Courses taught in foreign languages in academic year 2024/25

CONTENT

* individually offered course

Faculty/Institute:	**Faculty of Environment**
Course title:	***Sustainable Erasmus Mobility***
Course code:	KZP/0SEM0
ECTS:	8
Level of course:	bachelor / master
Teacher:	Mgr. Miloslav Kolenatý
Term:	winter / summer
Language of instruction:	English
Lectures/tutorials:	0/2 per week
Completion:	a written report, a presentation of sustainable activities and practices
Course goal:	Learning about and implementing sustainable activities and practices within an Erasmus stay
Abstract:	A practical course which deals with activities and practices supporting the environmental and social sustainability of Erasmus mobilities and decreasing one's ecological/carbon footprint. The course encourages students to make conscious, informed and sustainable choices, mainly in the following areas: - travel - digitalization and technology - consumer habits - food - litter & waste (recycling, composting etc.) - pollution - energy consumption - biodiversity conservation - physical and mental health, resilience - global citizenship - local economy development - social commitment - community strengthening The course includes instructional meetings, tutorials and students' presentations of how they managed to make their Erasmus stay as sustainable as possible.

Faculty/Institute:	**Faculty of Environment**
Course title:	***Valuation and Pricing of Natural Resources***
Course code:	KZP / 0HOPZ
ECTS:	8
Level of course:	bachelor
Teacher:	Doc. Ing. Seják Josef, CSc.
Term:	winter, summer
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	written test + spoken exam
Course goal:	Introducing the history of natural resource pricing within the economic theory development.
Abstract:	History of natural resource pricing within the economic theory development. Valuation of market and non-market natural resources (ecosystems). Neoclassical methods based on the concept of willingness to pay or willingness to accept. Expert methods based on valuing the ecological functions of ecosystems. Selected case studies. 1. Introduction, Importance of natural resource and ecosystem 2. valuations. The practice of environmental expert witnesses. 3. History of natural resource valuations, Time factor, Cost-benefit analysis. 4. Basic estimations of natural resource price. Formulas for basic natural resource types. 5. Land valuations (admin. and market prices, price information system, price maps) 6. Valuation methods of ecosystem functions and services. Preferential and expert methods. 7. Case studies in contingent valuations in environmental quality change. 8. Biotope valuation method (BVM) in the CR. 9. Case studies in BVM. 10. Ecosystem services and their valuations. 11. Externalities and public goods. 12. Property rights and nature protection. 13. Valuations in integrated forest functions. 14. Pricing of water and water flows in landscape. 15. Seminar works and their assessment.

Faculty/Institute:	**Faculty of Environment**
Course title:	***Ecological Economics***
Course code:	KZP / 0EKEK
ECTS:	8
Level of course:	bachelor
Teacher:	Doc. Ing. Seják Josef, CSc.
Term:	winter, summer
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	Exam/written test
Course goal:	This transdisciplinary course introduces students into the general interactions among economics, economy and natural environment, brings students to the interface of natural sciences and social sciences. Gives basic knowledge about the decision-making processes in frame of the environmental dimension with help of economic instruments and environmental values.
Abstract:	1. Earth and Life history; Energy Flows, Thermodynamics and Life 2. A Short History of Economic Thinking and Doing 3. Ecological Economics as an Integration of Economic System into Ecological System of Biosphere 4. Sustainable Development Principles and Philosophy 5. Valuing Natural Resources and Ecosystem Services 6. Market Failure and Internalization of Externalities 7. Human Behaviour and Economics 8. Macroeconomic Concepts: GNP, GDI, ISEW 9. Economic Instruments and Environm. Adjusted Cost Benefit Analyses 10. Green Taxes, Limits and Commands, Tradable Permits 11. Sustainable Scale, Just Distribution, Efficient Allocation 12. Environmental Dimension of Global Economy 13. Short Essay and Its Discussion.

Faculty/Institute:	**Faculty of Environment**
Course title:	***Drought and flood protection***
Course code:	KZP/0DAFP
ECTS:	4
Level of course:	bachelor / master
Teacher:	Mgr. Richard Grünwald, Ph.D.,
Term:	winter
Language of instruction:	English
Lectures/exercises:	2/2 per week
Completion:	Exam + team work
Course goal:	The course is designed as a comprehensive insight into drought and flood protection. Students will acquire basic overview of flood-drought prevention and learn how to adress contemporary water challenges. Special attention will be paid to the adaptive water governance and unintended consequences of flood-drought management. During the course, students will prepare a joint working project and discuss contemporary water challenges on various case studies to deepen their existing water knowledge.
Abstract:	1. Flood-drought management (introduction of the contemporary water insecurities, selection of the joint working projects) 2. Water resources development (water organizations, grey and green infrastructure, and other water practices) 3. Theory of water scarcity and abundance (types of assessments and indexes, approaches and unintended consequences) 4. Adaptive water governance (actors, code of conduct, flood-drought plans, limits and challenges) 5. Disaster Risk Reduction (vulnerability, resilience, sustainable development, integrated water resources development) 6. Water citizen science (River Chiefs in China, Tai Baan science, popularization of water science, challenges) 7. Czech flood in 2002 (history, assessment, conflict resolution, consequences) 8. Xe-Pian Xe-Namnoy dam collapsed in 2018 (history, assessment, conflict resolution, consequences) 9. Uttarakhand flood in 2021 (history, assessment, conflict resolution, consequences) 10. South-North Water Transfer Project in China in 2002 (history, assessment, conflict resolution, consequences) 11. Danube-Oder-Elbe Canal in 2023 (history, assessment, conflict resolution, consequences) 12. Děčín Weir in 2023 (history, assessment, conflict resolution, consequences)

