digitally. They are getting to know many geoprocessing and spatial statistics tools.

Subject-specific skills:

On successful completion of the course students are expected

- to have an understanding of the main application of GIS

- to be able to collect data, build a database

- to comprehend of the uses of the database operations

- to create and present a digital map in GIS

- to be capable of making GIS analysis

- to understand the main elements of spatial statistics, analysis and it's GIS uses

- to able to apply the GIS to the analysis of various problems

ENMNGEO1201/ ONFOLAK1-0501 Regional Geography of the Continents I.

On successful completion of this course students are acquainted with the landscape of Asia and Australia, the laws, interactions, processes which influence geologic, hydrologic, and climatological geomorphic evolution and are familiar their dynamics, as well as their basic human geographical features, including population dynamics, economic geography, political geography and their regional differences.

On successful completion of the course students are expected to be able to:

Interpret the impact of physical geographical processes on the surface of the World,

Recognize surface landforms on which the everyday activities of humanity take place, reveal their origin and to evaluate environmental changes (climate change, human impact) from a physical geographical perspective.

Recognize and understand the basic social, political and economic place-based patterns, processes and problems of the continents.

Subject-specific skills:

Students involved in the class become capable of finding topics of contact between geology, hydrology, climatology, geomorphology and social processes, recognizing and explaining the impact of geological processes on the surface of the continents, as well as the interaction between nature and society.

Subject-specific skills:

On successful completion of the course students are expected to be able to assess and comprehend the physical characteristics of continents and socio-economic attributes of countries.

ENMNGEO1202/ ONFOLAK1-0502 Regional Geography of the Continents II.

On successful completion of this course students are acquainted with the landscape of the Americas and Africa, the laws, interactions, processes which influence geologic, hydrologic, and climatological geomorphic evolution and are familiar their dynamics, as well as their basic human geographical features, including population dynamics, economic geography, political geography and their regional differences.

On successful completion of the course students are expected to be able to:

– interpret the impact of physical geographical processes on the surface of the World,

– recognize surface landforms on which the everyday activities of humanity take place,

– reveal their origin and to evaluate environmental changes (climate change, human impact) from a physical geographical perspective

– recognize and understand the basic social, political and economic place-based patterns, processes and problems of the continents.

Subject-specific skills:

Students in earth sciences become capable of finding topics of contact between geology, hydrology, climatology, geomorphology and social processes, recognizing and explaining the impact of geological processes on the surface of the continents, as well as the interaction between nature and society.

Subject-specific skills:

On successful completion of the course students are expected to be able to critically engaged with the continents physical geographical characteristic, and social geographical features of the countries.

ENMNGEOS1-01 GIS Programming I.

Objectives:

1. To provide an understanding of the basic knowledge of programming.

2. To provide students with an understanding of the role computation can play in solving GIS problems.

Knowledge:

On successful completion of this course students are expected to be able to solve a simple computation problem with branching, iteration and numerical operators in .NET and Python environment.

Subject-specific skills:

Students will be able to solve simple GIS problems by writing and compiling programs. Describe and apply object-oriented programming methodology.

ENMNGEOS1-02 GIS Database Modelling

Objectives:

1. To provide an understanding of the fundamentals of Database Management Systems

2. To apply database concepts to GIS problems in the fields of physical and human geography.

Knowledge:

On successful completion of this course students are expected build simple DBMS in MS Windows and Linux environment.

Subject-specific skills:

On successful completion of the course students are expected to be able to: get ordered data from widely used DBMSs. The student will be able to form SQL statements and queries.

ENMNGEOS1-03 Applied Geomorphological Mapping

Objectives:

1. To provide an understanding of landform mapping

2. To provide digital tools for designing and using geomorphic maps

3. To apply old and new trends in geomorphological mapping

Knowledge:

On successful completion of this course students are expected to be familiar with the main problems and issues of detailed geomorphic mapping.

Subject-specific skills:

On successful completion of the course students are expected to be able to design and draw a geomorphic map with digital tools and to interpret and evaluate geomorphic maps.

ENMNGEOS1-04 Engineering and Anthropogenic Geomorphology

Objectives:

1. To provide an understanding of the anthropogenic landforms

2. To develop an understanding of geomorphic hazards and risk

3. To acquaint students with the key issues in engineering way of landforms

Knowledge:

On successful completion of this course students are expected to have an understanding of engineering approaches of natural and anthropogenic landforms.

Subject-specific skills:

By the end of the course students should have gained:

familiarity and confidence with some of the key methods used to evaluate slope stability and an ability to interpret anthropogenic landforms

ENMNGEOS1-05 Quaternary Research

Objectives:

1. To develop an understanding of nature and impacts of Quaternary climate change

2. To acquire and develop scientific skills relating to studying Quaternary research

3. To develop an understanding of the evolution of Quaternary landforms

Knowledge:

On successful completion of this course students are expected to be familiar with Quaternary research issues and state-of-art results of the Quaternary studies.

Subject-specific skills:

By the end of the course students should have gained:

– the ability to describe and explain the Quaternary climate change,

– the ability to engage with some of the key debates in Quaternary science research,

– familiarity and confidence with some of the key archives and methods used to trace past climate and environmental change,

– an appreciation of the wider significance of the Quaternary record.

ENMNGEOS1-06 Surface Modelling

Objectives:

1. To provide an understanding of the surface modelling techniques and model types.

2. To provide a quantitative discussion of phenomena-based model analysis and interpretation.

3. To apply model building and data analysis concepts to contemporary problems surface modelling

Knowledge:

On successful completion of this course students are expected to be able to build various kind of surface models; to have an understanding of basic terms and types of surface models; to be familiar with model analysis steps to able to extract landforms and interpret Earth surface processes.

Subject-specific skills:

On successful completion of the course students are expected to be able to:

assess different types of surface models; comprehend different purpose of error propagation techniques, understand the geostatistical simulation of surface data; present and discuss modelling parameters on various kind of surfaces and processes; evaluate raw data for surface modelling, use software tools for modelling purposes.

ENMNGEOS1-07 3D Visualization

Objectives:

1. To provide an understanding of the 3D digital and spatial visualisation

2. To provide a skills of 3D computer graphics and GIS software using

3. To apply 3D computer graphics and GIS software

Knowledge:

On successful completion of this course students are expected to be familiar with using the 3D computer graphics and GIS software.

Subject-specific skills:

On successful completion of the course students are expected to be able to: plan, create and modify 3D objects, make informative 3D maps and models.

ENMNGEOS1-08 Fieldwork in Geomorphology

Objectives:

Base learning of the skills needed for successfully conducting field research in geomorphology. The course will be based on field work and in the detailed study of sights of interest in relation to geomorphology. Through this training, students will develop observational and analytical skills

allowing to better understand the inter-relationships between landscape elements.

Specific training on geomorphological and geological description and analysis will

be the basis of the course, which will serve as a complement to in-class geomorphological and in general physical geography classes.

Knowledge:

On successful completion of this course students are expected to have an understanding of the basic geomorphological processes that impact our environment, and Specifically, students will have the:

- Ability to design and plan field work based on target objectives;

- Ability to relate the different components of the landscape in order to understand

their dynamics and allowing to propose genetical hypothesis for their formation;

Subject-specific skills:

On successful completion of the course students are expected to be able to:

assess, comprehend and be critically engaged with all subdisciplines of physical geography and related phenomena that influence geomorphological development and evolution of a given area.

- Ability of using different types of maps;

- Ability of developing detailed field-based mapping (geomorphological and geoecological);

- Ability to develop hypothesis and and fieldwork methodologies to solve

problems arising from geomorphological, geological, topographical knowledge in order to contribute to laboratory and office-based research.

ENMNGEOS1-09 Geomorphic Systems

Objectives:

1. To provide an understanding of the physical processes on the Earth's surface

2. To provide a systematic and quantitative approach to dynamic physical processes

3. To present the relevant parameters for the description of landforms

4. To reveal contemporary problems (natural hazards) related to geomorphic processes

Knowledge:

On successful completion of this course students are expected to be get an overview of the interactions between the physical processes operating on the Earth's surface. The will obtain an understanding of the importance of the individual agents in shaping the relief, in the evolution of landforms and the practical implications on human society.

Subject-specific skills:

On successful completion of the course students are expected to be able to assess the relative importance of drivers of change on the Earth's surface, to explain processes on the basis of General Systems theory. Students will be able to judge the threats presented by natural hazards and the impacts of global climate change on the operation of geomorphic systems. They will be familiar with the evaluation of geomorphic hazards and mitigation efforts.

