

Courses offered in foreign languages at the Faculty of Natural Sciences Matej Bel University in Banská Bystrica, Slovak Republic in 2014 - 2015

Course: Freshwater Ecology

Annotation: Given that most of the Earth is covered in water, understanding aquatic ecosystems is of vital importance, especially since water is critical to the survival of all life on Earth. Freshwater ecology is a branch of ecology which is concerned with the study of aquatic ecosystems, most specifically of rivers, lakes, streams, seasonal bodies of water, underground water deposits, and the surrounding areas. Within the present course we will define different types of water bodies, natural populations of organisms in the water, learning about natural variations and the impact of environmental factors, such as temperature, salinity, pH, water depth, location, and season. We will focus on aquatic organisms of economic importance and usage of organisms as bioindicators as well as on the functioning of aquatic ecosystems as wholes. (Depending on an agreement with the students, the contents of the course can slightly vary.)

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: prof. Peter Bitušík, CSc., Ing. Ladislav Hamerlík, PhD.

Course: Nature Conservation

Annotation: Definitions, terminology and history of nature conservation (Slovakia and world). Conservation biology and basic principles. Biodiversity and threats. Red lists. Species conservation - plants, animals, minerals, fossils and trees. Protected areas - categories, levels of protection (IUCN and Slovakia). Organizational aspects of nature conservation. Management of protected areas. EU legislation (Nature 2000 – birds directive and habitats directive). International conventions. (Depending on an agreement with the students, the contents of the course can slightly vary.)

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: doc. Ing. Peter Urban, PhD., Ing. Peter Sabo, CSc., Ing. Juraj Švajda, PhD.

Course: Microbial Ecology

Annotation: Importance of microbes in environment. Microbial groups, nutritional classification, basic cell structure and physiology, microbial activities. Participation of microorganisms in ecosystem functions, carbon cycle, decomposition of organic matter, lignin and cellulose, nitrogen cycle, oxygen cycle, sulphur cycle. Sediment metabolism, methanogenesis. Pollution and microbial behavior, xenobiotics, bioremediation, biodegradation. Public health microbiology, communicable disease, water treatment, waste water treatment

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: RNDr. Jana Judová, PhD.

Course: Environmental Management of Human Settlements

Annotation: Biological basis of territoriality, social roots of territoriality, spatial distances, privacy and aloneness, density and crowding; prosocial behavior and altruistic motives,

empathy, cost – reward analysis, equity, egoism, equality and needs, the just-world hypothesis, community and prosocial behavior.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: PhDr. Ivan Murín, PhD.

Course: Environmental Health

Annotation: To get basic information on environmental health. To inform on effective tools of health promotion and environmental diseases prevention. To learn identify environmental health risks and prognoses future development and trend of health status of people.

Subject annotation: Environmental Health and Public Health. Man and environment (influences and effects). Diseases prevention – actual state and perspectives, infectious diseases prevention, nutrition and diseases prevention – cardiovascular, respiratory and oncology diseases. Methods of population health study, Health statistics, Health Risk Assessment, Environmental compartments and their influence on health – chemical, physical and biological hazards.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: Ing. Marek Drimal, PhD.

Course: Human Ethology

Annotation: Lectures of human ethologic for nonbiologist (museologist, ecologist, environmentalist, etc.) are composed from selected themes of comparative study of human behavior. Mainly they are adaptation, accommodation, communication of human species. The last lectures are composed from actually methods analysis of communication – Laban- Knust transcription of kinethography, semiotic analysis in ATLAS.ti . The condition of graduate of lecture is a terrain research in locality Dolinka (Klenovec, Central Slovakia, Gypsies community) - international research project with Charles University (Prague).

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: PhDr. Ivan Murin, PhD.

Course: Social and Cultural Anthropology

Annotation: A short summary of weighty culture anthropological paradigms – evolution views, archetypes in psychoanalysis, British functionalism, structural analysis, cognitive anthropology, semiotic and bio semiotic. Separately lectures are contained from anthropological interpretation of terms supporting for concrete paradigm. For evolution anthropology they are mainly – nonlinear and multilinear evolution of man, functionalism – theory of functions in society, psychoanalysis – archetypes, collective consciousness and unconsciousness, structural analysis and semiotic theory – structural elements, variant, invariant, permutation and cognitive theory – mental representations.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: PhDr. Ivan Murin, PhD.

