BIOLOGY, ENVIRONMENTAL SCIENCES

Autumn 2020

Course title	ECTS	Degree	Course code	Prerequisites	Subject area
Molecular Biology of Cell	5	Bachelor	B001B115	Not requested	Biomedical sciences, biology
Global Ecology	3	Bachelor	B003B136	No requested	Ecology and environmental studies
Meteorology and Climatology	6	Bachelor	P510B119	Mathematics and its Application in Ecology, Hydrology, Physics, Environmental Chemistry	Physical sciences, physical geography, climatology
Environmental Chemistry	6	Bachelor	P305B102	Organic chemistry	Physical sciences, biomedical sciences, technological sciences
Project Development and Management	6	Master	B001M104	Knowledge in ecosystem degradation, climate change, environmental pollution and global environmental problems	Biomedical sciences, biology, ecology
Recreation Ecology	8	Master	B003M107	Methodology of Ecology Research, Bases and Statistics of Ecological Data, Wildlife Resource Management, Bioindication in Environmental Studies	Ecology, biology, geography

Subject area: **Biomedical sciences, biology**

Status	Course code: B001B115 Course title: **MOLECULAR BIOLOGY OF CELL** Taught by: Prof. Dr. Ingrida Šaulienė		
Semester	**ECTS credits**	**Languages**	**Duration**
Autumn	5	Lithuanian, English, Russian	1 semester
Study hours	**Assessment**	**Prerequisites**	**Examination**
Lectures - 32 h Practical tasks – 30 h Laboratory – 16 h Self-study – 55 h Total – 133 h	10-point scale	*No*	Peer-assessment 10 % Self-assessment 10 % Laboratory notes and report 20 % Defense of laboratory work 10 % Oral presentation 10 % Exam 40 %

Subject content	The program is designed to deepen students knowledge about the cell structure and its functions at the molecular level and about the cell as unified system as well as about cells with disturbed molecular processes that determine the appearance and development of pathological processes. The abilities and skills for working in the laboratory and doing experimental research, using modern research equipment, are gained. Students enrolled in this course often work in the laboratory; participate in workshops where the knowledge of molecular biology is combined together with cognition of natural life science. After completing this course, students will be able to use the acquired skills throughout the studying period and apply molecular cell biology research methods in the ecologist career. Students will learn time management and team work skills, and to be responsible of their work
Learning Outcomes	1. Understands the phenomenon of life expression on molecular level and knows biologically relevant molecular processes that regulate cell function and structure of the expression 2. Is able to creatively apply knowledge of molecular biology and on them based technology, to integrate them into solutions of environmental problems caused by human impact as well 3. Is able to carry out experimental work in laboratory by using modern equipment, to collect research data and to do results analysis in up-to-date research environment 4. Is able plan research progress and apply molecular methods for investigation of biological diversity, structure and functioning of living organisms

Literature	Molecular Biology Web Book http://www.web-books.com/MoBio/ The Molecular Biology Notebook Online http://www.rothamsted.ac.uk/notebook/ The Virtual Library of Biochemistry, Molecular Biology and Cell Biology http://biochemweb.org/ Using Molecular Techniques to Answer Ecological Questions. http://www.nature.com/scitable/knowledge/library/using-molecular-techniques-to-answer-ecological-questions-15643181

Subject area: **Ecology and environmental studies**

Status	Course code: B003B136 Course title: **GLOBAL ECOLOGY** Taught by: Lect. Dr. Martynas Kazlauskas		
Semester	**ECTS credits**	**Languages**	**Duration**
Autumn	3	Lectures in Lithuanian with only some additional lectures in English. Group and individual exercises, consultations and examination in English.	1 semester
Study hours	**Assessment**	**Prerequisites**	**Examination**
Classwork – 48 h Individual work – 32 h Total – 80 h	10 - point scale	No requested	Essay * 0,1 + Presentation * 0,2 + Examination * 0,5 + Report * 0,2

