**SYLLABUS** (MODULE-ERASMUS+)

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| Course/module (as specified in the approved curriculum for the field of study)  **Applied ecology** | | | | | | ECTS  **4** | | Component code  **ENVI 3.3** | |
| Name in Polish  **Ekologia stosowana** | | | | | |
| Unit(-s) providing the course/module (Faculty, Institute/Department)  **Faculty of Environmental and Mechanical Engineering, Department of Ecology and Environmental Protection** | | | | | | | | | |
| Head of course/module (e-mail address)  **Daniel Gebler, PhD (**[**daniel.gebler@up.poznan.pl**](mailto:daniel.gebler@up.poznan.pl)**)** | | | | | | | | | |
| Other teachers  **Krzysztof Szoszkiewicz, Prof.** | | | | | | | | | |
| Course category  **Open** | | Language  **English** | | Level  **Bachelor/Master** | Profile  **Academic-general** | | Semester  **Winter/Summer** | | |
| **TYPE OF CLASSES/LECTURES AND THE NUMBER OF HOURS**  (organised classes/lectures and self-study) | | | | | | | | | |
| Type of studies: full-time | | |  | Type of studies: extramural | | | | |  |
| * lectures | | | 15 | * lectures | | | | | - |
| * practical classes | | | 15 | * practical classes | | | | | - |
| * field exercise | | | 15 | * field exercise | | | | | - |
| * other lessons | | | - | * other lessons | | | | | - |
| * self-study | | | 55 | * self-study | | | | | - |
| Total number of hours: | | | 100 | Total number of hours: | | | | | - |
| **PRE-REQUSITES**  Basic knowledge in biology. | | | | | | | | | |
| **OBJECTIVE OF COURSE/MODULE**  Introduction of practical ecological principles to understand, control and manage biological processes and methods using living organisms. Environmental factors affecting populations, communities, ecosystems and other ecological systems. Ecological processes utilised in protection, conservation and restoration of aquatic and terrestrial ecosystems. Ecological applications at individual, population, community and ecosystem levels will be studied. Biological monitoring systems used in air, soil and water assessment. | | | | | | | | | |
| **TEACHING METHODS**  Lectures based on multimedia presentation with elements of discussion.  Practical classes: individual project, exercises in laboratory, field trips.  Possibility to use distance learning tools and techniques. | | | | | | | | | |
| **LEARNING OUTCOMES** | | | | | | | Reference  to field outcomes | | |
| Knowledge | O1: Students understand the functioning of biotic and abiotic elements of the environment (air, soil, water, plants and animals).  O2: Students have knowledge of mechanisms and processes in the environment.  O3: Students know international and European regulations regarding environmental protection and engineering. | | | | | | Not  applicable | | |
| Skills | O4: Students gain to acquire, verify, evaluate and integrate environmental and geographical data from various sources.  O5: Students have the skills to conduct multi-faceted analysis of natural environment conditions and processes.  O6: Students are able to conduct multi-faceted analyses of natural environmental conditions and processes. | | | | | | Not  applicable | | |
| Social  competences | O7: Students can explain complex environmental issues with the context of their socio-economic impacts to the public.  O8: Students are able to independent or team work to solve the problem. | | | | | | Not  applicable | | |
| **METHODS TO VERIFY LEARNING OUTCOMES**  Public presentation and written assignment.  Reports from the field exercises.  Written exam. | | | | | | | Outcome Reference  Numbers  O1, O2, O3, O4, O5, O6, O7, O8 | | |
| **TEACHING CONTENT**  **Lectures:** Ecological issues with particular emphasis on their practical application (bioindication, reclamation and restoration of ecosystems). The content refers to the full range of ecological links in nature, both autecological and synecological, taking into account the level of the organism, population and the entire ecosystem, together with an indication of the use of this knowledge in environmental protection. Population - structure, processes, managing populations, species conservation. Community - parameters, biodiversity and its measurement, biodiversity conservation (including EU Habitat Directive approach), succession, biotic interactions, managing pests. Ecosystems - trophic levels and food webs, bioaccumulation, energy flow and energy budgets or ecosystems, productivity. Ecological basics of biological monitoring of various antropopressures. Different types of terrestrial (agricultural, forest, urban) and aquatic ecosystems are considered.  **Practical classes:** Adaptation of organisms to life in various conditions with an indication of the possibility of their practical use. Variation in natural populations. Analysis of variability in Mendelian populations (Hardy and Weinberg's law). Genetic parameters characterizing the population structure. Wright Statistics. Parameterization of the population and communities - calculations with the use of basic statistical methods. Assessment of biodiversity. The process of energy flow and matter circulation in various ecosystems. Analysis of selected food chains and food webs as the basis of biological methods of water reclamation. Calculations of primary and secondary production of aquatic ecosystems. Plants and animals as bioindicators of environmental pressures (pollutions and other factors). Laboratory work with the biological early warning system - familiarization with the operation of the system. Study of river habitat protected under Habitat Directive (habitat 3260).  **Field training:** Morasko-Suchy Las waste dump – waste management, use of biogas, water treatment technologies. Morasko Reserve –protection of diversity, conservation ecology.  Cybina Valley - biological methods of improving the condition of water ecosystems. Methods of reclamation of water ecosystems. Structure of aquatic ecosystems - field measurements. | | | | | | | | | |
| **Forms and criteria for passing of course/module**  Project evaluation and completion.  Final written exam. | | | | | | | Percentage of final mark  50%  50% | | |
| **LIST OF LITERATURE**   1. Goodenough A. 2017. Applied Ecology. Monitoring, Managing and Conserving. Oxford University Press. 2. Begon M., Colin B., Townsend R., Harper J.L. 2017. Ecology: From Individuals to Ecosystems. Wiley-Blackwell. 3. Mackenzie A., Ball A. S., Virdee S. R.2015. Ecology. Instat notes. Taylor & Francis 4. Bruce R. 2020. Environmental Biotechnology: Principles and Applications. McGraw-Hill Education. | | | | | | | | | |