Faculty/Institute:	**Faculty of Environment**
Course title:	***Environmental English***
Course code:	KZP/0ENEN
ECTS:	8
Level of course:	bachelor / master
Teacher:	Mgr. Miloslav Kolenatý
Term:	winter, summer
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	Successful completion (70%) of two tests. Participation in seminars - at least 75% (for full-time studies). Elaboration of a seminar paper: - scope of work is one A4 page - the task of the seminar work is to create an English text - a description of the animal or plant species chosen by the student (in printed form or send in electronic form to the address: miloslav.kolenaty@ujep.cz
Course goal:	Developing basic communication skills and current knowledge of English grammar. Work with professional English text (written and spoken). English technical terminology related to environmental protection. Language resources used in professional texts. Study of thematic areas corresponding to the professional focus. Development of communication skills (written and oral) with a focus on basic topics of environmental protection. The seminars are focused on working with materials intended for the topics prescribed for credit tests and the oral exam, 3 working materials (worksheets) are prepared for each topic. There are 4 topics for each semester. Improving communicative skills (writing and speaking, above all) focusing on the topics connected to the professional orientation.
Abstract:	Winter semester 1. Ecology Basics 2. Earth Science 3. Wildlife 4. Using the land Summer semestr 5. Pollution 6. Waste 7. Energy 8. The Environment of the Czech Republic

Faculty/Institute:	**Faculty of Environment**
Course title:	***Subterranean Habitats***
Course code:	KZP/0CAEC
ECTS:	6
Level of course:	bachelor
Teacher:	Mgr. Michal Holec, Ph.D.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	0/2 per week
Completion:	Two field trips - Seminar work
Course goal:	Introducing the definition and classification of caves and organisms occupied this ecosystem.
Abstract:	Course covering definition and classification of caves and organisms occupying cave habitats. Caves as a unique ecosystem. Providing basic information about other important underground ecosystems (e.g. debris stones, artificial mining galleries). The course includes visits of caves, artificial mining galleries and debris stones and examples of cave investigation methods. The course is focused on the caves in Northern Bohemia.

Faculty/Institute:	**Faculty of Environment**
Course title:	***Advanced Separation Methods in Environmental Analysis: a practical course***
Course code:	KECHT/0EPME
ECTS:	10
Level of course:	bachelor
Teacher:	Prof. Ing. Pavel Janoš, CSc., Doc. Dr. Ing. Pavel Kuráň
Term:	winter, summer
Language of instruction:	English
Lectures/exercises:	0/2 per week, limit 10 students – first come, first served
Completion:	Laboratory work - Seminar paper
Course goal:	Managing the practical application of chromatographic techniques (GC, HPLC) for the determination of pollutants in the environment.
Abstract:	Practical training in application of chromatographic techniques (GC, HPLC) for the determination of selected organic pollutants in environmental samples, including methods of preconcentration and sample pretreatment (extraction, etc.). Special requirements: basic knowledge of principles of analytical chemistry and laboratory skill are presupposed.

Faculty/Institute:	**Faculty of Environment**
Course title:	***Environmental Drainage Systems***
Course code:	KZP/0EDSY
ECTS:	8
Level of course:	bachelor / master
Teacher:	doc. Ing. Jakub Štibinger, CSc.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	exam
Course goal:	To introduce the basic principles of drainage processes and environmental drainage policy, with focusing on land, structures and water regime protection
Abstract:	Subject "Environmental Drainage Systems" is focused to present to the students the basic principles and applications of drainage policy. Also environmental or sustainable drainage processes will be presented and explained. The students will be explained with modified hydraulics methods with Darcy's Law and equation of continuity, which are necessary for design, verifications and estimations drainage and environmental drainage systems, especially to determining of the basic design parameters of drainage. Rural Sustainable Drainage System (RSuDS) with Sustainable Urban Drainage System (SUDS) for mitigation of negative impact of climate dynamics (heavy rains, floods, long term droughts) in the landscape (RSuDS) and in urban areas (SUDS) will be introduced. The findings from the soil hydrology area will be fully used. Exemplary case studies from Czech Republic, Netherlands, Egypt and Taiwan will be discussed.