Subject content	Study subject designed for bachelor undergraduates. During the course students assimilates knowledge about most ecological problems relevant to our planet, students get know background, means of solving and prevention of these problems. Students develop abilities to identify environment changes as well as advances in science and later to prioritise work of ecologist in natural and anthropogenic systems. Participants of the course develop skills of reasoned interpretation of data related to changes in biosphere and also skills to make a presentation to specialists and other learners. During the studies methods of group work are elaborated, analysis of scientific articles, debates, illustrated presentations with further discussions are applied. Students use computers, internet connection, the methodological tools developed by Department of Environmental Research. During the practice, students work individually determining the extent of human impact on the biosphere and searching for solutions to mitigate the adverse effects. During preparation for the debates students working in small groups looking for the latest scientific information. During practice each student make a presentation made at home, which is normally followed by answers to questions and discussions.
Learning Outcomes	Students are aware of natural and human caused changes in biosphere, their backgrounds, consequences and methods and possibilities of process control. On identifying changes in social environment and advances in sciences, students are able to prioritize work of ecologist in natural and anthropogenic systems and timely correct methods of environmental research in order to achieve objectives in exploratory and educational activities. After evaluation of local and global conditions students are able to interpret data related to changes in biosphere in reasoned way and will have skills to make a presentation to specialists and other learners
Literature	Beever E. A., Belant J. L., Raton B. 2012. Ecological consequences of climate change: mechanisms, conservation, and management. CRC Press. Begon M., Townsend C. R., Harper J. L. 2006. Ecology : from individuals to ecosystems. Malden: Blackwell. Cunningham W. P., 2012. Environmental science: a global concern. New York. Databases in ŠU library, available from ŠU computers: http://biblioteka.su.lt/lt/duomenu-bazes/ Kareiva P. et. al. 2012. Natural capital: theory & practice of mapping ecosystem services. New York: Oxford universitypress

Subject area: **Physical sciences, physical geography, climatology**

Status	Course code: P510B119 Course title: **METEOROLOGY AND CLIMATOLOGY** Taught by: Assoc. Prof. Dr. Laura Šukienė		
Semester	**ECTS credits**	**Languages**	**Duration**
Autumn	6	Lithuanian, English	1 semester
Study hours	**Assessment**	**Prerequisites**	**Examination**
Theory - 32 h, Practical work - 16 h, Laboratory work - 48 h, Individual work – 64 h, Total – 160 h	The system of ten grades and gathered evaluation system are being employed	Mathematics and its Application in Ecology, Hydrology, Physics, Environmental Chemistry	Individual Homework 25% Non-traditional task 25% Exam 25% Colloquium 25%

Subject content	During the study process students acquire the skills to understand the current condition of the atmosphere, the consistent pattern and importance of atmospheric processes and phenomenon, the tendencies of atmospheric movement, the factors which influencing the climate, to discern climatographic taxonomic units. Students acquire the skills to estimate the temperature regime of air and soil, to employ the meteorological data and climate information databases and to use the obtained knowledge and formed skills assessing the human impact on the environment and the environmental impact of the human. During activities (theory, practical and laboratory works) considerable attention is given to analysis of atmospheric radiation regime, thermal regimes of surfaces and atmosphere, atmospheric pressure field, to description of the water movement in the atmosphere, the formation and movement of air masses. Detailed discussion on a topics of climate forcing factors are on-going, students delve into the different climate classifications and regionalisation and its usefulness and expediency.
Learning Outcomes	1. Know and understand the basic physical processes in the atmosphere, the interface between meteorological parameters, phenomena and atmosphere consistent patterns, the indicators of climate and climate change and the main process in atmosphere leading to the direct impact on living organisms. 2. Able to determine the main meteorological elements and its variation aspects and to collect all the necessary information about the meteorological and climatic processes and employ the large empirical data sets. 3. By integrating the knowledge is able to analyse the meteorological and climatic factors, its location and the importance in a solving of ecological problems, to evaluate critically the human impact on the atmosphere processes. 4. Able to propose variants, to assert its in the analysis of climate change issues and assessing a climate change on ecosystems, without diminishing the life quality of human. 5. Able to self-learning to improve a lifelong study skills.
Literature	Ecological consequences of climate change: mechanisms, conservation, and management /edited by Eric A. Beever and Jerrold L. Belant. 2012. Advances in Meteorology, Climatology and Atmospheric Physics. Edited by Costas G. Helmis, Panagiotis T. Nastos. 2012. Springer Handbook of atmospheric science: principles and applications. Edited by C. Nick Hewitt, Andrea V. Jackson. 2003. Blackwell Science Pittock, A. Barrie. Climate change: turning up the heat. 2005 Planing for climate change. Strategies for mitigation and adaptation for spatial planners. Edited by Simin Davoudi, Jenny Crawford and Abid Mehmood. 2009. Earthscan.

