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| **Title of the course:**Fundamentals of Natural Sciences | **NEPTUN-code:**RKXTA1EBNF | **Weekly teaching hours:** l+cw+lw1+3+0 | **Credit:** 5**Exam type**: tm  |
| **Course leader:**Csaba Ágoston Ph.D. | **Position:** senior lecturer | **Required preliminary knowledge:** - |
| ***Curriculum:*** |
| The primary aim of the course is to develop students' scientific literacy, critical thinking and problem-solving skills. In addition to learning about natural laws, systems and processes, emphasis is placed on developing students' ecological perspectives. The practical tasks and projects are based primarily on the knowledge acquired in secondary school, thus enabling the knowledge acquired to be assessed and providing a basis for learning the subjects at university. In addition to basic knowledge of physics, biology, geography, chemistry and environmental protection, the course will provide a synthesis of knowledge focusing on the interrelationship of environmental elements that will help to solve engineering problems and develop environmentally aware behaviour. The integration of complex knowledge is realised in the understanding of the basic interrelationships between natural systems and is applied in project work and integrated into the students' thinking and actions. |
| **Curriculum Description:** |
| *Weeks* | **Topics of lectures and practice** |
| 1. (09.09.)
 | Holiday |
| 1. (16.09.)
 | Concept of science, different between science and pseudoscience. Subfield of sciences. description of project tasks (1., 2., 3.)History and topics of biology. Biology in other scientific fields, its importance in environmental protection. |
| 1. (23.09)
 | The role of biology in subfields of environmental protection I. |
| 1. (30.09.)
 | The role of biology in subfields of environmental protection II. |
| 1. (07.10.)
 | Fundamental of physics. Description of movements, reference systems. Velocity and acceleration. Newton’s laws. Force laws and equation of motion. Energy, work, energy conservation. Conservation of angular momentum.Presented through practical examples. |
| 1. (14.10.)
 | Fundamentals of mechanics of point systems. Field of gravity force. Dynamics of periodic movements. Description of movements in accelerating coordinate system.Presented through practical examples. |
| 1. (21.10.)
 | Mechanics of inflexible objects. Elastic deformation. Structure of solid object.Presented through practical examples. |
| 1. (28.10.)
 | Mechanics of fluids. Molecular forces in liquids. Flow of fluids. Waves.Presented through practical examples. |
| 1. (04.11.)
 | Mechanical waves, sound. Propagation and speed of light. Reflection and refraction of light. Optical tubes. Fundamental of optic. Interference and diffraction. Optical grid.Presented through practical examples. |
| 1. (11.11.)
 | History and topics of geography. Geography in other scientific fields, its importance in environmental protection. |
| 1. (18.11.)
 | The role of geography in subfields of environmental protection I.**Project presentations** |
| 1. (25.11.)
 | The role of geography in subfields of environmental protection II. |
| 1. (02.12.)
 | **Written test.**History and topics of chemistry. Chemistry in other scientific fields, its importance in environmental protection.The role of chemistry in subfields of environmental protection. |
| 1. (09.12.)
 | Replacement (supplementary) written test. |
| ***Mid-semester requirements:*** |
| *Attendance at lectures:* |
| It is compulsory to attend the lectures. The rules of education and exam directory of Óbuda University are the guidelines. |
| *Exams and tests (types, data)* |
| 1. | Project task 40 points |
| 2. | Written test 60 points |
| *Requirements for qualification:* |
| Total points: 100. Term marks: 86-100%: excellent (5), 71-85%: good (4), 56-70%: average(3), 41-55%: pass(2), 0-40%: fail(1)If the student has not met the requirements of obtaining the term mark (e.g. has not written or failed the in-class test, has not submitted the measurement report, etc.), he/she must be given one opportunity to make up for the term mark in the study period. |
| ***Professional competencies:*** |
| * Open and receptive to the application of new, modern and innovative organic farming practices and methods.
* In his/her work, he/she strives to act in a law-abiding manner and to respect engineering ethics.
* Ability to acquire new knowledge through the empirical solution of practical problems.
* Ability to translate solutions developed in nature into technical practice.
* Ability to participate in and lead teamwork.
* Understand and authentically represent the role of the environment in society and its fundamental relationship with the world.
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| ***Literature:*** |
| 1. Townsend, C.R., Begon, M., Harper, J.L. (2006). Essentials of Ecology (2nd Edition). Blackwell Publishing.
2. Darrell Ebbing,‎ Steven D. Gammon: General Chemistry, Cengage Learning, 2015, Cengage Learning, Boston, ISBN-13: 978-1305580343; ISBN-10: 1305580346
3. Serway Jewett: Physics for Scientist and Engineers
4. William M. Marsh, Martin M. Kaufman: Physical geography, Cambridge University Press, 2013.
5. Michael Allaby (2000): Basics of Environmental Science, Routledge, New York, ISBN 0415-21175-1
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