ENMNGEOS1-10 Earth Observation

Objectives:

Scope of the course is to present an overlook about the wide spectrum of the concept of remote sensing with a sort of practical exercises to deepen the knowledge. The students will get knowledge about the basic concepts of remote sensing, are able to use the specific terminology required, find and download optical and radar-based satellite images individually. They are also able to preprocess images and visualise them in certain software environment, to create composite maps and to interpret images visually.

Subject-specific skills:

On successful completion of the course students are expected to be able to:

- assess remote sensing products,
- comprehend physical background of remote sensing,
- compare different acquisition techniques,
- understand main application of Earth Observation,
- present basic processing steps of satellite data sets,
- refer to the main EO missions.

ENMNGEOS1-11 Stratigraphy

Objectives:

1. To get know the principles of stratigraphy and facies analysis

2. To get practice in using stratigraphic tools

Knowledge:

On successful completion of this course students are expected to be able to read geological maps, cross-sections and seismics. More specifically, students will be able to properly classify and describe sedimentary rocks in outcrop and hand sample accurately measure and record stratigraphic sections in a field setting predict what types of sedimentary processes and depositional environments would characterize a particular tectonic setting and what their stratigraphic signature would be interpret changes in a depositional environment through time (stratigraphic change) at a variety of spatial and temporal scales based on data from sedimentary rocks and successions. Students will be capable to build a stratigraphic section construct cross sections, isopach maps, and preliminary basin models based on publicly available well log data.

ENMNGEOS1-12 Research Methods in Geomorphology

The objectives of the course will be to develop skills in landform recognition and interpretation, topographic contouring, map navigation, topographic profiles, fundamental surveying skills with the alidade and total station, and mineral and rock resource calculation. All of these skills will be developed in the field environment as part of the laboratory component. The lecture will provide the theoretical underpinnings of the field methods used in the lab.

BSc Physical Training courses and descriptions

The general aim of the program is to train students to become coaches. Trainers who gain a well-established theoretical and practical knowledge and skills to be able to plan and implement training sessions for junior players, youth and adult athletes, too. Coaches who become responsible to select athletes, improve and guide their personality and to enhance their performance.

The curriculum is organized in five modules: team and individual sports, medical aspects of sport, social aspects of sport, sport sciences, and professional practice. Each module has approximately 5-10 subjects. Students participate in internships every semester. During the first three semesters as a visitor then later they are asked to conduct and lead workouts alongside with the teachers. The subjects are presented in lectures, seminars, practices, and laboratory work, too.

ENAEDZN0101 Callisthenics I.

Training of sports professionals (coaches, trainers) who:

- with the help of their practical and scientific knowledge are able to transfer values of physical culture embedded in callistenics in a high level, for all age groups through preventive, individualized and differentiated programmes by using the framework of callistenics,
- are prepared for professional advising, necessary to improve life quality; to elaborate and conduct various skill development motoric programmes; are able to broaden the desired range of health status and to enhance fitness.
- with the help of their goal driven psychomotoric and movement skills, are able to apply their practical knowledge and high level teaching of movement skills (free exercises, natural exercises and).

- through their theoretical and practical preparedness, are able to improve their knowledge related to callistenics in a creative way and publish their experiences and results
- by possessing scientific knowledge, skills and attitudes, are capable to fulfill educational and developmental tasks in the subfield.

ENAEDZN0301 Outdoor activities (recreational sports and games)

The aim of the course is to introduce as many forms of movement as possible for the students, which can be useful for sports programs, training conditions and recreational programs as well. Students learn practical knowledge that they can use in indoor and outdoor. They should be able to apply the acquired forms of movement by age groups and using the appropriate methodology indirectly.

ENAEDZN0401 Basics of individual sports (Basic of athletics, Swimming, Martial arts, Sport gymnastics)

The knowledge gained in this course is important in the many-sided sport preparation of young athletes. The basics of fundamental sports such as athletics, swimming, gymnastics, and combatting will be learned. Students will be able to recognize the importance of performance development and injury prevention, and to incorporate methodological principles of these sports in to their own sport training programs.

ENAEDZN0702 Basics of Theory of Training II.

Using the definitions, principles, and terminology discussed in the first part of the course, students will acquire the types of motor skills and the methodology of motor skill development. Students will be able to apply this knowledge in conditioning and workout planning for youth and adult athletes. The physiological background of motor skill development will also be discussed.

ENAEDZN0801 Biomechanics

In the course, students will be introduce to the interdisciplinary nature of biomechanics. Using previous knowledge in the fields of biology, anatomy, and physiology they will understand the laws and mechanisms responsible for human movement. Acquiring two major topics: principles of mechanics, and the neuromechanical basis of muscle, students will understand the background of muscular force production and forces acting on human body during physical activity.

ENAEDZN0901 Human Biology

Objectives: The lecture intends to introduce students to the characteristics of the human body. An overview is provided in the phenotypic variations of human kind, morphological features of the head/skull and body. The course gives an insight into the biological, anthropological differences between sexes, or before and after puberty.

Learning outcomes:

1. Describing factors determining a person's phenotype
2. To analyze the different factors determining/ modifying a person's phenotype. It is a very important point in the practice of a PE teacher or trainer. Without the proper knowledge it is impossible to create a correct and effective training program for a pupil, adolescent or adult.
3. Determining factors of body structure and body composition
4. Phases of human development, delineating the hormonal and structural changes of the body, especially around puberty.

ENAEDZN1001 Anatomy I.

The aim of the course is to familiarize students with the structure and the build-up of the human body, the anatomy of the skeletal system and the muscular system, as well as the anatomical structure and main function of the circulatory system to acquire important relationships for further studies.

Understanding the anatomy of the motion systems is essential for the building of physiological and sport physiological knowledge.

ENAEDZN1101 Accident prevention, First aid and Sport Hygiene

The job of trainers and sports experts is an activity performed in the interest of humans' health. Sport activities, work-outs, competitions expose humans to a higher risk for accidents and injuries, therefore acquiring the most up-to-date first aid knowledge is of major importance for the staff working in these fields.

The objective of the course is to teach first aid, accident prevention and sports health knowledge to future trainers and sports experts.

Students will be able to save lives via Basic Life Support (BLS) in sudden cardiac arrest and – as it is expected from trainers- they will be able to provide professional first aid while waiting for the paramedics to arrive.

ENAEDZN1201 Biochemistry

The subject is part of the „basic principles" module, covers the core principles and topics of cellular metabolism in resting and exercise. Proper knowledge of biochemistry is required to understand the different biomolecules and the cellular biochemical pathways, and to further study the adaptation of these mechanisms during physical exercise. The course focuses the biomolecules oxidation and degradation processes.

ENAEDZN1301 Physiology, Sportphysiology I.

The subject is part of the „basic principles" module, covers the fundamental principles of homeostasis in resting and exercise. Proper knowledge of human physiology is required to understand the different regulatory mechanisms, and to further study the adaptation of these systems during physical exercise. The first part of the course focuses blood and muscle movement in physiological terms.

ENAEDZN1501 Exercise Physiology

Objectives: The lecture intends to introduce students to the possible measurements strategies of sport performance. An overview is provided in the delineation of test systems, performance measurement types and skills. The course gives an insight into the sport performance of different ages, differences between sexes, or before and after puberty.

Learning outcomes:

1. Create a theoretical and practical knowledge of applied physiology,
2. Learn the measurement and computation of different physiological parameters in training situations or in a lab.
3. Learn the practical background of fitness assessment and training strategies to improve performance.
4. Analyzing and understanding data obtained from lab measurements.

ENAEDZN1801 Performance Testing

The aim of the course is to provide the students with comprehensive and systematic knowledge of motor skills, their age characteristics and different methods. By acquiring the knowledge they have the ability to determine the level of motor skills of different age groups with laboratory measurements and field tests.

ENAEDZN1901 Pedagogy I. (Introduction to Pedagogy)

For further information please contact the academic coordinators:

Dr Tamás ATLASZ (attam@gamma.ttk.pte.hu)
Ms Zsuzsanna GÉP (gepzsu@gamma.ttk.pte.hu)

ENAEDZN2001 Introduction to Psychology I.

At the end of this course students will understand the fundamental theories of psychology. Students will hear about the core mechanisms of learning, thinking perception, memory. Basic issues of developmental psychology and personality will also be covered.

ENAEDZN2101 Sportpsychology

Objectives: The aim of this course is introducing the field of sport psychology. Explaining the different theories about mental processes, which influence sport performance. Including affective and cognitive systems. Beside the theories of sport psychology, the course will include some practical introduction to the methods widely used by sport psychologists.
Learning outcomes: The students completing the course will have knowledge on basic terms and systems of sport psychology.