Course: Terrain Research in Culture Heritage Studies

Annotation: Terrain research in study area culture heritage mainly tangible and intangible culture heritage including research a man. Forms of the terrain research : stationary, long-dated, short-dated, returned, research station, research locality. Types of terrain data. Recording and selection of data. Comparison and verify of data. Practices of observation and forms of researcher participations. The legislation of terrain research realization. The courses are realized in different localities in Central Slovakia (according to themes specialization).

Language: English

Number of Credits: 4

Semester: Summer

Lecturers: PhDr. Ivan Murin, PhD.

Course: Principles of Field Research

Annotation: The course is devoted to the principles of field research, methods and data collection in geology, pedology, botany and zoology. Subject annotation: Field research in geology, pedology, botany and zoology. Interlinking between abiotic and biotic environment in selected ecotops with variable ecological conditions. Comparisons of biodiversity in disturbed and well preserved natural environment in relation to abiotic factors. Management of field records and their evaluation. Determination methods of subdisciplines.

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: prof. RNDr. Peter Andráš, CSc., RNDr. Eva Štrbová, PhD., RNDr. Ingrid Turisová, PhD., Ing. Ján Tomaškin, PhD., Ing. Radoslava Kanianska, PhD.

Course: Green Growth

Annotation: The course is devoted to the concept and principles of green growth and global environmental problems along the lines of green growth. Subject annotation: Trends in the use of natural resources (minerals, rocks, biomass, water, soil) at the national and international level. Material and energy flows and their accounting. Sustainable production and consumption. Ecosystem services. Life cycle analysis. Green growth indicators. Eco-efficiency of economic sectors. Renewable energy sources. Low carbon economy and eco-innovation. Global environmental problems along the lines of green growth. Policy initiatives and green growth.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: Ing. Radoslava Kanianska, PhD.

Course: Atmospheric Chemistry

Annotation: The aim of the course is to explore the physical and chemical processes in the Earth atmosphere, recognizing that human development of the planet has a variety of impacts at every scale – locally, regionally, and even globally. A part of the course is devoted to the basics of photochemistry, since photochemical processes are important counterparts of thermal atmospheric reactions. The course is intended mainly for students with chemistry background at the bachelor level. The course evaluation is based on student's activity and the final exam.

Course format: consultations

Assessment methods: oral/written exam

Language: English
Number of Credits: 4
Semester: Winter
Lecturer: doc. RNDr. Miroslav Medved', PhD.

Course: **Water Chemistry**

Annotation: The course is devoted specifically to the concepts of chemical properties of water. The course covers various topics such as structure, physical and physicochemical properties of water, chemical reactions and chemical equilibrium in water, chemical composition of water. Properties and quality requirements for natural and industrial waters as well as legislation on water protection are also included. The course is intended mainly for students with chemistry background at the bachelor level. The course evaluation is based on student's activity and the final exam.

Course type: consultations

Course evaluation: written exam

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: RNDr. Zuzana Melichová, PhD.

Course: **Air Pollution Modelling**

Annotation: The aim of the course is to model pollution in the Earth atmosphere with available software. Various computational modelling techniques for air pollution shall be briefly mentioned. Most part of the course is devoted to practical modelling, with understanding and analysing obtained results with respect to allowed pollution limits and other environmental aspects.

The course - in the form of seminars - is intended mainly for students with environmentally oriented subject of study. The course evaluation shall be based on the amount and quality of practical work done during seminars, and also on individual solving of assigned air pollution problems.

Course format: consultations

Assessment methods: oral/written exam

Language: English

Number of Credits: 4

Semester: Fall (Winter), Spring (Summer)

Lecturer: doc. RNDr. Miroslav Iliaš, PhD.

Course: **Actual Anthropogenic Threats to Soil and Regulation Measures under Conditions of Slovakia**

Annotation: Actual threats to soil, especially anthropogenic impact on soil functions and soil quality change and development under conditions of Slovakia will be described in this course. The most important chemical and physical threats to soil as soil contamination (inorganic and organic contaminants will be included), soil acidification, soil salinisation and sodification, decline in soil organic matter, soil compaction and soil erosion will be evaluated on the basis of quantitative and qualitative parameters and their relationships. In addition, on the examples of actual soil chemical and physical degradation processes will be explained and emphasized the specific role and position of soil in environment, especially with regard to its vulnerability. The most actual state and development of soils under conditions of Slovakia on the basis of results of national monitoring system will be described in this course.

The main principles and possible soil remediation advances will be also included. Finally, the latest results and knowledge from environmental research of soils and their chemical and physical properties in more details in Slovakia will be also used in this course.

Language: English

Number of credits: 4

Semester: Summer

Lecturer: prof. Ing. Jozef Kobza, PhD.