Faculty/Institute	**Faculty of the Environment**
Course title:	***Politics of the Environment***
Course code:	KZP/0POE
ECTS:	8
Level of course:	bachelor / master
Teacher:	Mgr. Richard Grünwald, Ph.D.,
Term:	Winter, summer
Language of instruction:	English
Lectures/exercises:	0/2 per week
Completion:	exam, grade or pass/no pass
Course goal:	Understanding the political process that influences the development of environmental problems in a particular country and globally. Students will acquire background knowledge on the most pressing global environmental issues, environmental history and international environmental relations. Students will develop skills and competences to analyze a particular environmental problem, stake-holder interests, and the associated political cycle, and offer solutions related to the issue.
Abstract:	The course will inquire into environmental political thought, policy and action. Students will explore the relationship between the „green thought" and other worldviews. The course will survey the development of green parties and the development of mainstream and radical environmental movements. We will observe the response of established political parties and systems to the current environmental challenges. Students will get introduced to public policy-making at international, EU, national and local levels. We will consider examples from Europe, U.S.A, as well as from authoritarian countries. The class should inspire interest and an active involvement in environmental conservation.

Faculty/Institute:	**Faculty of Environment**
Course title:	***Forest Oecology***
Course code:	KZP/0FOEC
ECTS:	8
Level of course:	bachelor / master
Teacher:	Mgr. Ing. Jiří Lehejček, Ph.D.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	exam
Course goal:	Description of the forest oecosystem, principles of oecological stability and natural forest dynamics. Introduction into ways of forest sustainable management and production.
Abstract:	1. Oecology, natural dynamics, environmental impact and management of Central European forests. 2. Fytogeographical and socio-economic determinants of forest management. 3. Basic management rules and certification schemes in forests of the Czech Republic. 4. Forest environmental effects and the methods of its valuation. 5. Main abiotic and biotic agens which form forest management and protection. 6. Impact of industrial pollution on forests of the Erzgebirge Mountains.

Faculty/Institute:	**Faculty of Environment**
Course title:	***Contemporary Environmental Challenges***
Course code:	KZP/0CECH
ECTS:	3
Level of course:	bachelor
Teacher:	Mgr. Ing. Miloslav Kolenatý, Mgr. Kateřina Marková, Ph.D., Ing. Jitka Tolaszová, Ph.D.,
Term:	summer
Language of instruction:	English
Lectures/exercises:	0/2 per week
Completion:	Presentation in English
Course goal:	The seminars focus on discussing current environmental issues, their possible solutions, and the role of individuals/students in addressing them. The course will serve as a complementary synthesis to specialized subjects, enabling discussion and personal insights in the English language. The seminars also include working with English vocabulary related to the topics (keywords).
Abstract:	1. Introduction to Contemporary Environmental Issues and Challenges 2. The Anthropocene and Sustainable Development 3. Climate Changes 4. Wildlife 5. Energy 6. Globalization 7. Carbon Footprint 8. Pollution 9. Waste 10. Urbanization 11. Soil, Droughts and Floods 12. War Yesterday, Today and Tomorrow 13. Final seminar: student presetations

Faculty/Institute:	**Faculty of Environment**
Course title:	***General Economics***
Course code:	KZP/0ECNE
ECTS:	8
Level of course:	bachelor
Teacher:	Ing. Jakub Vosátka, Ph.D.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	2 per week
Completion:	exam
Course goal:	Introducing the basics of economic science.
Abstract:	The General economics course is a first-level introduction to the economic science. Students learn to understand causes and impacts of basic economic phenomena on economic reality. The course consists of the two parts. The first part is focused at microeconomics, where students get acquainted with the behaviour of basic market agents, i.e. households and firms. The second part of the course is focused on the macroeconomic issues, considering the economic role of the state from viewpoints of different economic schools when facing such economic phenomena as inflation, unemployment, international trade, and so on.

Faculty/Institute:	**Faculty of Environment**
Course title:	***Environmental Microbiology***
Course code:	KECHT/0ENMI
ECTS:	8
Level of course:	bachelor
Teacher:	doc. Ing. Josef Trögl, Ph.D.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	written credit test
Course goal:	Introduction to microbiology with focus on the roles of microorganisms in the environment and their application
Abstract:	The first part of the course presents introduction into general microbiology (evolution and taxonomy, cell structure, proliferation, metabolism, genetics, physiology). The second part is focused on microorganisms in the environment, their relation to other organisms (competition, important symbioses), ecological factors affecting their distribution and their main roles in the environmental processes. The third part is focused on environmental applications of microorganisms (waste-water treatment, bioremediation, waste decomposition, biosensing…). 1. Introduction to general microbiology, evolution and taxonomy 2. Cytology and morphology of microorganisms 3. Proliferation of microorganism, growth curve 4. Introduction to microbial metabolism 5. Introduction to microbial genetics 6. Introduction to microbial physiology 7. Environmental microbiology 1 – ecology, strategies, roles, competition 8. Environmental microbiology 2 – microorganisms in soil and air 9. Environmental microbiology 3 – microorganisms is water 10. Environmental biotechnology 1 – biodegradation and bioremediation of pollutants, biosensing 11. Environmental biotechnology 2 – waste-water treatment, waste decomposition 12. Environmental biotechnology 3 – alternatives to chemical technologies (biofuels, bioplastics) 13. Research and development in the field, future perspectives