Subject area: **Physical sciences, biomedical sciences, technological sciences**

Status	Course code: P305B102 Course title: **ENVIRONMENTAL CHEMISTRY** Taught by: dr. Ilona KERIENĖ		
Semester	**ECTS credits**	**Languages**	**Duration**
Autumn	6	Lithuanian, English, Russian	1 semester
Study hours	**Assessment**	**Prerequisites**	**Examination**
Lectures - 32 h Practical tasks – 16 h Laboratory – 32 h Self-study – 80 h Total – 160 h	10-point scale	Organic chemistry	Defence of laboratory work 30 % Non-traditional task 10 % Test 10 % Exam 50 %

Subject content	In the course knowledge is assimilate on contemporary issues in ecosystems - air and water pollution, changes in the ozone layer, the enhanced greenhouse effect, the prevalence of toxic organic compounds in the environment. Working in pairs or small groups are developed skills of communication and teamwork. Acquired competence for natural waters, air and soil research, mathematical process and analyze the results, summarize, draw conclusions, find a solution to the problem raised. Laboratory work is being done by the workshops plan. Students work in pairs environment contamination studies, calculate, evaluate the results and summarize them. They display lab report and present the results in the form of a scientific report. During practical the theoretical questions of the topic material are discussed, and the problems are solved.
Learning Outcomes	1. Students will know contemporary issues in natural ecosystems (air and water pollution, changes in the ozone layer, the enhanced greenhouse effect, pesticides and toxic organic compounds and their influence on the condition of humans and the biota). Students will comprehend the methods proposed to solve specific problems. They will know the naturally occurring and anthropogenic chemical interactions, distribution, transport phenomena. 2. Students will be able to work with modern laboratory equipment used for environmental studies. 3. Students will be able to perform analysis of natural waters, air and soil pollution, analyze the results, summarize, draw conclusions, to find a solution to the problem raised.
Literature	Baird C., Cann M. 2005. Environmental Chemistry. Freeman and Company Zumdahl S. S., Zumdahl S. A. 2010. Chemistry. 8th edition. JAV. Illinois university Schwarcenbach R. P. 2003. Environmental Organic Chemistry. John Wiley & Sons John R. Dean. 2009. Extraction Techniques in Analytical sciences. John Wiley & Sons

Subject area: **Biomedical sciences, biology, ecology**

Status	Course code: B001M104 Course title: **PROJECT DEVELOPMENT AND MANAGEMENT** Taught by: Prof. Dr. Ingrida Šaulienė		
Semester	**ECTS credits**	**Languages**	**Duration**
Autumn	6	Lithuanian, English, Russian	1 semester
Study hours	**Assessment**	**Prerequisites**	**Examination**
Lectures - 32 h Practical tasks – 32 h Labaratory – 32 h Self-study – 64 h Total – 160 h	The system of ten grades and gathered evaluation system are being employed.	Knowledges in ecosystem degradation, climate change, environmental pollution and global environmental problems	The final assessment consists of 30% exam, 10% verbal illustrated report, 10% portfolio, 50% project report, 0% self-evaluation