Course: Environmental Analytical Chemistry

Annotation: The course is devoted specifically to the basic introduction to the analysis of water, air and soil. The course covers various topics such as the sampling of water, air and soil; pretreatment of the sample; analytical techniques most commonly used for environmental analysis (spectroscopic, electrochemical, chromatographic, electrophoretic and radioanalytical methods) and statistical treatment of analytical data. Selected laboratory environmental analysis are also included. The course is intended mainly for students with chemistry background at the bachelor level. The course evaluation is based on student's activity and the final exam.

Course format: consultations/laboratory experiments

Assessment methods: exam

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: Ing. Iveta Nagyová, PhD

Course: Environmental toxicology

Annotation: This basic course covers the principles of toxicology and health effects of chemical agents on biological systems and the environment. The course will cover basic principles governing toxic responses such as dose/response relationship, the effect of biological systems on a chemical (absorption, distribution, biotransformation and excretion) and the effects of chemicals on biological systems (reaction with target molecules, initiation of events leading to toxicities and various disease states). Properties through which chemicals may exert toxic effects will be discussed and modeled using QSAR methods. The impact of selected broadly used chemicals on various organ systems, the toxicities of certain classes of chemicals will be covered. The course is intended mainly for students with chemistry background at the bachelor level. The course evaluation is based on student's activity and the final exam.

Course format: consultations

Assessment methods: oral/written exam

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: RNDr. Šimon Budzák, PhD.

Course: Geo-Ecological Survey and Applications

Annotation: Theoretical basis, stages of geo-ecological survey, evaluation of landscape structure and its changes - time and space, geo-ecological aspects of regional development (territorial systems of ecological stability, territorial development and planning); geomorphological hazards and disaster prevention: regional seismic shaking, mountain hazards (snow avalanche, landslide, floods, site scale, drainage basin scale, ... in light of

accelerating environmental change), soil erosion, hazards and sustainable development, etc., case studies.

Language: English

Number of credits: 4

Semester: Summer

Lecturer: RNDr. Alžbeta Medved'ová, PhD.; RNDr. Martina Škodová, PhD.

Course: **Political Geography of Slovakia**

Annotation: The objective of the course is to analyse the geopolitical position of the Slovak republic within Europe and particularly within the Middle-European area which is a region of a very specific character from the geopolitical point of view. The course provides a concise characterisation of the process of forming a modern nation, a modern state and its boundaries together with its administrative organisation. A special attention is focused on the characteristics of a very dynamic political, social and cultural development of a recent twenty-year period. This transformation process is taking place within a very complicated context of building up an independent state, the international integration process, a response to the challenges of the globalisation process and recent difficulties of the world economy. The course thus offers a case study of Slovakia for a more complex insight into a very complicated reality of the states of the Central-Eastern Europe as it is now.

Language: English

Number of credits: 4

Semester: Summer

Lecturer: RNDr. Tibor Madleňák, PhD.

Course: **Geology of the Western Carpathians**

Annotation: There are three main tectonic structure of the Western Carpathians: Outer, Central and Inner (Plašienka 1999). This tectonic structures are divided by two sutures. Meliata sutures – between the Central and the Inner Western Carpathians and Pieninic lineament – Pieniny Klippen belt between Outer and Central Western Carpathians. The Western Carpathians are northernmost part of the Alpide belt which evolved during the Alpine orogeny.

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: prof. RNDr. Ján Spišiak, DrSc.

Course: **Mesozoic volcanism in the Western Carpathians**

Annotation: Mesozoic volcanic processes are known from all main tectonic units of the Western Carpathians. There are Triassic volcanic rocks in the Tatric and Hronic units (basalts - melaphyres). Cretaceous primitive alkali volcanites (teschenites, basanites, alkali lamprophyres) were found in the Outer (Silesian unit) and Central (Tatric, Fatric and Hronic units) Western Carpathians. Third types of volcanic rocks are MORB-likes basalts in the Meliata unit associated with ultrabasites and radiolarites (ophiolite suit).

Language: English

Number of Credits: 3

Semester: Summer

Lecturer: prof. RNDr. Ján Spišiak, DrSc.

Course: Geo-Information Technologies in the Sphere of Landscape Conservation

Annotation: Geographic Information Systems (GIS) are as a result of technological and scientific advances in many disciplines. They include a range of technologies such as remote sensing, global positioning systems, digital photogrammetry. Its immediate surroundings have recorded on various media for more than 4000 years. Technology data record during this period changed significantly. It was a shift from the records on tablets of stone (eg, targeting parcels in ancient Babylon and Egypt) to the latest Geoinformation technologies to collect, evaluate and visualize data. Significant leap in modern geo-information technologies was mainly conditioned by scientific and technological developments in geodesy, topography, cartography, mathematics, computer science, design, etc. From the interaction of scientific and technical disciplines and efforts to work with the simplest spatial data are gradually was formed GIS.