Faculty/Institute:	**Faculty of Environment**
Course title:	***Laboratories in Environmental Microbiology***
Course code:	KECHT/0LENM
ECTS:	8
Level of course:	bachelor
Teacher:	doc. Ing. Josef Trögl, Ph.D., Mgr. Diana Holcová, Ph.D.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	3 blocks of 4 hours
Completion:	written credit test
Course goal:	Introduction to laboratory techniques in environmental microbiology
Abstract:	The course introduces into basic laboratory techniques in general and environmental microbiology. No previous laboratory experience is required. Students shall bring their own sample of natural water (1 L) and soil (~50 g). Block 1 – Introduction to safety in laboratory, introduction to sterile work, preparation of used media, and sterilization of used material. Block 2 – Basic cultivation techniques, culture determination of bacteria in water sample, effect of UV on bacteria, bacterial growth-inhibition assay. Block 3 – Introduction to microscopy, Gram staining of bacteria, microscopy of water microorganisms, determination of phosphatase activity in soil, evaluation of data

Faculty/Institute:	**Faculty of Environment**
Course title:	***Geographic Information Systems and 3D modeling***
Course code:	KGI/0GIMD
ECTS:	8
Level of course:	bachelor / master
Teacher:	Ing. Jan Pacina, Ph.D.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	0/2 per week
Completion:	practical exam / written credit test
Course goal:	Introducing GIS and image-based 3D modeling
Abstract:	GIS has a leading role in analyzing the environment based on spatial data, maps and aerial images. This course will introduce basics of GIS (data collection, visualization and analysis), web-mapping applications, aerial image processing and 3D models creation. 1. Basics of GIS – data visualization 2. Map compositions 3. Data going online – web mapping applications 4. How to collect data with your smart-phone? 5. Data collection using precise GPS 6. Image based 3D modeling – create your house, car or head in 3D 7. Aerial image processing (images from aircrafts and drones) 8. Let's fly it up – data collection with UAVs (drones)

Faculty/Institute	**Faculty of the Environment**
Course title:	***Climate Change: adaptation and mitigation measures***
Course code:	KECHT/0CLCH
ECTS:	8
Level of course:	bachelor / master
Teacher:	Professor Valentina Pidlisnyuk, Dr.Sc.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	7 lectures, 3 exercises, home reading, project, test
Course goal:	This multidisciplinary course will introduce broad diverse perspectives on global climate change. It will train students how do we adapt to the negative impacts of climate change, how we can mitigate it, how climate actions may be planned and financed, and how the climate negotiation work. The course will make students prepared to address effectively and adequately to the current climate change challenges arise.
Abstract:	The course will provide a survey of key aspects of the problem. Topics include main reasons of the climate change and impacts, current prognosis for climate modeling, ecological impacts and feedbacks, international climate policies, and social and environmental justice. Main background document: Paris Agreement and A European Green Deal will be deeply analyzed. Other topics include response of EU countries toward implementation of 2030 climate&energy framework with stress on the carbon market, cutting the greenhouse gas emission, increasing energy efficiency and renewable energy share, greening of industry, implementation of circular economy and value chain policy, contributing to the achievement of the Sustainable Development Goals. The course includes lecturing by primary instructor and guest lecturers, providing an overview of the complex and inter-related nature of global climate change. During the course students will be obligated to review the web-page on Climate Change's impact, to write a position paper based on the article on Climate Change's issue, and to participate in Conflict resolution game related to mitigation action of Climate Change. A home reading is included into the course. The course will culminate in a project based on finding solutions to the real problem of climate change selected by students based on own concern and background. Students will be required to take a leadership role in bridging the multiple disciplines knowledge to accomplish the course.
Literature	Pidlisnyuk V., 2021 (Ed). Key Questions on Climate Change and Sustainability. Towards the Make-or-Break Years, Printeko, Ukraine,139 pp. Erickson L. and Brase G., 2020. Reducing greenhouse gas emissions and improving air quality. CRC Press, Taylor &Francis Group, 157 pp. Erickson L. E. and Pidlisnyuk V. (Eds.), 2021. Phytotechnology with Biomass Production: Sustainable management of contaminated sites. CRC Press, Taylor &Francis Group, 240 pp. Barber L., Israel R., 2017. A Checkup of country efforts to implement the Paris Agreement. In the Leading greenhouse gas emitting countries, 33 pages. Brawn L.R., 2011. World on the Edge, Earth Policy Institute, WWNorton Company, New York- London, 174 pages. Guides to support implementation of the Paris Agreement, 2017. Part One: Supporting access to finance for Climate Action. Part Two: Towards Green Climate Fund Accreditation and Support. Part Three: Integrating Climate Action into national development planning- Coherent implementation of the Paris Agreement and Agenda 2030. SIDA. Available at : www.sida.se Sustainable Development in the European Union. Monitoring report on progress towards the SDGs in an EU context, 2020. -366 pages.