ENAEDZN2301 Methods of Physical Education and Inclusion

Students are familiar with the concepts of integration and inclusion. Learn about domestic and international integration practices.
Students acquire knowledge of alternative and adapted modalities in physical education education. Get a picture of the features of inclusive pedagogy. Learn the methods used in alternative schools, the specifics related to physical education education.

ENAEDZN2501 Social Sciences I. (Phylosophy)

The course gives an insight into the history of western philosophy and thinking, its key issues and characters and their works. The philosophical works discussed during the semester give an outlook on paradigm shifts concerning the connection between philosophical and scientific thinking.

ENAEDZN2503 Social Sciences III. (Introduction to Sport Pedagogy and Sport Sociology)

For further information please contact the academic coordinators:
Dr Tamás ATLASZ (attam@gamma.ttk.pte.hu)
Ms Zsuzsanna GÉP (gepzsu@gamma.ttk.pte.hu)

ENAEDZN2701 Informatics

Acquisition of basic IT knowledge essential for university studies and coaching, dissemination of IT culture and the transfer of practical skills required for the use of computer tools. Beginning with high school students, learn the basics of IT and computer management: dissertation, topic presentation, internet search.

ENAEDZN2901 Sportmanagement

The course offers the opportunity for the student to gain information and understanding of the various practices and procedures associated with sport management. The course goals to introduce the field of sport management to students and introduce the concepts, scope, and common practices in the sport management industry. To identify major issues in sport management and provide students with the intellectual tools to analyze those issues.

ENAEDZN3201 Programs of Youth Sports

Long Term Athlete Development is a practical course for foreign students in sport coaching programme. The main object is to describe the theory and practice of youth development and long term development sport programmes.

ENTESV10 Kangoo

Students will learn the basic, and the most important exercises of this sport. Develope the basic and speacial physical and mental skills of the students. The principle of this sport is that the students have to get new stimulus training by training. Its meant to be performance a sort of the force, we can use in our common life.

ENTESV04 Crossfit

They will learn the basic, and the most important exercises of this sport. Develope the basic and special physical and mental skills of the students. The principle of this sport that the students have to get new stimulus training by training. Its meant to be performance a sort of the force, we can use in our common life.

ENTESV06 Yoga (Hatha yoga)

During yoga lessons, students will get to know the theoratical part and yoga practices. Nowadays hatha yoga is the most popular type of yoga in Europe.

During practises the types of yoga asanas, the importance of balance exercises will be taught theoretically and practically, that will be useful for their every day life routine. The

relaxation, the meditation, and the flow will be put in the focus of the basic of practice and in theory. The instructor will take the presentation of the flow, as a basic of the pozitive pshycology. Students will get familiar with the different types of relaxation. We will discouss about their sport life, and about their experience of the flow. Teacher will make students certain about the importance of the practical part of yoga, during their sport life. The aim is to improve how to dicrease the stress in the daily routine.

TTENTESV88 Yoga meditation flow

During yoga lessons, students will get to know the theoratical part and yoga practices. We will study about yoga history, philozophy, the types of yoga breathing. During practises the types of yoga asanas, the importance of balance exercises will be taught theoretically and practically, that will be useful for their every day life routine. The relaxation, the meditation, and the flow will be put in the focus of the basic of practice and in theory. The instructor will take the presentation of the flow, as a basic of the pozitive pshycology. Students will get familiar with the different types of relaxation. We will discouss about their sport life, and about their experience of the flow. Teacher will make students certain about the importance of the practical part of yoga, during their sport life. The aim is to improve how to dicrease the stress in the daily routine.

ENTESV08 Doping and sports

The objective of this course is to encourage a critical understanding of doping. To achieve this goal, this course will rely on a multidisciplinary approach that allow you to see how different disciplines get into a single object, in different perspectives and often complementary ways. This approach will also allow us to appreciate the complexity of a subject like doping.

ENTESV13 Listening and Speaking

This advanced level class focuses on refining note taking strategies and learning to use these notes to outline, summarize, discuss and develop critical opinions about educational topics. The course has a strong focus on speaking skills needed for success in lecture classes and seminars. The objective of the course is to equip students with the language skills, which are necessary for discussions based on properly structured reasoning.

The course aims to improve students' listening and note-taking skills, so they understand how spoken texts are constructed: identify key ideas and follow arguments, select and prioritize information, paraphrase, summarize and lay out notes.

Students are exposed to lectures, presentations and other authentic input, which assist the development of their listening and speaking skills for more effective communication in study and professional situations. The course is designed to improve students' fluency through group discussions and debates as well as their persuasion skills while covering topics of discussion in various academic fields related to education.

ENTESV21 Sports Geography

The goals of the class is to acquaint students with the spatial and territorial issues of sport. Be aware of how branches of exercise have developed in different regions of the world, what factors have influenced its development.

At the same time, students should learn about the impact of the geographical environment (nature, economy, economy, infrastructure) on the development of the sports sector. What are the optimal conditions that have made it possible to overthrow new world peaks, to improve human abilities.

Furthermore, they should be able to successfully apply spatial and territorial features in their future professions.

ENTESV15 Diagnostic Imiging in Sport Medicine

Diagnostic imaging in sports medicine will provide a general overview on the currently applied imaging methods in sports medicine. The course will give you the opportunity to study about the most common sports injuries and the proper imaging method for detection and monitor healing.

ENAEDZN0102 Callisthenics II.

Training of sports professionals (coaches, trainers) who:

- with the help of their practical and scientific knowledge are able to transfer values of physical culture embedded in callistenics in a high level, for all age groups through preventive, individualized and differentiated programmes by using the framework of callistenics,
- are prepared for professional advising, necessary to improve life quality; to elaborate and conduct various skill development motoric programmes; are able to broaden the desired range of health status and to enhance fitness.
- with the help of their goal driven psychomotoric and movement skills, are able to apply their practical knowledge and high level teaching of movement skills (free exercises, natural exercises and).

- through their theoretical and practical preparedness, are able to improve their knowledge related to callistenics in a creative way and publish their experiences and results
- by possessing scientific knowledge, skills and attitudes, are capable to fulfill educational and developmental tasks in the subfield.

ENAEDZN0201 Physical Education Games

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Ms Zsuzsanna Gép (gepzsu@gamma.ttk.pte.hu)

ENAEDZN0501 Motor development

Objectives: The lecture intends to introduce students to the characteristics of the human development, stages of the extrauterin life. An overview is provided in the development of the brain, body structures and changes of human movement The course gives an insight into the biological progression and regression of human life and movement.
Learning outcomes:
1. Understanding developmental stages of the human life, especially in the frame of motor functions
2. Understanding the special features of developmental stages in the frame of physical activity, trainability, especially in different school ages and adulthood.

ENAEDZN0601 Motor Learning Motor Control

The subject is provides the student with an introduction to the human nervous and muscle systems. Motor learning study focuses on the behavioral, biomechanical, and neural bases of development, acquisition, and performance of functional movement skills. Motor control is concerned with issues of control and coordination of such fundamental motor activities as posture, locomotion, multi-joint reaching movement.

ENAEDZN0701 Basics of Theory of Training I.

The present course discusses the performance-oriented sport preparation possibilities in youth and adults. Knowing and using proper definitions and terminology, students will be able to interpret and integrate the results in the field of exercise science. The intention in students to acquire new training methods and to creatively integrate the theory and

practice will be developed. Students will learn the principles of sport preparation and physical adaptation.

ENAEDZN1002 Anatomy II.

Objectives: The lecture intends to introduce students to the world of human anatomy, particularly the structure of viscera and the nervous system. Besides acquiring the correct anatomical nomenclature students will learn the logic of anatomy, particularly that of the nervous system. These elements will form the basis of the physiology and sports physiology.

Learning outcomes: Students completing the course will have knowledge on basic human anatomy. They will be able to they will have a competence of understanding the anatomical basis of sport movements and will be able to apply it in analysing kinematographic chains. Their positive attitude towards innovative methods in movement analysis will increase significantly.

ENAEDZN1302 Physiology, Sportphysiology II.

Physiology II is the second part of a two-semester subject. This course provides the student with an introduction to each of the major physiological organ systems (cardiovascular, respiratory, renal, gastrointestinal and endocrine). This course will examine the integrated physiological response to exercise and the adaptation to special environments.

ENAEDZN1401 Dietetics

Objectives: The lecture intends to introduce students to the characteristics of the human energy metabolism and energy balance. An overview is provided in the characteristics of general rules of healthy diet and nutrition. The course gives an insight into the biological background of diet planning and strategies of supplementation in sport.