Language: English

Number of credits: 4

Semester: Summer

Lecturer: RNDr. Michal Klaučo, PhD.

Course: Climatology seminar

Climate is a long term characteristic of the average pattern of variation in meteorological variables like temperature, humidity, atmospheric pressure, wind, precipitation etc. in a given region. The aim of this course is to provide background knowledge of climate on theoretical and practical level. You will learn about Earth's climatic system, climatic classifications, climate of Slovakia and a strong accent will be given also on climate change aspects, the latests findings and scenarios. Basic numerical and graphical data analyses will be performed during the practical part of the seminar.

Language: English

Number of credits: 3

Semester: Summer

Lecturer: Mgr. Lenka Anstead, PhD.

Course: Geography of Tourism

Annotation: Tourism is a global, national and local phenomenon, with economic, social, cultural and also environmental impacts. Geography of tourism studies spatial aspects, spatial models and spatial features of tourism. This course presents current approaches to research of tourism, its history, motivation, regions, infrastructure, activities, tourism trends, regionalization, valorization etc. All these characteristics of tourism are applied to the conditions of Slovakia and selected localities. This course contains also fieldwork.

Language: English

Number of credits: 4

Semester: Summer

Lecturer: PaedDr. Bohuslava Gregorová, PhD.

Course: Geography Education

Annotation: Students will be introduced with school education system in Slovakia focusing on teaching of geography. The course examines teaching strategies, preparation for lesson selected themes (Globe, maps, atlas, Regional geography, Earth movements, Day and night, Seasons), diagnostic and evaluation methods, IT in education (Google Earth and Marble Globe).

Language: English

Number of credits: 4

Semester: Summer

Lecturer: Mgr. Ľuboš Balážovič, PhD.; Mgr. Peter Barto, PhD.

Course: **Dynamical Systems**

Annotation: Introduction into the theory of dynamical systems with continuous as well as discrete time. The course starts describing systems with simple behavior, gradually increasing the level of complexity. The topics covered are: one-dimensional systems on the real line, the compact interval, the circle; two-dimensional systems on the plane, the torus; planar billiards; etc. Fundamental notions of the theory are developed on the way. The course is focused on theoretical aspects, not applications (though a few are mentioned).

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: doc. RNDr. Roman Hric, PhD.

Course: **Dynamical Modeling via Difference Equations**

Annotation: Introduction into dynamical modeling using dynamical systems with discrete time. The main tools are difference equations and basic methods of solving them. The course is focused on applications in different areas of human activity such as economy, biology, genetics, etc.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: doc. RNDr. Roman Hric, PhD.

Course: **Econometrics**

Annotation: Econometrics of cross-sectional data. Gaussian linear regression model (GLRM). Estimation and inference in GLRM. Misspecification of model: diagnostic tools. Linear regression model: properties of Least Squares method; inference. Applications. (Depending on an agreement with the students, the contents of the course can slightly vary.)

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: doc. Mgr. Marian Grendár, PhD.

Course: **Duality theory on 10 dollars a day**

Annotation: The main focus is on basic concepts and techniques in duality theory and its applications. The well-known Stone duality for Boolean algebras, the Pontryagin duality on Abelian groups and the Priestley duality for Distributive lattices will be presented as well as basics of a general (natural) duality theory. In addition, there is a segment on latest research developments in the world in this area. The course is based on the excellent article [1] given below which will be provided to all participants as well as on texts [2], [3], [4]. Its emphasis is on active student engagement in solving problems and in discussions and on an individual work on fortnightly assignments.

[1] B.A. Davey, "Duality Theory on Ten Dollars a Day", in: Rosenberg, I.G. and Sabidussi, G., eds., Algebras and Orders, NATO Advanced Study Institute Series, Series C, Vol. 389, Kluwer Academic Publishers, pp. 71--111, 1993.

[2] S. Burris and H.P. Sankappanavar, A Course in Universal Algebra, Springer Verlag, Berlin, 1981. Online source: <http://citeseer.ist.psu.edu/sankappanavar81course.html>

[3] B.A. Davey and H.A. Priestley, Introduction to Lattices and Order, Second Edition,

Cambridge University Press, Cambridge, 2001.