Subject content	One of the most prominent contemporary trends – the increasing organization by projects of various types of work in the private and public sectors. This course is designed for master students enrolled in the program "Nature Recreation" and for those seeking to deepen the theoretical preparation, codify existing knowledge, methodically manage the project, flexibly organize project team work and use resources, effectively communicate with project participants, predict risks and reduce their influence. In the studies it is focused on both the programs and the projects related with life sciences and recreational activities in nature. During studies, theoretical knowledge and practical skills that will enable to identify conflict situation and to creatively manage them through conflict management strategies and personal conflict resolution techniques will be taught. Course participants will deepen their communication skills, develop emotional intelligence, and learn to be aware of the importance of personal contribution addressing professional activities situations in the project. The biggest part of the study process contact time is devoted to practical work that students will undertake in various projects in the Department of Environment and physics as well as acting in the selected organisation.
Learning Outcomes	1. Knows the principles of project activities, properties and targets and understand the key project management processes: initiating, planning, preparation, execution (including administrative and operational), and assessment. 2. Be able to analyse the project dedicated to operate in biodiversity and recreation area conditions and factors, reason the project idea and adjust it in changing circumstances, and identify stakeholders, target groups, risk factors, plan project resources. 3. Have the skills to develop and implement the project and the ability to take responsibility for project management, control quality of the project, and solve project management problems even in unpredictable situations. 4. Applying innovative techniques will be able to operate at constant changing needs of the task combinations and according to research, evaluate alternative solutions and possible social and ethical consequences of the activities.
Literature	Richardson G. L., Raton B., 2010. Project management theory and practise Clements J. P., Gido J., 2012. Effective project management Moustafaev J., 2010. Delivering exceptional project results: a practical guide to project selection, scoping, estimation and management. Whitaker S., 2012. The practically perfect project manager Project Cycle Management Guidelines. http://ec.europa.eu/europeaid/multimedia/publications/publications/manuals-tools/t101_en.htm

Subject area: Ecology, biology, geography

Status	Course code: B003M107 Course title: **RECREATION ECOLOGY** Taught by: Assoc. Prof. Dr. Laura Šukienė		
Semester	**ECTS credits**	**Languages**	**Duration**
Autumn	8	Lithuanian, English	1 semester
Study hours	**Assessment**	**Prerequisites**	**Examination**
Lectures – 32 Seminars – 72 Laboratory – Self-study – 109	10-point scale	Methodology of Ecology Research, Bases and Statistics of Ecological Data, Wildlife Resource Management, Bioindication in Environmental Studies	Non-traditional task – 30% Reflection on action – 15% Colloquium – 20% Oral presentation – 15% Exam – 20%

Subject content	1. The development of recreation ecology science and achievements 1.1 Recreation ecology science and its development 1.2 The research methods and techniques in recreation ecology

	2. Mechanical ecosystem damage during recreation process 2.1 Mechanical damage in terrestrial ecosystem 2.2 Mechanical damage in aquatic ecosystem 3. Vegetation changes because of different recreational activities 3.1 The physiological reactions of plants to damage 3.2 Changes of form and function 3.3 Vertical and structural changes of vegetation, the consequences, damage assessment 3.4 The changes in communities and populations, damage assessment 3.5 The changes of coverage and biomass, damage assessment 4. Soil changes because of different recreational activities 4.1 Waste and soil pollution 4.2 The changes of soil bulk density, porosity and penetrability 4.3 The changes of soil water, temperature and nutrients. 4.4 The changes of the living soil 4.5 Erosion 4.6 The restoration of soil condition and damage prevention 5. Animal changes because of different recreational activities 5.1 Invertebrates changes, consequences, damage assessment 5.2 Reptile changes, damage of recreation, prevention 5.3 Damage to different bird species, prevention 5.4 Small mammals changes, consequences, damage assessment 5.5 Large mammals changes, consequences, damage assessment 6. Complex recreation impact assessment and innovation 6.1 Ecosystem damage assessment and reduction measures 6.2 Environmentally friendly innovations in recreational activities process
Learning Outcomes	Deepened the knowledge of nature protection which are necessary in a process of nature ideas development, the formulation of solution of ecological problems, which are occures because the organizing of human recreation, in the selection of optimal instruments for the reduction of recreational activities damage. Able to recommend environmentally friendly alternatives of recreational activities and to make advices about nature protection.
Literature	M. Liddle. 1997. Recreation Ecology. Springer, 639 p. W. E. Hammitt, D. N. Cole. 1998. Wildland recreation: ecology and management. John Wiley and Sons, 361 p. D. Newsome, S. A. Moore, R. K. Dowling. 2002. Natural area tourism: ecology, impacts, and management. Channel View Publications, 340 p.