Learning outcomes:

1. Understanding metabolism, diet, food consumption, and the complex interaction of these.
2. Understanding the basic principles of healthy diet and healthy food choice in life and elite sport

3. Understanding the correlation between body structure, health and diet, sport performance and diet.

4. Understanding the concept of diet/sport diet planning, the student is able to analyze and plan his/her own diet.

ENAEDZN1601 Prevention, Physical Therapy, Rehabilitation

1. Students should be familiar with the theoretical and practical material of the physiotherapy course, with their specific tools, with particular regard to the training aspects of disease prevention and health rehabilitation.
2. Acquire the approach of prevention and rehabilitation. They should be able to use adaptive tasks during their work to avoid the use of contraindicated exercises.
3. They should be able to use physiotherapy practice to promote rehabilitation and promote health preservation.
4. Have an adaptive approach.

ENAEDZN1902 Pedagogy II.(Public education)

1. The subject is aimed at learning the basics of school activity.
2. Students understand the structure, context, content, basic documents and rules of the public education system.
3. They acquire the roles related to the work of school educators.
4. They are enabled to engage in the production of documents, planning, organization, administration. Innovation is enriched.

ENAEDZN1903 Pedagogy III. (Theories of Education, Didactics)

ENAEDZN2002 Introduction to Psychology II. (Developmental Psychology)

The course covers some significant theories of developmental psychology (psychosexual by Sigmund Freud, psychosocial by Erik H. Erikson, cognitive by Jean Piaget and Lev Vygotsky) as well as some basic issues like nature-nurture, the role of play, drawing and fairy tales in children's development and moral development. Based on the latest reference literature students are encouraged to reflect critically on the discussed issues.

ENAEDZN2201 Pedagogical Psychology

The course is an introduction to some basic issues of Educational Psychology (socialization, school readiness, motivation, supporting effective learning, learning disorders, deviance, supporting disabled children, supporting skilled children, what makes a teacher effective), as well as to point out the educational consequences of the various socialization strategies, the social environmental conditions and the organic or neurotic developmental disorders. The course is designed for future teachers who would

like to understand the underlying psychological processes of teaching and education. Based on the latest reference literature students are encouraged to reflect critically on the presented issues.

ENAEDZN2502 Social Sciences II. (Communication, Introduction to Sociology, Basic of Sport Law)

Communication:

Communication and its professional application became an elementary expectation in the 21st century labour market so as in sports. The actors of the sports activities apply communication frameworks and channels during their work, so it is of great importance for them to understand the theories of this discipline. During the course the students acquire the most important theories and processes of modern communication in such relations which they can apply after their studies in the everyday job situations.

Introduction to sociology:

Sociology studies the laws of society with an objective methodology in order to find answers for its internal processes. Sport is a social phenomenon so its professionals need to understand the features and tendencies of the society. During the course the students acquire through theories of sociology and practical examples all those social knowledge which develop their social, cognitive and problem recognizing and solving abilities which are necessary for their later work in sports.

ENAEDZN2601 Communication in Sport

Effective sports communication is one of the most important abilities of the sports professionals since deriving from their speciality – and in order to be successful in the labour market – the high level theoretical and practical knowledge of the written, verbal and metacommunication knowledge is indispensable.

The aim of the subject is that the students should acquire all those applied communicational knowledge whose application is indispensable during their later labour, since during the everyday tasks of sports we have to expect from a professional as a basic skill to be able to create and maintain the relations due to his/her activities.

During the course the students will acquire and due to their tasks apply in a practice oriented way the (sports) communication methods and techniques of the 21st century and further on come to know the communication strategies of the market oriented sports of the present.

ENAEDZN2801 Introduction of Research methods in Sport

The main goal of the Course is to introduce the most important types of research, the main secondary and primary research methods. Discussing the role and importance of the hypothesis, the conceptualization and Operationalization of the main definitions, dimensions and variables. Going through the methods of sampling and selection criteria, choosing the primary research method in order to prove or deny the hypothesis – quantitative and qualitative methods – and the main rules of creating a survey or preparing an interview.

ENAEDZN3001 Event management

The aim of the subject is to acquaint students with the issues of organization of sporting events. The students will learn about the rules of play and competition in the context of sports event, the methodological steps of organizing and conducting competitions, and sport-specific organizing tasks.

Learning outcomes: students completing the course will have knowledge on organising sport events in various sports. They will be able to independently design and organize sports competitions.

ENAEDZN3101 Leadership and organization of sport camps

For further information please contact the academic coordinators:

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Erasmus Study Guide - course list 2021/22 academic year, Faculty of Sciences, University of Pécs