[4] D.M. Clark and B.A. Davey, Natural Dualities for the Working Algebraist, Cambridge Studies in Advanced Mathematics, Vol. 57, Cambridge University Press, Cambridge, 1998.

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: doc. RNDr. Miroslav Haviar, CSc.

Course: **Introduction to Universal Algebra**

Annotation: The main focus is on basic concepts and techniques in the area of universal algebra. In addition, there is a segment on latest research developments in the world in this area. The course is based on the well written graduate textbook given below which is available also online. Its emphasis is on active student engagement in solving problems and in discussions and on an individual work on fortnightly assignments.

[1] S. Burris and H.P. Sankappanavar, A Course in Universal Algebra, Springer Verlag, Berlin, 1981. Online source: <http://citeseer.ist.psu.edu/sankappanavar81course.html>

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: doc. RNDr. Miroslav Haviar, CSc.

Course: **Introduction to Order and Lattices**

Annotation: The main focus is on basic concepts and techniques in the area of ordered sets, lattice theory and their applications. In addition, there is a segment on latest research developments in the world in this area. The course is based on the well written graduate textbook [1] given below. Its emphasis is on active student engagement in solving problems and in discussions and on an individual work on fortnightly assignments.

[1] B.A. Davey and H.A. Priestley, Introduction to Lattices and Order, Second Edition, Cambridge University Press, Cambridge, 2001.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: doc. RNDr. Miroslav Haviar, CSc.

Course: **Discrete Mathematics I**

Annotation: An introductory course covering elementary combinatorics and graph theory. The course is directed to bachelor students of mathematics and computer science. The course is based on two textbooks [1, 2]. The course covers basic principles of combinatorics, permutations and combinations, binomial and multinomial coefficients, the pigeonhole principle, Ramsey numbers, principle of inclusion and exclusion. Then the course follows by more advanced topics including generating functions and recurrence relations.

[1] C.-C. Chen and K.-M. Koh, Principles and Techniques in Combinatorics, World Scientific, London, 2007. 5-th edition.

[2] J. Matousek, J. Nešetřil, An Invitation to Discrete Mathematics, Oxford University Press, USA; 2008, 2-edition.

Language: English

Credits: 4

Semester: Winter

Lecturer: prof. RNDr. Roman Nedela, DrSc.

Course: Linear algebra

Annotation: The main focus is on solving systems of linear equations via Gauss-Jordan elimination and the use of determinants, on basic concepts and their properties in the theory of finite-dimensional vector spaces and on linear mappings. In addition, there is a segment on Euclid's vector spaces and orthogonalization. The main tool throughout the course is the use of matrices and elementary row operations on them. The course emphasis is on active student engagement in solving mathematical problems and an individual work on weekly assignments.

[1] Serge Lang: Introduction to Linear Algebra, Undergraduate Texts in Mathematics, 2nd ed. 1986, 5th printing 1997, 293 pp., 66 illus., ISBN: 0-387-96205-0.

[2] M. Haviar, Algebra III. Linear algebra (in Slovak), Pedagogic faculty, MBU, 2001.

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: doc. RNDr. Miroslav Haviar, CSc.

Linear algebra**Course: Metric Spaces and Topology**

Annotation: Metric spaces – definition and examples. Open sets, convergence, closed sets. Continuity. Completeness. Separability. Compactness. Product spaces. Banach fixed-point theorem and its applications. Baire category theorem. Topological spaces.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: prof. RNDr. Lubomír Snoha, DrSc.

Course: Romantic mathematics 1

Annotation: Galois' roots. First schools- Louis-le-Grand. Galois and mathematics. Louis-Paul-Emile RICHARD. Galois – "French Abel". First Works. Father's death. Galois' second examinations. Ecole Préparatoire. School troubles. Galois different life. Evariste's second passion. Beginning of destruction. To Louis- Philippe. The course is based on the well written popular text on mathematics [1]. Its emphasis is on active student engagement in discussions and on one class student oral presentation of a part of [1] RIGATELLI, L.: Evariste Galois, 1811 – 1832, Birkhäuser Verlag, 1996. [2] VOSKÁROVÁ, L.: Evariste Galois. Life of mathematical genius. Diploma thesis (in both Slovak and English), PDF MBU, Banská Bystrica, 2003.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: doc. RNDr. Miroslav Haviar, CSc.