Faculty/Institute	**Faculty of the Environment**
Course title:	***Global Environmental Change***
Course code:	KECHT/0GECH
ECTS:	8
Level of course:	bachelor / master
Teacher:	Professor Valentyna Pidlisniuk, Dr.Sc.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	3/0 per week
Completion:	9 lectures (in person and remote), Guest lecture (University of Arizona, USA) ; 3 exercises (web-page analysis; home reading and essay, conflict resolution game), final presentation, test
Course goal:	Course is highly interdisciplinary, seamlessly crossing disciplinary boundaries and offer a "front-loaded" approach. It is introducing students to the science of the Earth 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. 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.
Abstract:	Course consists of 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. The formal legal framework. How the above are mediated by crosscutting dimensions of a legal, economic, cultural and ecological nature. Case-studies on mitigation and adaptation measures in CC are presented. Guest lecture will be provided by professor Octavian Trujillo, University of Arizona, USA about service to communities in environmental matters and adaptation/mitigations measures. Students have to be prepared for a stimulating and challenging journey filled with new concepts, theories, problems, and experiences.
Literature	• Lesly Brawn, World on the Edge, 2011.Earth Policy Institute, USA,174 pp. • Class Book "Key Questions on Climate Change and Sustainability: Towards the Make-or-Break Years", 2021. Edited by Valentina Pidlisnyuk, supported by NATO SPS MYP G4687. Publisher: Printeko, Kyiv, Ukraine, 139 pp. ISBN 978-617-7876-38-9 • Class Book. The Strategy of Sustainable Development and Climate Change, 2013. Edited by Valentina Pidlisnyuk. Pidlisnyuk V., Zagirnyak M., Jilkova J., Publisher Shcherbatykh A.V., Ukraine, 2013.- 224 pp. ISBN 978-617-639-036-7 (in Ukrainian; abstract- in English). • Paris Agreement and related documents

Faculty/Institute	**Faculty of the Environment**
Course title:	***Sustainable Management of Contaminated Sites***
Course code:	KECHT/0SMCS
ECTS:	8
Level of course:	master / PhD
Teachers:	Leader: Professor Valentina Pidlisnyuk, Dr.Sc. Lecturer: Associate Professor Josef Trogl
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	Lectures and Guest lectures, practical exercises; Home-reading and informal discussion; field trips; final presentation; test
Course goal:	Course introduce an integrative project-oriented capstone "bringing" opportunity and is based at the International experiences in sustainable management of diverse contaminated sites: industrial, military, agricultural and abandoned. Graduates of the course will be well poised to successfully lead in developing and implementation multifaceted solutions to environmental, societal and other cross-sectors problems connected with polluted regions. They will be skilled in determination the contaminated sites, their analysis and selection of the techniques applied for the proper management depending by multivariate factors.
Abstract:	Sustainable management of contaminated sites implies application of sustainable practices to the categories of polluted industrial, military, agricultural and abandoned sites by operation them in a way that will guarantee the achievement of the current needs and taking into account the future generation wellbeing. The application of the circular economy and estimation of the value chain of the products by the LCA and LCC approaches will be ensured. Courses includes formal lectures on targeted topics, home reading with group's discussions, and practical exercises, including participation in the field research in the international project. Lectures cover the following topics: "Principles of environmental sustainability", "Introduction to the different remediation techniques», «Plant used in phytoremediation", "Plant resistance mechanism"; "Phytotechnology for differently contaminated sites". Case-studied will be overviewed within the course by the Guest lecturers, i.e.:"Phytoremediation of the metal contaminated military sites with biomass production: project NATO SPS MYP", " "Indian case study on bioremediation of oil spills", project of Superfund; "Case study on Metaleurope site, France"; "Bioproducts from biomass produced at the marginal land: project CORNET". Course includes a field trip to the marginal post-mining site in the North Bohemia. Course will be finalized by the final student's presentation and test.

Faculty/Institute	**Faculty of the Environment**
Course title:	***GIS Project***
Course code:	KGI/0GISP
ECTS:	4
Level of course:	bachelor
Teacher:	Mgr. Martin Dolejš, Ph.D.
Term:	summer
Language of instruction:	English
Lectures/exercises:	0/2 per week
Completion:	Attendance at exercises. Semester work with defense (theoretical topics) in English. Semester project (case study from practice) in English.
Course goal:	The course focuses on the comprehensive solution of a joint project in GIS within a problem-solving team. Students learn both independent work and teamwork. They work on a thematic (problem-oriented) task directed towards various aspects of the human environment (ecological, social, economic, or cultural issues), independently acquiring, processing, analyzing, and interpreting data. Consultations on projects take place during seminars, and individual problems arising from the implementation of GIS issues into practice are solved. Individuals or small teams create a report based on their own work (data processing, etc.), which they present to others in English at the end of the semester.
Abstract:	Theoretical part: 1. Introduction to the subject 2. Issues of large-scale projects in GIS practice 3. Concept creation 4. Editorial guidelines 5. Work in the main team or smaller teams - activity checks, ensuring consistency of work 6. Consultation with experts (ecologists, geographers, economists, etc.) 7. Project schedule 8. Field research - working with data sources Practical part: 1. Processing of the individual project part in English and its report 2. Presentation in English at the end of the semester.