	CODE	TITLE	COURSE TYPE	EXAM TYPE	SUGGESTED SEMESTER (HOUR-WEEK)/(HOUR-SEMESTER)						ECTS	INSTRUCTOR-IN-CHARGE	Study Program	Which Semester is announced?	Notes
Type of courses					1	2	3	4	5	6					
OBLIGATORY COURSES	KEMNA1101	General and Inorganic Chem. I. lect.	Lecture	EXAM	4						5	Kollár László	**Chemistry BSc**	Autumn Semester	
OBLIGATORY COURSES	KEMNA1102	General and Inorganic Chem. I. sem.	Seminar	Practice Grade	2						3	Horváth Attila	**Chemistry BSc**	Autumn Semester	
OBLIGATORY COURSES	KEMNA1103	General and Inorganic Chem. I. lab.	Practice	Practice Grade	4						5	Petőcz György	**Chemistry BSc**	Autumn Semester	
OBLIGATORY COURSES	KEMNA1104	General and Inorganic Chem. II. lect.	Lecture	EXAM		4					5	Kollár László	**Chemistry BSc**	Spring Semester	
OBLIGATORY COURSES	KEMNA1105	General and Inorganic Chem. II. sem.	Seminar	Practice Grade		2					3	Horváth Attila	**Chemistry BSc**	Spring Semester	
OBLIGATORY COURSES	KEMNA1106	General and Inorganic Chem. II. lab.	Practice	Practice Grade		5					6	Petőcz György	**Chemistry BSc**	Spring Semester	
OBLIGATORY COURSES	ENKEMNA1501	Organic Chem. I. lect.	lecture	Exam	4						5	Sár Cecília	**Chemistry BSc**	Autumn Semester	
OBLIGATORY COURSES	ENKEMNA1502	Organic Chem. I. Lab.	Practice	Practice Grade		4					5	Sár Cecília	**Chemistry BSc**	Spring Semester	
OBLIGATORY COURSES	ENKEMNA1503	Organic Chem. II. lect.	Lecture	Exam		4					5	Sár Cecília	**Chemistry BSc**	Spring Semester	
OBLIGATORY COURSES	ENKEMNA1504	Organic Chem. II. lab.	Practice	Practice Grade			4				5	Sár Cecília	**Chemistry BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZNA1401	Mechanics lecture	lecture	Exam			2				2	Dr. Szlachányi Kornél	**Physics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZNA1402	Mechanics practical course	Practice	Practice Grade			2				2	Dr. Szlachányi Kornél	**Physics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZNA2101	Computer technology I.	lecture	Exam	2						2	Dr. Almási Gábor	**Physics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZNA3001	Metrology lecture	lecture	Exam	2						2	Dr. Márton Zsuzsanna	**Physics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZNA3002	Metrology practical course	Practice	Practice Grade	1						1	Dr. Márton Zsuzsanna	**Physics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZNA0801	Electricity and magnetism lecture	lecture	Exam			2				2	Dr. Almási Gábor	**Physics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZNA0802	Electricity and magnetism seminar	Seminar	Practice Grade			2				2	Dr. Almási Gábor	**Physics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZNA1901	Quantum mechanics lecture	lecture	Exam					3		3	Dr. Gál Tamás	**Physics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZNA1902	Quantum mechanics practical course	Practice	Practice Grade					3		3	Dr. Gál Tamás	**Physics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENFIZN1001	Thermodynamics lecture	lecture	Exam		2					3	Dr. Pálfalvi László	**Physics BSc**	Spring Semester	
OBLIGATORY COURSES	ENFIZN1002	Thermodynamics practical course	Practice	Practice Grade		2					3	Dr. Pálfalvi László	**Physics BSc**	Spring Semester	
OBLIGATORY COURSES	ENFIZN1701	Electrodynamics lecture	lecture	Exam				2			3	Dr. Korpa Csaba	**Physics BSc**	Spring Semester	
OBLIGATORY COURSES	ENFIZN1702	Electrodynamics practical course	Practice	Practice Grade				2			3	Dr. Korpa Csaba	**Physics BSc**	Spring Semester	
OBLIGATORY COURSES	ENFIZN1101	Waves and optics lecture	lecture	Exam		2					3	Dr. Erostyák János	**Physics BSc**	Spring Semester	
OBLIGATORY COURSES	ENFIZN1102	Waves and optics practical course	Practice	Practice Grade		2					3	Dr. Erostyák János	**Physics BSc**	Spring Semester	
ELECTIVE COURSES	ENFIZNS3101	LabView basics	Practice	Practice Grade		2					3	Dr. Márton Zsuzsanna	**Physics BSc**	Spring Semester	
OBLIGATORY COURSES	ENFIZNS3201	Physics and electronics laboratory II.	Practice	Practice Grade				4			4	Dr. Buzády Andrea	**Physics BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN0101	Callisthenics I.	practice	Practice Grade	2						2	Prókai Judit	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN0301	Outdoor activities (recreational sports and games)	practice	Practice Grade					2		2	Cselkó Alexandra	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN0401	Basics of individual sports (Basic of athletics, Swimming, Martial arts, Sport gymnastics)	practice	Practice Grade			8				8	Dr. Váczi Márk	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN0702	Basics of Theory of Training II.	lecture	Exam			2				2	Dr. Radák Zsolt	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN0801	Biomechanics	lecture	Exam			2				2	Dr. Váczi Márk	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN0901	Human Biology	lecture	Exam	2						2	Dr. Gábrielné Wilhelm M	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN1001	Anatomy I.	lecture	Exam	2						2	Dr. Gábriel Róbert/Mayer	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN1101	Accident prevention, First aid and Sport Hygiene	practice	Practice Grade	2						2	Dr. Tóth Ákos Levente	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN1201	Biochemistry	lecture	Exam	2						2	Csepregi Kristóf/László Sz	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN1301	Physiology , Sportphysiology I.	lecture	Exam			2				2	Dr. Atlasz Tamás	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN1501	Exercise Physiology	practice	Practice Grade					2		2	Dr. Gábrielné Wilhelm M	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN1801	Performance Testing	practice	Practice Grade					2		2	Gyebrovszki Ádám	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN1901	Pedagogy I. (Introduction to Pedagogy)	lecture	Exam	2						2	Dr. Dezső Renáta	**Physical Training BSc**	Autumn Semester	no course description
OBLIGATORY COURSES	ENAEDZN2001	Introduction to Psychology I.	lecture	Exam	2						2	Dr Bálint Ágnes	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN2101	Sportpsychology	lecture	Exam			2				2	Dr Paic Róbert	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN2301	Methods of Physical Education and Inclusion	Theory+practice						2+2		4	Dr. Csovcsics Erika/Katon	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN2501	Social Sciences I. (Phylosophy)	theory	Exam	2						2	Dr. Bertók Ilona Rózsa	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN2503	Social Sciences III. (Introduction to Sport Pedagogy and Sport Sociology)	theory	Exam			2+2				4	Dr. Németh Zsolt/Váczi M	**Physical Training BSc**	Autumn Semester	no course description
OBLIGATORY COURSES	ENAEDZN2701	Informatics	practice		2						2	Dr Farkas Gábor	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN2901	Sportmanagement	theory	Exam					2		2	Kajos Attila	**Physical Training BSc**	Autumn Semester	
OBLIGATORY COURSES	ENAEDZN3201	Programs of Youth Sports	practice	Practice Grade					2		2	Balázs Bence	**Physical Training BSc**	Autumn Semester	
ELECTIVE COURSES	ENTESV10	Kangoo	practice	Practice Grade	0+2		0+2				3	Szatmári Adrienn	**Physical Training BSc**	Autumn Semester	
ELECTIVE COURSES	ENTESV04	Crossfit	practice	Practice Grade	0+3		0+3				3	Szatmári Adrienn	**Physical Training BSc**	Autumn Semester	
ELECTIVE COURSES	ENTESV06	Yoga (Hatha yoga)	practice	Practice Grade	0+2	0+2	0+2				4	Gép Zsuzsanna	**Physical Training BSc**	Autumn Semester	
ELECTIVE COURSES	TTENTESV88	Yoga meditation flow	theory	exam							3	Gép Zsuzsanna	**Physical Training BSc**	Spring Semester	
ELECTIVE COURSES	ENTESV08	Doping and sports	theory	Practice Grade	0+2		0+2				3	Dr. Atlasz Tamas	**Physical Training BSc**	Autumn Semester	
ELECTIVE COURSES	ENTESV06	Yoga (Hatha yoga)	practice	Practice Grade	0+2	0+2	0+2				4	Gép Zsuzsanna	**Physical Training BSc**	Spring Semester	
ELECTIVE COURSES	ENTESV13	Listening and Speaking	Theory+practice								3	Zank Ildikó	**Physical Training BSc**	Spring Semester	