Course: Romantic mathematics 2

Annotation: "I think, I'll stop here." – Cambridge, 23 June 1993. From Pythagorean Theorem to Fermat's Last Theorem. Number theory and its development. A remark on margin. Death of genius. Philosophy of goodness. Duel with infinity. Fermat's Last Theorem proved? The lecture of century. Terrifying e-mail. A birthday gift. Big unsolved problems. Price. The course is based on one of the best ever written popular texts on mathematics [1]. Its emphasis is on active student engagement in discussions and on one class student oral

presentation of a chapter of [1] SINGH, S: Fermat's Last Theorem, Fourth Estate Limited, 1998.

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: doc. RNDr. Miroslav Haviar, CSc.

Course: **Molecular Modeling**

Annotation: The course covers the basic concepts of molecular modeling. Major topics include force fields, density functional theory and ab initio methods. Attendees will adopt the topics discussed in the class through short step by step tutorial. Molecular modeling will be applied to problems of modern chemistry like equilibrium and transition state geometry search, vibrational, electronic spectra and thermochemistry. The course is intended mainly for students with chemistry background at the bachelor level. The course evaluation is based on student's activity and the final exam.

Course format: consultations

Assessment methods: oral/written exam

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: RNDr. Šimon Budzák, PhD.

Course: **Methods in Computational Chemistry**

Annotation: Computational chemistry is rapidly emerging as a subfield of theoretical chemistry. Expecting that basic concepts of chemical bonding are understood, the course is devoted to explanation of widely used quantum chemistry methods ranging from semiempirical approaches (AM1, PM3), through the Hartree-Fock (HF) method to density functional theory (DFT). The course is intended mainly for students with chemistry background at the bachelor level. The course evaluation is based on student's activity and the final exam.

Course format: consultations

Assessment methods: oral/written exam

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: doc. RNDr. Miroslav Medved', PhD.

Course: **Molecular Docking in Biochemistry**

Annotation: The course is focused on a special method of molecular modeling which predicts the preferred orientation of a molecule that binds to another molecule to form a stable complex. Molecular docking plays an important role in the rational drug design where it predicts the binding orientation of a small organic molecule (drug, ligand) to its target protein. The course deals with various aspects of protein-ligand docking: various docking approaches, searching and scoring algorithms, target (receptor) and ligand flexibility, water inclusion etc. Training in some of the frequently used software applications (Autodock, Autodock Vina, GOLD Suite, GemDock) is also included. The course is intended mainly for students with chemistry background at the bachelor level. The course evaluation is based on student's activity and the final exam.

Course format: consultations

Assessment methods: oral/written exam

Language: English
Number of Credits: 4
Semester: Summer
Lecturer: RNDr. Marek Skoršepa, PhD.

Course: Numerical Methods and Programming in Chemistry

Annotation: The course deals with basic numerical methods which each university student of natural sciences has to know: linear and nonlinear equations, interpolation, extrapolation, numerical integration and differentiation, solving differential equations. Practically, these methods are taught in the comfortable Microsoft Excel 2010 environment together with basic skills of programming. The course is intended mainly for students with chemistry background at the bachelor level. The course evaluation is based on student's activity and the final exam.

Course format: consultations
Assessment methods: oral/written exam
Language: English
Number of Credits: 4
Semester: Summer
Lecturer: RNDr. Miroslav Iliaš, PhD.

Course: Mechanics

Annotation: Goal of the theme is acquaint the students' with ground of mechanics, teach them systematically work with primer idea and literature, and give them basis of methodology solving physical tasks. This discipline introduces a lot of idea and phenomenological description action, which are the ground for superior understanding by other physical sectors. Discourse are draft so in order to students offer integrated look on given problems from classic physics as well as from views of constraints mathematical resources at the beginning of academics study.

Language: English
Number of Credits: 4
Semester: Winter
Lecturer: doc. RNDr. Janka Raganová, PhD.

Course: Physics Problem Solving I

Annotation: The course aims to introduce applications of mechanics using simple mathematics and to develop students' problem solving abilities. The themes of the course cover methodology of problem solving in physics; vectors in physics; simple types of motion; Newton's laws; work, energy and conservation laws; rotational kinematics and dynamics; projectile motions; simple harmonic motion; mechanical waves.

Language: English
Number of Credits: 4
Semester: Winter
Lecturer: M.S. Evgeni Kolomeitsev, PhD.

Course: Introduction to Measurement

Annotation: Introduction to methods of performing experiments and analysing experimental data is given. Particular attention is paid to error analysis and discussion of statistical and systematically uncertainties. System of units SI is introduced. Graphical presentation of data and procedures is discussed: tables, plots, protocol. Introduction to computer supported experiments is given.