Faculty/Institute	**Faculty of the Environment**
Course title:	***Environmental Humanities***
Course code:	KZP/ 0ENHU
ECTS:	8
Level of course:	bachelor
Teacher:	Mgr. at Mgr. Kateřina Marková, Ph.D.
Term:	winter / summer
Language of instruction:	English
Lectures/exercises:	0/2 per week
Completion:	essay /oral exam
Course goal:	Introducing basic English environmental humanities terms and skills, focusing on general aspects and specific environmental problems.
Abstract:	The course is terminated with a short essay followed by an oral examination. Dealing with scientific texts in English (spoken and written). English terminology connected to the studied subject. Language items used in scientific texts. Dealing with topics covering the professional orientation. Improving communicative skills (writing and speaking, above all) focusing on the topics connected to the professional orientation in environmental humanities. 1. Welcome to the Czech Republic 2. Environment and Ecology - Sustainable development 3. Earth Sciences and Humanities (sciences) – (philosophy, psychology, cultural anthropology…). 4. Wildlife (Natura) X Culture 5. Using the land – culture (using the land) 6. Philosophy of environmental education

Faculty/Institute	**Faculty of the Environment**
Course title:	***Remote sensing of environment***
Course code:	KGI/0RSOE
ECTS:	4
Level of course:	master
Teacher:	Ing. Vladimír Brůna, Mgr. Jana Müllerová, Ph.D.,
Term:	summer
Language of instruction:	English
Lectures/exercises:	0/2 per week
Course goal:	The course will introduce various remote sensing applications for natural resources management and environmental sciences. Students will learn how to apply remote sensing data and techniques to different environmental problems (defining a research problem, choosing and processing relevant remotely sensed and ancillary data, and synthesizing the results). The course will be organized as a series of lectures providing real-world examples from different fields of environmental applications of remote sensing techniques.
Abstract:	The topics will include: 1. Land cover change, land management. 2. Urban sprawl. 3. Nature conservation. 4. Landscape planning and recreation management. 5. Archeology. 6. Vegetation monitoring (biodiversity, seasonal variations). 7. Forestry (stand structure assessment using lidar and photogrammetric point cloud, deforestation, insect outbreaks). 8. Precision agriculture. 9. Geology. 10. Water resource management. 11. Disaster management (damage assessment and disaster risk mapping, wildfires, flooding). 12. Climate change context (glacier melting and temperature raising). 13. Recreation management.

Faculty/Institute	**Faculty of the Environment**
Course title:	***Management of Small-Scale Protected Areas***
Course code:	KZP/0MSSA
ECTS:	3
Level of course:	master
Teacher:	Ing. Eliška Wildová, Ph.D.
Term:	winter
Language of instruction:	English
Lectures/exercises:	0/2 per week
Completion:	Written test. Presentation in English.
Course goal:	The aim the course is to develop knowledge from the area of management of small-scale protected areas and, at the same time, to practice professional English vocabulary. The course is of interdisciplinary nature, however, it emphasizes social-science approaches to the management of protected areas. Organizational and economic aspects of management of protected areas will be inspected. The course maps also the instruments of environmental policy related to nature and landscape conservation, specifically to protection of biodiversity. Nature reserves, natural monuments and other small-scale protected areas - an introduction. Small-scale protected areas in the Czech Republic, Europe and around the world. Protected values. General goals of protected areas.
Abstract:	1. Selected small-scale protected areas in the Czech Republic and Europe. Nature reserves and natural monuments inNorth Bohemia. Categories of small-scale protected areas. 2. Financing and administration of small-scale protected areas in the Czech Republic and abroad. Public financial sources. Protected areas on private lands. Private protected areas and protected areas managed by NGO´s. 3. European biodiversity conservation and landscape protection. European Landscape Convention. Green Infrastructure. 4. Natura 2000 system. Principles and practices of Natura 2000 localities. Legislation. Priority habitats. Monitoring and reporting. 5. Nature and landscape restoration efforts. Restoration of mires and wet grasslands. Restoration of rivers and floodplains. 6. Environmental policy instruments and land-based biodiversity conservation. Typology of environmental policy instruments of nature conservation and landscape protection. Legal regulation and economic instruments. 7. Agri-environmental measures and their significance in biodiversity conservation. Agricultural land ecosystems. Sustainable and organic agriculture. Protected areas on agricultural land. EU and national subsidies. 8. Forest-environmental measures, other forestry subsidies and their significance in biodiversity conservation. Forest land ecosystems. Sustainable forestry. Protected areas on forest land. EU and national subsidies. 9. Law enforcement and program evaluation. Impact and enforcement of legal regulation. Evaluation of efficiency of public expense programs. 10. Legal regulation and economic instruments of nature conservation and landscape protection in European countries and in North America. Selected cases from various European countries and from English-speaking North America. 11. A fieldtrip to a small-scale protected area in North Bohemia or in Saxony.