ELECTIVE COURSES	TTENTESV88	Yoga meditation flow	theory	exam							3	Gép Zsuzsanna	**Physical Training BSc**	Spring Semester	
ELECTIVE COURSES	ENTESV21	Sports Geography	Theory	exam							2	Dr Bánhidi Miklós	**Physical Training BSc**	Spring Semester	
ELECTIVE COURSES	ENTESV04	Crossfit	practice	Practice Grade	0+3		0+3				3	Szatmári Adrienn	**Physical Training BSc**	Spring Semester	
ELECTIVE COURSES	ENTESV15	Diagnostic Imiging in Sport Medicine	practice								3	Dr Orsi Gergő	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN0102	Callisthenics II.	practice	Practice Grade		2					2	Prókai Judit	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN0201	Physical Education Games	practice	Practice Grade				2			2	Cselkó Alexandra	**Physical Training BSc**	Spring Semester	no course description
OBLIGATORY COURSES	ENAEDZN0501	Motor development	theory	Exam						2	2	Dr. Gábrielné Wilhelm M	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN0601	Motor Learning Motor Control	theory	Exam						2	2	Dr. Atlasz Tamás	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN0701	Basics of Theory of Training I.	theory	Exam		2					2	Dr. Radák Zsolt	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN1002	Anatomy II.	oral	Exam		2					2	Dr. Gábriel Róbert/Mayer	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN1302	Physiology, Sportphysiology II.	Theory+practice	Exam				2+2			4	Dr. Atlasz Tamás	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN1401	Dietetics	theory	Exam				2			2	Dr. Gábrielné Wilhelm M	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN1601	Prevention, Physical Therapy, Rehabilitation	Theory+practice	Practice Grade						2+2	4	Kovács Szabó Zsófia	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN1902	Pedagogy II.(Public education)	theory	Exam		2					2	Dr. Dezső Renáta	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN1903	Pedagogy III. (Theories of Education, Didactics)	Theory+practice	Exam				2+2			4	Dr Csovcsics Erika	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN2002	Introduction to Psychology II. (Developmental Psychology)	theory	Exam		2					2	Bálint Ágnes	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN2201	Pedagogical Psychology	theory	Exam				2			2	Dr Markó Éva	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN2502	Social Sciences II. (Communication, Introduction to Sociology, Basic of Sport Law)	theory	Exam		2+2+1					5	Dr. Marton Gergely	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN2601	Communication in Sport	practice	Practice Grade				2			2	Dr. Marton Gergely	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN2801	Introduction of Research methods in Sport	Theory+practice	Practice Grade		2+2					4	Dr Atlasz Tamás	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN3001	Event management	practice	Practice Grade				2			2	Dr Marton Gergely	**Physical Training BSc**	Spring Semester	
OBLIGATORY COURSES	ENAEDZN3101	Leadership and organization of sport camps	practice	Practice Grade						3	3	Balázs Bence	**Physical Training BSc**	Spring Semester	no course description
OBLIGATORY COURSES	ENPTIA0301	Elementary linear algebra	Lec+Prac/Coll.		2+2						4	Dr. Frigyik Béla András	**Computer Science BSc**	Autumn Semester	
Modular Elective course	ENTPIA0201	Calculus I	Lec+Prac/Coll.		2+2						5	Dr. Pap Margit	**Computer Science BSc**	Autumn Semester	
Modular Elective course	ENTPIA0202	Calculus II	Lec+Prac/Coll.			2+2					5				
Modular Elective course	ENPTIA4101	Analysis I	Lec+Prac/Coll.		3+2						5	Dr. Pap Margit	**Computer Science BSc**	Spring Semester	
Modular Elective course	ENPTIA4102	Analysis II	Lec+Prac/Coll.			3+2					5				
OBLIGATORY COURSES	ENTPIA0501	Probability and statistics	Lec+Prac/Coll.				2+1				3	Dr. Figyik B. András	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIB0701	Mathematical logics	Prac/Prac		0+2						3	Bodor András	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA0901	Numerical methods I	Lec+Prac/Prac.					2+2			5	Dr. Király Balázs	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIA0902	Numerical methods II	Prac/Prac.						0+2		2	Dr. Király Balázs	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA0601	Operations research	Prac/Prac						0+3		3	Dr. Király Balázs	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENMNAMA11	Discrete mathematics I	Lec+Prac/Coll.		2+2						5	Dr. Szabó Sándor	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA0102	Discrete mathematics II	Lec+Prac/Coll.			2+2					5	Dr. Szabó Sándor	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIA0801	Basics of computer science	Lec+Prac/Prac.				2+2				5	Dr. Jenei Sándor	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA1201	Elemetary programming	Prac/Prac.		0+4						4	Dr. Zentai Norbert	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA1601	Programming I	Prac/Prac.		0+4						5	Dr. Gimesi László	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA1602	Programming II	Prac/Prac.			0+4					5	Dr. Gimesi László	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIA1701	Compilers and assemblers	Prac/Prac.						0+2		2	Dr. Gimesi László	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA1001	Algorithms, data structures	Lec+Prac/Coll.			2+2					5	Dr. Jenei Sándor	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIB1101	Formal languages and automata	Lec+Prac/Prac		2+2						5	Dr. Jenei Sándor	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA2301	Distributed systems, parallel programming	Prac/Prac						0+3		3	Bodor András	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA1401	Relational databases	Lec+Prac/Coll.				2+2				5	Dr. Laczkó József	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA1301	Methodology of programming I	Lec+Prac/Prac.			2+2					5	Dr. Laczkó József	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIA1501	System engineering	Lec+Prac/Coll.				2+2				5	Dr. Pauler Gábor	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIA1801	Professional communication	Lec+Prac/Prac.					1+2			3	Dr. Bugya Titusz	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIA2101	Operating systems	Lec+Prac/Coll.							2+2	5	Dr Almási Gábor	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIA1901	Computer architectures	Lec/Coll.		2+0						2	Dr. Almási Gábor	**Computer Science BSc**	Autumn Semester	
OBLIGATORY COURSES	ENPTIB2001	Computer networks	Lec/Coll.			4+0					5	Dr. Mechler Mátyás Illés	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIA2201	Information and data security	Lec/Coll.							3+0	3	Dr. Hatvani Zsolt Ákos	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIB2401	Operation of IT systems	Prac/Prac.					0+2			3	Horváth Zoltán	**Computer Science BSc**	Spring Semester	
OBLIGATORY COURSES	ENPTIB4001	Control technology	Lec+Prac/Coll.							1+2	5	Dr. Laczkó József	**Computer Science BSc**	Spring Semester	no course description
OBLIGATORY COURSES	ENMATNA1202	Analysis in Several Variables sem.	Seminar	Seminar Grade			2				2	Dr. Pap Margit	**Mathematics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENMATNA1301	Abstract Algebra	Lecture	EXAM			2				2	Dr. Tóth László	**Mathematics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENMATNA1302	Abstract Algebra sem.	Seminar	Seminar Grade			2				2	Dr. Tóth László	**Mathematics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENMATNA0903	Geometry 2	Lecture	EXAM			2				2	Dr. Ruff János	**Mathematics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENMATNA0904	Geometry 2 sem.	Seminar	Seminar Grade			2				2	Dr. Ruff János	**Mathematics BSc**	Autumn Semester	
OBLIGATORY COURSES	ENMATNA1401	Probability Theory ans Statistics	Lecture	EXAM				3			3	Dr. Frigyik András	**Mathematics BSc**	Spring Semester	
OBLIGATORY COURSES	ENMATNA1402	Probability Theory ans Statistics sem.	Seminar	Seminar Grade				3			3	Dr. Frigyik András	**Mathematics BSc**	Spring Semester	
OBLIGATORY COURSES	ENMATNA1701	Complex functions	Lecture	EXAM				2			2	Dr. Pap Margit	**Mathematics BSc**	Spring Semester	
OBLIGATORY COURSES	ENMATNA1702	Complex functions sem.	Seminar	Seminar Grade				2			2	Dr. Pap Margit	**Mathematics BSc**	Spring Semester	
OBLIGATORY COURSES	ENMATNA1901	Linear Algebra	Lecture	EXAM				2			3	Dr. Simon Ilona	**Mathematics BSc**	Spring Semester	
OBLIGATORY COURSES	ENMATNB1902	Linear Algebra sem.	Seminar	Seminar Grade				1			2	Dr. Simon Ilona	**Mathematics BSc**	Spring Semester	
OBLIGATORY COURSES	ENMATNA1601	Differential Equations	Lecture	EXAM				2			3	Dr. Eisner Tímea	**Mathematics BSc**	Spring Semester	
OBLIGATORY COURSES	ENMATNA1602	Differential Equations sem.	Seminar	Seminar Grade				2			2	Dr. Eisner Tímea	**Mathematics BSc**	Spring Semester	