Language: English
Number of Credits: 4
Semester: Winter
Lecturer: M.S. Evgeni Kolomeitsev, PhD.

Course: **Elementary Particles**

Annotation: This course will give an introduction to high energy physics on the level of (selected chapters from) the book by Perkins. We shall discuss basic kinematic variables and relations used in high energy physics. Symmetries and conservation laws for various types of interactions shall be reviewed. Some part shall be devoted to hadronic cross sections and to the structure of hadrons. A short look at the experimental facilities used in high-energy physics shall be given.

Language: English
Number of Credits: 4
Semester: Summer
Lecturer: doc. dr. rer. nat. Boris Tomášik

Course: **Solid State Physics**

Annotation: The aim of the course is to provide basic theoretical knowledge about structural and physical properties of solid materials. It comprises crystal structure and symmetry, diffraction methods for determining crystalline structures, defects in crystal lattice, band theory, vibrations and thermal properties, electronic properties of metals and semiconductors, electric and transport phenomena, magnetic and optical properties.

Language: English
Number of Credits: 4
Semester: Summer
Lecturer: Mgr. Jaroslav Chovan, PhD.

Course: **English for applied informatics**

This module gives students opportunity of improving their language skills using various activities which include reading with understanding, listening, presentation of various informatics themes and creative activities.

Language: English
Number of Credits: 2
Semester: Winter
Lecturer: PaedDr. Ivan Brodenec, PhD.

Course: **Internet 2**

Annotation: This module shows practical use of technologies used to create WebPages (PHP, CSS, MySQL...). Students will be acquainted with PHP scripting language and its use together with database server, they will learn basics of web-design using style sheets and will create their own dynamical home page.

Language: English
Number of Credits: 4
Semester: Winter
Lecturer: PaedDr. Ivan Brodenec, PhD.

Course: **Multimedia**

Annotation: The module includes the basic knowledge of developing multimedia applications and video editing. Different multimedia software tools and video technique equipment are

introduced. Students will create their own multimedia application. A good equipped multimedia classroom and studio is available for an individual work.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: Ing. Dana Horváthová, PhD.

Course: **Programming in C/C++**

Annotation: The module introduces a basic knowledge of programming in language C or C++, for programming exercises the C++ Borland Builder is used. An attention is paid to the object-oriented programming. According to the students' skills and knowledge of the programming and algorithms the more complicated algorithmic and programming problems are included into the module.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: PaedDr. Mgr. Vladimír Siládi, PhD.

Course: **Operating systems 1**

Annotation: The module introduces a theoretical knowledge of principles and multitasking algorithms of operating systems. An attention is paid to the introduction, Operating System Concepts, Processes and Threads, Process Scheduling I, Process Scheduling II, Process/Thread Synchronization, Java Threads, Deadlocks Memory Management, Memory Management II: Paging and Segmentation, File Systems, Input/Output Management.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: Ing. Jarmila Škrinárová, PhD.

Course: **Computer graphics**

Annotation: The module introduces the definition of computer picture and methods of its creation, processing, storing and transmission, both in 2D and 3D graphics. The work with Geographic Information System (GIS). Graphic processors is a part of the exercises and the use of computer graphics in different technical and social areas are demonstrated.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: Mgr. Peter Trhan, PhD.

Course: **Introduction to JAVA**

Annotation: The module introduces JAVA language and some related technologies. Students will develop simple web application.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: Mgr. Michal Vagač, PhD.

Course: **Chemical Informatics**

Annotation: Students learn how to search chemical information on the internet in various available databases. Likewise they get basic knowledge on how to process collected sources

in text editors, spreadsheets (Word, Excel) and how to prepare presentations of their theses. The course is intended mainly for students with chemistry background at the bachelor level. The course evaluation is based on student's activity and the final exam.

Course format: consultations

Assessment methods: oral/written exam

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: RNDr. Miroslav Iliaš, PhD.

Course: **Model Making**

Annotation: The acquirement of the specific knowledge and skills in connection with the base model making vocations for its utilization within the frame of alternative learning matter in subject of Technical education in spare-time activity area.

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: PaedDr. Ján Stebila, PhD.

Course: **Practicum of School Experiments 1**

Annotation: Training and development of experimental skills for future physics (science) teachers, performing/conducting of a large number of incentive/motivational physics school experiments from various fields of physics. Demonstrational experiments, hands-on experiments, exhibited interactive experiments, experiments and our daily life.

Language: English

Number of Credits: 4

Semester: Summer

Lecturer: RNDr. Janka Raganová, PhD.

