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| Title of the course:**Ecology** | ***NEPTUN-code:***RKXOK1ABNF | ***Weekly teaching hours:*** *l+cw+lw* 2+1+0 | ***Credit*:** 4***Exam type****:* tm |
| ***Course leader:***Prof. Dr. habil. Hosam Bayoumi Hamuda  | ***Position:*** Private university professor Associate professor | ***Required preliminary knowledge:*** RKXBI1EBNF |
| ***Curriculum:*** |
| The aim of the course is to introduce the concepts and principles of ecology. Topics: Units of supra-individual organization; biological organizational levels, with particular regard to supra-individual organizational levels, definitions, characterizations. Interaction between nature and man, biological-cultural coevolution, complementarity of biological capacity and mediating systems. Association theories. Interpretation of environmental and nature protection. The concept of primary production, its distribution on Earth, environmental factors limiting primary production. Population, community ecology. Changes in communities over time, main types of succession. The structure and change of living communities (associations). The main status indicators of ecosystems, the characteristics of communities of organisms interpreted as systems. The biome and the biosphere. The biosphere and its history; the concept of biodiversity, its importance, and the need to protect it; the Gaia hypothesis; changing associations and global biogeochemical cycles and their consequences; the history of man's nature-transforming activity; the problem of world food; the lack of fresh water; the problem of world population growth; the growth of the world economy, economic globalization; environmentally friendly technologies, environmental protection. |
| **Detailed description of the subject, timetable** |
| **Weeks** | **Topics of lectures and practices** |
| 1. | **Lecture**: Presentation of concepts and principles of ecology.**Practical**: Effect of climatic changes on vegetation-1 |
| 2. | **Lecture**: Levels of supra-individual organization; biological organizational levels, definitions, and characterizations.**Practical**: Effect of climatic changes on vegetation-1 |
| 3. | **Lecture**: Interaction between nature and human, biological-cultural coevolution, complementarity of biological capacity and mediating systems. Association theories.**Practical**: Effect of CO2 on plant growth and nutrition-1 |
| 4. | **Lecture**: Interpretation of environmental and nature protection.**Practical**: Effect of CO2 on plant growth and nutrition-2 |
| 5. | **Lecture**: The concept of primary production, its distribution on Earth, environmental factors limiting primary production.**Practical**: Eco-friendly nutrient replenishment and plant protection in the small garden-1 |
| 6. | **Lecture**: Ecology of population and community.**Practical**: Eco-friendly nutrient replenishment and plant protection in the small garden-2 |
| 7. | **Lecture**: Changes in communities over time, main types of succession**Practical**: Ecologically, sustainable development as a principle of environmental regulation,  |
| 8. | **Lecture**: The structure and change of living communities (associations).**Practical**: Industry and environment. Agriculture as environment. With the weather forecast, with air pollution. |
| 9. | **Lecture**: The main status of indicators of ecosystems, the characteristics of communities that can be interpreted as systems**Practical**: Environmental protection in corporate practice, Institutions of Environmental organization. Requirements and application guidelines. |
| 10. | **Lecture**: The biome and the biosphere**Practical**: Environmental organization of companies. Requirements and application guidelines. |
| 11. | **Lecture**: The biosphere and its history**Practical**: Vegetation "population". The ecological foundation of the Excel spreadsheet program. Graphic display. Use of statistical functions. Data analysis functions. |
| 12. | **Lecture**: The concept of biodiversity, its importance and the need to protect it; the Gaia hypothesis**Practical**: Use of statistical functions, Data analysis functions |
| 13. | **Lecture**: Changing associations and global biogeochemical cycles and their implications**Practical**: Using Quadrat methods to measure the vegetation rates-1 |
| 14. | **Lecture**: The history of man-nature-transforming activity; the problems of: world food; the lack of fresh water; the problem of world population growth; the growth of the world economy, economic globalization; environmentally friendly technologies, environmental protection.**Practical**: Using Quadrat methods to measure the vegetation rates-1 |
| **Mid-term requirements** |
| **Participation in occupations:**Participation in practical lessons and lectures is obligatory. Students should not be absent more than 4 lectures and 1 practical lesson. If more, the course result is disable |
| **Mid-terms, protocols, reports, etc.:**Two written examinations (including the theory + practice lessons) must be completed at least at a satisfactory level, the homework solution, and an essay, as well as the practical presentation. Examinations must be completed at least with a satisfactory level (separately). The replacement examination is due in the 14th week or during the examination period as prescribed by the HKR. |
| **The method of evaluation:**Signature conditions: a sufficient level of performance of the 2 written examinations, solving the homework and write the assay as well as the practical final report of the practical lessons. In case of written examination mark fail (1), correction opportunities (the replacement examination are available according at the 14th week according to the Student Requirement System (HKR).**Important dates:**1. written examination:7th of April 2025
2. written examination: 12th of May 2025

Supplement date of the essay and solving the homework: 30th of April 2025Date of replacement the written examination(s): 22nd of May 2025 |
| **Professional competencies:** |
| From a practical point of view, student should know the ecological complexity, organization, management in given environmental and economic conditions, as well as research, development and problem-solving opportunities. Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required pursuing activities in the special field of environment protection. Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem-solving techniques. Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them. Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection. Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances. Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions. Constantly upgrading their knowledge of environment protection by attending organized professional development training courses. Sharing experiences with colleagues, thus promoting their development. Taking responsibility towards society for their decisions made in the scope of environment protection***.*** |
| **Literature*:*** |
| Townsend, C.R., Begon, M., Harper, J.L. (2006). Essentials of Ecology (2nd Edition). Blackwell Publishing. (Highly recommended).Begon, M., Townsend, C. R., Harper, J. L. (2006). Ecology (4th edn). Towsend, C.R., Begon, M., Harper, J. (2003): Essentials of Ecology. 2nd ed. Blackwell Science, Oxford.Press, M.C., Huntly, N.J., Levin, S. (2001): Ecology: Achievement and challenge. Blackwell Science, Oxford.Crawley, M. J. (1997): Plant ecology. 2nd ed. Blackwell Science, Oxford.Begon M., Harper J.L., Townsend C.R. (1996): Ecology. Blackwell ScienceKrebs, C. J. (1994 & 2001). Ecology. (4th & 5th edns). Harper Collins, New York. |
| **Comments**:Attendance at the lectures is mandatory! Obligations of attendance can be fulfilled in case of a maximum of 4 absences. In case of 5th absence from the sessions, the course can no longer be completed. At least sufficient (50-64% = 2) completion of the med-term exams, preparation of practical reports, written of one essay and solving the homework questions. |