Faculty/Institute	**Faculty of the Environment**
Course title:	***Management of Large-Scale Protected Area***
Course code:	KZP/0MLSA
ECTS:	3
Level of course:	master
Teacher:	Ing. Eliška Wildová, Ph.D.
Term:	summer
Language of instruction:	English
Lectures/exercises:	0/2 per week
Completion:	Written test. Presentation in English.
Course goal:	The aim the course is to develop knowledge from the area of management of large-scale protected areas and, at the same time, to practice professional English vocabulary. The course is of interdisciplinary nature; however, it emphasizes social-science approaches to the management of protected areas. Organizational and economic aspects of management of protected areas will be inspected.
Abstract:	1. National parks (NP), protected landcapes (PLA), and other large-scale protected areas: an introduction. Geographic overview of large-scale protected areas in the Czech Republic, Europe and around the world. Protected values. 2. Categories of protected areas. 3. Financing of national parks and protected landscape areas in the Czech Republic and abroad. Financial sources for NP and PLA from the public budget. Own financial resources of protected areas. The use of public financial sources by other subjects on the territory of NP and PLA. 4. Organisational structure and personnel management of national parks and protected landscapes. Organisational departments. Employees´ skills/education. Personnel management. 5. Strategy and planning of national parks and protected landscapes. Strategic and conceptual documents. Types of protected area management plans 6. Protected area management plan. Setting of goals and objectives. Tourism management plans and business management plans. 7. Tourism and visitor management. Impacts of visitor use. Assistance to visitors and ecologically sustainable visitor use. 8. Political environment and management of national parks and protected landscape areas. Sectoral and local policies. Interest and lobby groups. Nongovernmental non-profit organisations (NGO´s. Law enforcement. 9. Business activities in national parks and protected landscape areas. Opportunities and limits of private business activities in NP and PLA. Agriculture and forestry. Hard and soft recreation, agrotourism and ecotourism. 10. Public relations. Public image of NP and PLA. Environmental education and interpretation. Media management. 11. Evaluation of work of NP and PLA administrations. Economic efficiency and environmental effectiveness of measures - result and impact indicators. International standardization and comparison (IUCN, etc.). 12. International cooperation and inspiration in management of large-scale protected areas. European union, U.S.A, and Visegrad countries. Natura 2000. 13. A students´ field trip to a national park (or a protected landscape).

Faculty/Institute	**Faculty of the Environment**
Course title:	***Management of Ecosystems***
Course code:	KZP/0MAEC
ECTS:	6
Level of course:	master
Teacher:	prof. doc. RNDr. Michal Hejcman, Ph.D.
Term:	summer
Language of instruction:	English
Lectures/exercises:	2/2 per week + excursion
Course goal:	The possibilities of conservation, management, use and restoration of forest and non-forest ecosystems will be discussed in detail within the subject. The course will focus on legislative framework of the issue as well as practical approaches and examples of good practice. Special attention will be paid to the ecosystem in the SPA.
Abstract:	1. Forest vegetation stages, hydric series, trophic series and dynamics of Central European forests in vegetation stages. 2. Disturbance and the use of their creative power in the management of forest ecosystems. 3. Forest cultivation and possibilities of its regeneration 4. Possibilities of forest in climate change mitigation and its adaptation to climate change and strengthening of landscape resilience 5. Management of tropical and subtropical forest ecosystems, their protection and importance for climate and biodiversity 6. Management of boreal forest ecosystems and the northern tundra, their protection and importance for climate and biodiversity 7. Management of savanna ecosystems - examples of fire dynamics in interaction with animal grazing in Africa 8. Grassland management in Europe - grazing versus mowing and the impact on diversity 9. Weed communities on arable land - an overview of the main weed species and methods of their control 10. Use of pesticides in ecosystem management 11. Management of mountain ecosystems - examples from the Giant Mountains, Alps and Himalayas, transhumance 12. Nutrient cycle in ecosystems and their influence by humans - nitrogen, phosphorus and potassium cycles 13. Major natural disasters and their impact on ecosystems and their management - volcanic eruptions, the bottle neck effect

Faculty/Institute	**Faculty of the Environment**
Course title:	***Bioremediation and phytoremediation***
Course code:	KECHT/0BIPH
ECTS:	4
Level of course:	master
Teacher:	Karim Al Souki, Ph.D., prof. Valentyna Pidlisniuk, DrSc., doc. Ing. Josef Trögl, Ph.D.
Term:	winter
Language of instruction:	English
Lectures/exercises:	2/2 per week
Course goal:	The course presents an overview of methods and their background of biological elimination of pollution from soils and water. Excursion to real-field applications will be included. Biotechnology course is a prerequisite for this course.