	ENAFOTNA0101	Mathematics basics practice	practice	Practice grade	2/26						2	Tamás Gál	**Earth Sciences Bsc**	Autumn semester	no course description
	AFOLNA0201	Introduction to Office-related applications	lab	Practice grade	3/39						3	Titusz Bugya	**Earth Sciences Bsc**	Autumn semester	
	ONFOL1-0202	Introduction to Geology lecture	lecture	Exam	2/26						3	János Kovács	**Earth Sciences Bsc**	Autumn semester	
	AFOLNA0402	Introduction to Geology practice	lab	Practice grade	2/26						2	Amadé Halász	**Earth Sciences Bsc**	Autumn semester	
	ENAFOTNA0301	Chemistry basics I. lecture	lecture	Exam	2/26						2	Attila Horváth	**Earth Sciences Bsc**	Autumn semester	
	ENAFOTNA0901	Physics basics I. lecture	lecture	Exam	2/26						2	János Erostyák	**Earth Sciences Bsc**	Autumn semester	
	ENAFOTNA1201	Biology basics lecture	lecture	Exam	2/26						2	Jenő Purger	**Earth Sciences Bsc**	Autumn semester	
	ENAFOTNA0302	Chemistry basics II. lecture	lecture	Exam		2/26					2	Attila Horváth	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA0303	Chemistry basics practice	lab	Practice grade		2/26					2	Attila Horváth	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA0902	Physics basics II. lecture	lecture	Exam		2/26					2	János Erostyák	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA0903	Physics basics practice	lab	Practice grade		2/26					2	János Erostyák	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA0501	Meteorology lecture	lecture	Exam	2/26						3	István Geresdi	**Earth Sciences Bsc**	Autumn semester	
	AFOLNA0701	Introduction to Astronomy lecture	lecture	Exam	2/26						2	Péter Gyenizse	**Earth Sciences Bsc**	Autumn semester	
	ONFOL1-2601	Introduction to Pedology	complex	Practice grade	3/47						4	Szabolcs Czigány	**Earth Sciences Bsc**	Autumn semester	
	AFOLNA1001	Introduction to GIS I.	complex	Practice grade	3/39						4	István Péter Kovács	**Earth Sciences Bsc**	Autumn semester	
	ENAFOTNA1401	Geomorphology	complex	Practice grade		3/47					4	Dénes Lóczy	**Earth Sciences Bsc**	Spring semester	
	ONFOL1-2701	Historical geology and paleontology lecture	lecture	Exam		3/39					3	László Bujtor	**Earth Sciences Bsc**	Spring semester	
	AFOLNS-0201	Introduction Remote sensing	practice	Practice grade		2/26					3	Levente Ronczyk	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA1301	Climatology	lecture	Exam		2/26					3	István Geresdi	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA0601	Mathematical methods in earth sciences	lab	Practice grade		4/52					5	István Geresdi	**Earth Sciences Bsc**	Spring semester	
	AFOLNA1002	Introduction to GIS II. practice	lab	Practice grade		3/39					4	István Péter Kovács	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA1501	Introduction to hydrology and hydrogeology practi	lab	Practice grade			3/39				4	József Dezső	**Earth Sciences Bsc**	Autumn semester	
	ENAFOTNA1502	Introduction to hydrology and hydrogeology lectur	lecture	Exam			2/26				3	Attila Kovács	**Earth Sciences Bsc**	Autumn semester	
	ENAFOTNA3601	Field work I.	field practice	Practice grade			/40				5	Amadé Halász	**Earth Sciences Bsc**	Autumn semester	
	ENAFOTNA2401	Field measurements, documentation, geological m	practice	Practice grade				2/26			3	Amadé Halász	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA2601	Analytical techniques in geology practice	lab	Practice grade				2/26			3	János Kovács	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA2801	Introduction to hydrometeorology practice	practice	Practice grade				3/39			3	Szabolcs Czigány	**Earth Sciences Bsc**	Spring semester	
	ENAFOTNA1101	Physical geography of Hungary practice	practice	Practice grade				2/26			3	Szabolcs Ákos Fábián	**Earth Sciences Bsc**	Spring semester	
	ONFOL1-2501	Introduction to Geography	complex	Exam	3/39						4	dr. Nagyváradi László	**Geography Bcs**	Autumn semester	
	AFOLNA0201	Introduction to Office-related applications	lab	Practice grade	3/39						3	dr. Bugya Titusz	**Geography Bcs**	Autumn semester	
	AFOLNA3101	Road to Geography	lecture	Exam	1/13						1	dr. Pirisi Gábor	**Geography Bcs**	Autumn semester	
	AFOLNA0101	Geomathematics and Geostatistics	practice	Practice grade			3/39				4	dr. Geresdi István	**Geography Bcs**	Autumn semester	
	ENAFOLNA0901	Introduction to Physics	lecture	Exam		2/26					2	dr. Erostyák János	**Geography Bcs**	Spring semester	
	AFOLNA0301	Social Studies for Geographers	complex	Exam	4/52						6	dr. Tésits Róbert	**Geography Bcs**	Autumn semester	
	ONFOL1-0501	Meteorology and Climatology	lecture	Exam		3/39					4	dr. Geresdi István	**Geography Bcs**	Spring semester	
	AFOLNA0701	Introduction to Astronomy	lecture	Exam	2/26						2	dr. Gyenizse Péter	**Geography Bcs**	Autumn semester	
	ONFOL1-0402	Astronomical Geography and Cartography	practice	Practice grade		3/26					3	dr. Nagyváradi László	**Geography Bcs**	Spring semester	
	ONFOL1-0202	Introduction to Geology	lecture	Exam	2/26						3	dr. Kovács János	**Geography Bcs**	Autumn semester	
	AFOLNA0402	Introduction to Geology	practice	Practice grade	2/26						2	dr. Halász Amadé	**Geography Bcs**	Autumn semester	
	AFOLNA1001	Introduction to GIS I.	lab	Practice grade	3/45						4	dr. Kovács István Péter	**Geography Bcs**	Autumn semester	
	AFOLNA1002	Introduction to GIS II.	lab	Practice grade		3/39					4	dr. Kovács István Péter	**Geography Bcs**	Spring semester	
	AFOLNA1301	Introduction to Scientific Work	seminar	Practice grade			2/26				3	dr. Pirisi Gábor	**Geography Bcs**	Autumn semester	
	ENAFOLNA1401	Geomorphology	complex	Exam		3/47					4	dr. Varga Gábor	**Geography Bcs**	Spring semester	
	ONFOL1-2701	Historical Geology and Paleontology	lecture	Exam		3/39					3	dr. Bujtor László	**Geography Bcs**	Spring semester	
	ONFOL1-2601	Introduction to Pedology	practice	Practice grade			3/43				4	dr. Czigány Szabolcs	**Geography Bcs**	Autumn semester	
	ONFOL1-1301	Biogeography	lecture	Exam			2/28				3	dr. Czigány Szabolcs	**Geography Bcs**	Autumn semester	
	ONFOL1-0801	Hydrogeography	practice	Practice grade				3/43			4	dr. Dezső József	**Geography Bcs**	Spring semester	
	ONFOL1-1101	Introduction to Human Geography	lecture	Exam	2/26						2	dr. Trócsányi András	**Geography Bcs**	Autumn semester	
	ONFOL1-2801	Population, Place and Identity	complex	Exam		4/52					6	dr. Pap Norbert	**Geography Bcs**	Spring semester	
	AFOLNA3301	Urban Geography	complex	Exam			4/52				6	dr. Pirisi Gábor	**Geography Bcs**	Autumn semester	
	AFOLNA2201	Economic Geography	complex	Exam			4/52				6	dr. Trócsányi András	**Geography Bcs**	Autumn semester	
	ONFOL1-2301	Physical Geography of Europe	complex	Exam					4/52		6	dr. Gyuricza László	**Geography Bcs**	Autumn semester	
	ONFOL1-2401	Human Geography of Europe	complex	Exam					4/52		6	dr. Reményi Péter	**Geography Bcs**	Autumn semester	
	ONFOL1-1901	Physical Geography of the Carpathian Basin	complex	Exam				4/52			6	dr. Fábián Szabolcs Ákos	**Geography Bcs**	Spring semester	
	ONFOL1-1801	Human Geography of Hungary	complex	Exam				4/52			6	dr. Tésits Róbert	**Geography Bcs**	Spring semester	
	ONFOL1-0901	Field Trip	practice	Practice grade				0/24			3	dr. Szabó Géza	**Geography Bcs**	Spring semester	
	ENMNGEO01/MNFOTN0501	Modelling and simulations in Geography	Practice	Practice grade		2/36					3	dr. Halmai Ákos	**Geography Msc**	Spring semester	
	ENMNGEO02/MNGEO14	Geographical Applications of GIS	Lecture	Exam	2/36						2	dr. Gyenizse Péter	**Geography Msc**	Autumn semester	
	ENMNGEO03/MNGEOA03	Research Methodology	Seminar	Practice grade	2/36						2	dr. Trócsányi András	**Geography Msc**	Autumn semester	
	ENMNGEO04/MNGEO09	Geomathematics	Practice	Practice grade			2/36				3	dr. Sarkadi Noémi	**Geography Msc**	Autumn semester	
	ENMNGEO05/MNGEOA15	History and Schools of Geography	Lecture	Exam	2/36						2	dr. Pap Norbert	**Geography Msc**	Autumn semester	
	ENMNGEO06/MNGEO19	Geographical Landscapes of the Carpathian Basin	Lecture	Exam	2/36						2	dr. Fábián Szabolcs Ákos	**Geography Msc**	Autumn semester	
	ENMNGEO07/MNGEO20	Landscape Ecology and Landscape Evaluation	Complex	Exam	3/39						4	dr. Lóczy Dénes	**Geography Msc**	Autumn semester	
	ENMNGEO08/MNGEO21	Geographical Approaches of Regional Developmen	Seminar	Practice grade	2/36						2	dr. Reményi Péter	**Geography Msc**	Autumn semester	
	ENMNGEO09/MNGEO22	Political Geography	Complex	Exam	4/52						4	dr. Pap Norbert	**Geography Msc**	Autumn semester	
	ENMNGEO10/MNGEOA17	Space, Society and Sustainability	Lecture	Exam		2/36					2	dr. Pirisi Gábor	**Geography Msc**	Spring semester	
	ENMNGEO11/MNGEO81	Practical Applications of the GIS	Lab	Practice grade		2/36					3	dr. Bugya Titusz	**Geography Msc**	Spring semester	
	ENMNGEO1201/ONFOLAK1-0501	Regional Geography of the Continents I.	Complex	Exam	4/52						6	dr. Wilhelm Zoltán	**Geography Msc**	Autumn semester	