Course: **Practicum of School Experiments 2**

Annotation: Training and development of experimental skills for future physics (science) teachers, performing/conducting of a large number of incentive/motivational physics school experiments from various fields of physics. Demonstrational experiments, hands-on experiments, exhibited interactive experiments, experiments and our daily life.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: RNDr. Janka Raganová, PhD.

Course: **Foundamentals of Sustainable Development**

Annotation: The course focuses on environmental issues in a globalize contest within the framework of sustainable development and covers the following themes: sustainable development concept and background, Agenda 21, Millennium Development Goals, global events and UN initiatives in sustainability. The ecological, economical and social threats such as biodiversity loss, ozone layer depletion, water, air and soil contamination, waste accumulation, poverty and population growth are overviewed. In addition, the course studies policies in climate change, energy implications and saving. The key role of education for sustainable development is discussed and practical aspects like sustainable water use, sustainable agriculture, greening of economy and methods for selection and monitoring of sustainable development' indicators. The case studies from USA, China, Baltic counties,

Slovakia and Ukraine are considered as representative of the relationship between economic development, environmental protection and social aspects.

Through an interdisciplinary perspective, the course will provide students with key competences and instruments for the analysis of natural and environmental resources in a sustainable perspective and development of policies oriented towards the promotion of sustainability at the local, national and international levels.

Language: English

Number of Credits: 7

Semester: Fall

Lecturer: prof. Valentina V. Pidlisnyuk, Dr.Sc.

Course: **Global Change**

Annotation: Course is highly interdisciplinary, seamlessly crossing disciplinary boundaries and offer a “front-loaded” approach. It is introducing students to the science of the Earth and its living and nonliving systems as well as how humans interact with Earth and its natural systems and how humans can use powerful tools, such as policy and communication to harm or help those systems. It provides a broad understanding of complex issues involved in global change and global sustainability and enables students to use quantitative tools in approaching global change issues. The main expectations are to advance awareness of the magnitude and consequences of global changes and to train the next generation of problem-solvers who will adequately address the phenomena.

Course can be divided on the two main parts:

Part 1. Issues and Driving Forces

Growth and nature of environmental awareness, values and perceptions. Critical issues in current and future environmental change in terrestrial, atmospheric, aquatic and marine systems. Climate change and its impact. The forces driving change including population growth and consumption, resource scarcity, climate, patterns of energy use, ecosystem changes, thresholds and sustainability.

Part 2: Managing the Global Environmental Changes

The nature of environmental changes at various levels, the business perspective, special interest groups, national and international action and co-operation and the formal legal framework, and how the above are mediated by cross-cutting dimensions of a legal, economic, cultural and ecological nature.

Students have to be prepared for a stimulating and challenging journey filled with new concepts, theories, problems, and experiences.

Language: English

Number of Credits: 7

Semester: Spring

Lecturer: prof. Valentina V. Pidlisnyuk, Dr.Sc.

Course: **Water Management**

Annotation: Course is focused on the global and regional aspects of water policy&management and challenges arise. It is intended to give students the current knowledge about situation with water status, water use in the different spheres, and access to water. Main pieces of the EU legislation in the field of water policy and management are deeply overviewed, i.e. EU Water Framework Directive, EU Directive on the Assessment and Management of Flood Risk and Carpathian Convention. Questions about water quality, water ability, water stress and water management strategy are covered as well as impact of climate change to water resources and quality. Case studies regarding implementation of European water legislation for selected river Basins are presented.

Language: English

Number of Credits: 4

Semester: Spring

Lecturer: prof. Valentina V. Pidlisnyuk, Dr.Sc., Ing.Marek Drimal, PhD.

Course: **Software Maintenance**

Annotation: This lecture deals with the maintenance of software and covers all activities necessary after the delivery of a program. We understand by the term 'software maintenance' not only the correction of errors discovered by users, but also the extension and adaption of a program. Software maintenance is one of the most important interdisciplinary fields in Software Engineering. A good deal of the total budget of software engineering companies is absorbed by software maintenance activities.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: Safeeullah Soomro PhD.

Course: **Compiler Construction**

Annotation: This course will discuss the major ideas used today in the implementation of programming language compilers. You will learn how a program written in a high-level language designed for humans is systematically translated into a program written in low-level assembly more suited to machines!.

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: Safeeullah Soomro PhD.

Course: **Object oriented Programming in JAVa**

Annotation: The module introduces JAVA language and fundamentals of programs. Also gain knowledge of object oriented concepts during course duration with practicals..

Language: English

Number of Credits: 4

Semester: Winter

Lecturer: Safeeullah Soomro PhD.