Faculty/Institute	**Faculty of the Environment**
Course title:	***Chemistry and Physics of Materials in Environmental and Sustainable Technologies***
Course code:	KECHT/0CPME
ECTS:	6
Level of course:	master
Teacher:	Ing. Daniel Bůžek, Ph.D., doc. Ing. Jiří Orava, Ph.D., Ing. Tadeáš Riley Wangle, Ph.D.,
Term:	winter
Language of instruction:	English
Lectures/exercises:	0/2 per week
Course goal:	The course implements an innovative approach of reverse class and brainstorming. Students are encouraged to actively participate in emerging topics concerning chemistry and physics of new materials, environmental and green chemistry, the principle of sustainable technologies and circular economy. The focus is on discussing energy- and cost-efficient materials with new advanced functionalities; how to greatly reduce the amount of material demanded in modern technologies; and how to make materials with defined properties to meet everyone's individual needs. Students will learn about different scientific aspects of sustainability, renewability, and recycling. They will gain the knowledge of physics and chemistry of modern materials, how they are made, used, and applied to reduce the impact of the current lifestyle. At the end of the course, students should have an appreciation for innovative material design and new chemical approaches as an additional tool for reducing environmental impact, and they should be able to choose materials, chemical processes, and technologies according to multiple criteria.
Abstract:	Below, we show a list of possible topics to be covered in the course. Yet, the list is mostly a guideline, and the content of the course will be updated annually to reflect new trends and challenges of emerging materials being developed. 1. History of materials - important aspects and milestones of human discoveries 2. Summary of fundamental processes such as sorption, catalysis, oxidation, reduction and their kinetics, isothermal sorption etc. 3. Fundamental properties of materials - thermal, electrical, mechanical, ultra-high-temperature, ultra-high-pressure etc. 4. Overview of experimental techniques used to characterize materials 5. Nature's selection of materials 6. Materials by design: Bulks vs thin films vs nanomaterials - deposition techniques, tuning physico-chemical properties on-demand by controlling the material's atomic structure 7. Photoinduced processes, photocatalysts, and photosensitisers in environmental applications 8. New types of materials (natural materials, oxides, hybrid etc.) in environmental applications 9. Materials for renewable energies 10. Balancing safety and energy recovery in nuclear power - materials and technology approach; radiation-resistant (non)-crystalline materials 11. Using less material by design - modern structural materials, additive manufacturing and other novel manufacturing techniques 12. Recycling materials - green-chemistry approaches, design for recycling, the energy costs and environmental impact of various processes

Faculty/Institute	**Faculty of the Environment**
Course title:	***Environmental biotechnology***
Course code:	KECHT/0ENBI
ECTS:	5
Level of course:	master
Teacher:	Karim Al Souki, Ph.D., Mgr. Jakub Ederer, Ph.D., prof. Valentyna Pidlisniuk, DrSc., doc. Ing. Josef Trögl, Ph.D.,
Term:	winter
Language of instruction:	English
Lectures/exercises:	2/2 per week
Completion:	Written test. Oral examination.
Course goal:	The aim of the course is to provide students with sufficient knowledge to understand environmental biotechnological processes from both a biological-evolutionary perspective (biochemistry of technologically relevant metabolic pathways and their significance for organisms, connections with energy and nutrition of organisms, adaptation, and competitive interactions among organisms) and a technological perspective (how to achieve process optimization, specific challenges of using organisms such as toxicity or unsuitable environments, how suitable equipment functions, etc.). Students are introduced to an overview of commonly used environmental biotechnological processes; the final part also covers modern trends at various stages of technological transfer (GMOs, immobilization, non-physiological cultivations, use of organism parts, etc.).
Abstract:	1. Introduction to environmental biotechnology - the position of the field, basic principles, biological material, advantages, and risks 2. Biochemistry of technological organisms - amino acids, proteins, lipids, carbohydrates, enzymatic catalysis 3. Energetics of technological organisms - respiration, fermentation, phototrophy 4. Nutrition of organisms - auto-/heterotrophy, macro- and micro-nutrients, growth curve, Monod's relationship 5. Basic catabolic pathways - glycolysis, pentose phosphate pathway, Entner-Doudoroff pathway, beta-oxidation of fatty acids, citric acid cycle, aerobic and anaerobic respiratory chains, polysaccharide catabolism, fermentation processes 6. Basic anabolic pathways - synthesis of carbohydrates, lipids, and proteins, secondary metabolism 7. Autotrophic metabolism and photosynthesis 8. Genetics of technological organisms, metabolic regulation, genetic manipulations, GMOs 9. Overview and taxonomy of technologically significant organisms 10. Raw materials for biotechnology, waste utilization 11. Technological equipment for biotechnology, bioreactors, process regulation, immobilization of biological material, kinetics of biotechnological processes 12. Overview of environmental biotechnologies - biological wastewater treatment, biofilters, bioremediation and phytoremediation, composting, biomining, methanogenesis and biogas production, algae biomass production, hydrogen production by biological means The exercises will primarily focus on practical calculations (energetics of metabolic pathways and their efficiency, product yields, kinetic calculations, calculations of flow systems, calculations from Monod's relationship, capacity of equipment, etc.).