	ENMNGEO1202/ONFOLAK1-0502	Regional Geography of the Continents II.	Complex	Exam		4/52					6	dr. Nagyváradi László	**Geography Msc**	Spring semester	
	ENMNGEOS1-01	GIS Programming I.	Lab	Practice grade		2/36					3	dr. Halmai Ákos	**Geography Msc**	Spring semester	
	ENMNGEOS1-02	GIS Database Modelling	Lab	Practice grade			2/36				3	dr. Bugya Titusz	**Geography Msc**	Autumn semester	
	ENMNGEOS1-03	Applied Geomorphological Mapping	Practice	Practice grade			2/36				4	dr. Fábián Szabolcs Ákos	**Geography Msc**	Autumn semester	
	ENMNGEOS1-04	Engineering and Anthropogenic Geomorphology	Practice	Practice grade		2/36					3	dr. Fábián Szabolcs Ákos	**Geography Msc**	Spring semester	
	ENMNGEOS1-05	Quaternary Research	Lecture	Exam			2/36				3	dr. Fábián Szabolcs Ákos	**Geography Msc**	Autumn semester	
	ENMNGEOS1-06	Surface Modelling	Practice	Practice grade				2/36			3	dr. Kovács István Péter	**Geography Msc**	Announced only from 2022 spring!	
	ENMNGEOS1-07	3D Visualization	Lecture	Exam				2/36			2	dr. Gyenizse Péter	**Geography Msc**	Announced only from 2022 spring!	
	ENMNGEOS1-08	Fieldwork in Geomorphology	Practice	Practice grade		0/13					4	dr. Czigány Szabolcs	**Geography Msc**	Spring semester	
	ENMNGEOS1-09	Geomorphic Systems	Lecture	Exam				3/39			4	dr. Lóczy Dénes	**Geography Msc**	Announced only from 2022 spring!	
	ENMNGEOS1-10	Earth Observation	Practice	Practice grade				2/36			3	dr. Ronczyk Levente	**Geography Msc**	Announced only from 2022 spring!	
	ENMNGEOS1-11	Stratigraphy	Lecture	Exam		2/36					3	dr. Budai Tamás	**Geography Msc**	Spring semester	
	ENMNGEOS1-12	Research Methods in Geomorphology	Practice	Practice grade			2/36				3	dr. Kovács János	**Geography Msc**	Autumn semester	
OBLIGATORY COURSES	ENBIOB0101	Mathematics	Lecture	Exam	2						**2**	Dr Simon Ilona	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB0102	Mathematics	Practice	Practice grade	2						**3**	Dr Simon Ilona	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB0301	Fundamental Physics	Lecture	Exam	2						**2**	Dr Erostyák János	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB0201	Fundamental Chemistry I	Lecture	Exam	2						**2**	Dr Horváth Attila	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB3001	Biological Laboratory Fundamentals	practice	Practice grade	2						**3**	Dr Kerepesi Ildikó	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB1103	Comparative Anatomy I lecture	Lecture	Exam	2						**2**	Dr Molnár László	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB1104	Comparative Anatomy I laboratory	practice	Practice grade	3						**4**	Dr Pollák Edit	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB2101	Plant Anatomy and Morphology lecture	Lecture	Exam	3						**3**	Dr Stranczinger Szilvia	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB2102	Plant Anatomy and Morphology laboratory	Practice	Practice grade	3						**4**	Dr Stranczinger Szilvia	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB1301	Cell Biology lecture	Lecture	Exam	2						**2**	Dr Molnár László	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB1302	Cell Biology laboratory	Practice	Practice grade	2						**3**	Dr Molnár László	**Biology BSc**	Autumn Semester	
OBLIGATORY COURSES	ENBIOB0401/ENBION0501	Organic Chemistry lecture	Lecture	Exam		2					**2**	Pápayné Dr Sár Cecilia	**Biology BSc**	Spring Semester	
OBLIGATORY COURSES	ENBIOB1201	Zootaxonomy lecture	Lecture	Exam		3					**3**	Dr Horváth Győző	**Biology BSc**	Spring Semester	
OBLIGATORY COURSES	ENBIOB1202	Zootaxonomy practice	Practice	Practice grade		3					**4**	Dr Horváth Győző	**Biology BSc**	Spring Semester	
OBLIGATORY COURSES	ENBIOB0501	Introduction into the scientific Bibliography semina	Practice	Practice grade		1					**1**	Dr Stranczinger Szilvia	**Biology BSc**	Spring Semester	
OBLIGATORY COURSES	ENBIOB0801	General Ecology	lecture	exam			2				**2**	Dr Csabai Zoltán	**Biology BSc**	Autumn semester	
OBLIGATORY COURSES	ENBIOB3301	Microbiology	Lecture	Exam				2			**2**	Dr Fekete Csaba	**Biology BSc**	Spring semester	no course description
OBLIGATORY COURSES	ONFOL1-0202	Introduction to geology	lecture	Exam					2		**3**	Dr Kovács János	**Biology BSc**	Autumn semester	
OBLIGATORY COURSES	ENBIOB3201	Basic Genetics	Lecture	Exam					3		**3**	Dr Hoffmann Gyula	**Biology BSc**	Autumn semester	
OBLIGATORY COURSES	ENBIOB1601	Human biology	Lecture	Exam					2		**2**	Dr Wilhelm Márta	**Biology BSc**	Autumn semester	
OBLIGATORY COURSES	ENBIOB1701	Biogeography	lecture	Exam					2		**2**	Dr Purger Jenő	**Biology BSc**	Autumn semester	
OBLIGATORY COURSES	ENBIOB2001	Nature conservation and Environmental Protection	lecture	Exam						2	**2**	Dr Csiky János	**Biology BSc**	Spring semester	
OBLIGATORY COURSES	ENBIOB3202	Genetics laboratory	practice	Practice grade						2	**3**	Dr Hoffmann Gyula	**Biology BSc**	Spring semester	
OBLIGATORY COURSES	ENBION2201/ENBIOB2301	Evolution	lecture	exam						2	**2**	Dr Hoffmann Gyula	**Biology BSc**	Spring semester	
OBLIGATORY COURSES	ENBIOB1901	Ethology	practice	Practice grade						2	**3**	Dr Purger Jenő	**Biology BSc**	Spring semester	
ELECTIVE COURSES	ENBIOBSV0601	Applied Biotechnology	practice	Practice grade					3		**4**	Dr Papp Gábor	**Biology BSc**	Autumn semester	
ELECTIVE COURSES	ENBIONSV0302	Microtechniques	practice	Practice grade				2			**3**	Dr Pollák Edit	**Biology BSc**	Spring semester	
ELECTIVE COURSES	ENBIONSV0303	Microtechniques laboratory	practice	Practice grade				3			**4**	Dr Pollák Edit	**Biology BSc**	Spring semester	
ELECTIVE COURSES	ENBIONSV0502	General toxicology	practice	Practice grade				3			**4**	Dr Papp Gábor	**Biology BSc**	Spring semester	
ELECTIVE COURSES	ENBIONSV1502	Models in neurobiology	practice	Practice grade						3	**4**	Dr Völgyi Béla	**Biology BSc**	Spring semester	
ELECTIVE COURSES	ENBIONSV0902	Functional histology	practice	Practice grade				3			**4**	Dr Molnár László	**Biology BSc**	Spring semester	
ELECTIVE COURSES	ENBIONS0602	Fundamentals in limnology seminar	practice	Practice grade				2			**3**	Dr Móra Arnold	**Biology BSc**	Spring semester	
ELECTIVE COURSES	ENBIOBSV1101	Plant identification	practice	Practice grade					2		**3**	Dr Albert Éva	**Biology BSc**	Autumn semester	
ELECTIVE COURSES	ENBIOBSV1201	Animal identification and ecology	practice	Practice grade					4		**5**	Dr Purger Jenő	**Biology BSc**	Autumn semester	
ELECTIVE COURSES	ENBIOBSV1301	Biomonitoring seminar	practice	Practice grade					3		**4**	Dr Horváth Győző	**Biology BSc**	Autumn semester	
ELECTIVE COURSES	ENBIOBSV1401	Soil science	practice	Practice grade					2		**3**	Dr Morschhauser Tamás	**Biology BSc**	Autumn semester	
ELECTIVE COURSES	ENBIONV0201	Fundamentals in plant sociology	practice	Practice grade						2	**3**	Dr Csiky János	**Biology BSc**	Spring semester	
ELECTIVE COURSES	ENBIOBSV1601	Conservation of flora and fauna seminar	practice	Practice grade						3	**4**	Dr Csiky János	**Biology BSc**	Spring semester	
ELECTIVE COURSES	ENBIOBSV1701	Introduction to applied ecology seminar	practice	Practice grade					3		**4**	Dr Horváth Győző	**Biology BSc**	Autumn semester	
OBLIGATORY COURSES	ENMNBIOA0101	Biophysics	lecture	exam							**2**	Dr Hideg Éva	**Biology MSc**	Autumn semester	
OBLIGATORY COURSES	ENMNBIOA2501	Biostatistics	practice	Practice grade							**2**	Dr Csabai Zoltán	**Biology MSc**		
OBLIGATORY COURSES	ENMNBIOA1601	Biotechnology	lecture	exam							**5**	Dr Jakab Gábor	**Biology MSc**		no course description
OBLIGATORY COURSES	ENMNBIO13	Developmental and stress physiology of plants	lecture	exam		28					**2**	Dr Jakab Gábor	**Biology MSc**	Spring semester	
OBLIGATORY COURSES	ENMNBIO2901	Ecological fundamentals in environmental protecti	practice	Practice grade							**4**	Dr. Csiky János	**Biology MSc**		
OBLIGATORY COURSES	ENMNBIO2801	Evolution of the structure and function in the living	lecture	exam							**5**	Dr. Hoffmann Gyula	**Biology MSc**		
OBLIGATORY COURSES	ENMNBIO2701	Molecular cell biology	lecture	Exam	42						**3**	Dr. Jakab Gábor	**Biology MSc**		
OBLIGATORY COURSES	ENMNBIOA0601	Proposal preparation and scientific communication	practice	Practice grade			2				**2**	Dr Gábriel Róbert	**Biology MSc**	Autumn semester	
OBLIGATORY COURSES	ENMNBIO3001	Regulatory biology	lecture	Exam		2					**2**	Dr Gábriel Róbert	**Biology MSc**	Spring semester	