



Faculty of
Environmental Sciences

Final State Examinations for Bachelor Programmes – Thematic Areas

2022

Environmental Engineering

All thematic areas are compulsory.

BIOLOGY AND ECOLOGY

1. Explain some examples of mechanical defences or adaptations of species to discourage animal predation
2. How is it possible to measure the biodiversity?
3. Which adaptations have mammals to be protected against extreme temperatures (high or low)?
4. How is organized a food chain?
5. Explain the ecological role of pollinator species
6. What is the difference between a population and a community?
7. Are all individuals of the same species identical? Use ants as an example.
8. Explain the main focus of "Ecology" and the potential overlap with other scientific disciplines
9. What is the inter-specific competition (cite an example)
10. Are two species distributed in the same territory sharing the same "ecological niche"?
11. What is a parasite species? (cite one example)
12. What is a "bioindicator"? Explain with some examples.
13. Describe at least three inter-specific relationships.
14. Is evolution a linear process? Explain.
15. What is the geographic distribution of a species?

Suggested books

Begon, M.E., Townsend, C.R., Harper, J.L., 2006. Ecology: From Individuals to Ecosystems, 4th editio. ed. John Wiley & Sons, Ltd, Oxford.

Gaston K.J., 1996 Biodiversity a biology of numbers and difference. Blackwell Science, Oxford etc., 396 pp.

Krebs C.J., 1998 Ecological methodology, 2nd edition. Addison Wesley Longman, Menlo Park etc., xii+620 pp.

Ridley M., 1996 Evolution, 2nd edition. Blackwell Science, Oxford etc., xxi+719 pp.

ENVIRONMENTAL CHEMISTRY

1. The introduction to Environmental Chemistry, basic terms, definitions. Basic principles of thermodynamics.
2. Phase and chemical equilibria. Definitions, laws, computations.
3. Surfaces processes. Definitions, principles, computations.
4. Basic fundamentals of analytical methods used in Environmental Chemistry.

5. EARTH – formation, structure, minerals and rocks, weathering processes, soil formation.
6. Chemistry of soils, organic matter, Fe, Mn – oxides, soil pH, ion exchange, sorption/desorption processes, basic terms of ecotoxicology, soil pollution.
7. WATER – chemical structure of water, water as a solvent, water cycle, acid-base behaviour, ions in solution, carbonate buffer system, oxidation-reduction potential. Physical and chemical properties of pure water, water anomalies
8. Basic parameters of water quality. Form of occurrence of chemical substances in water
9. Inorganic substances in water and their behaviour (metals, radioactive compounds, halides, gases)
10. Nutrients in water, eutrophication, impact of urban drainage on P cycle
11. Acidification and its impact on water bodies, soil, plants. How is acid rain created? Differences between rain in clean and polluted areas.
12. Organic substance in water (humic substance, PAH, detergents, pharmaceutical compounds, chlorinated organic compounds, pesticides) and methods of their assessments
13. Lake circulations and its importance for water quality and seasonal changes of water quality
14. AIR – structure of the atmosphere, biogeochemical cycles of carbon, nitrogen, sulphur. Global warming and greenhouse effect.
15. Ozone layer, UV protection, air pollution, urban smog.

Recommended Literature:

Stumm, W., Morgan, J.J. (1996). Aquatic chemistry: chemical equilibria and rates in natural waters. Wiley, 1022p

Mason, C. (2002). Biology of freshwater pollution. Pearson Education Limited. Essex. 376p,

Laws, E.A. (2000). Aquatic pollution. An Introductory text. John Wiley and sons, New York, 632p.

LAND MANAGEMENT

1. Landscape and its definitions by major land users/stakeholders. Multifunctional land use, its importance and consequences of not following this concept.
2. Landscape fragmentation, its types, consequences and mitigation. Land tenure security and its effect on land management.

3. Components and functionality of a Land Administration (Cadastre) system. Description and functionality of the Torrens and Deeds cadastre concepts. What are the main differences between them?
4. Sustainable Land Management, - main concepts and application in developing and developed countries.
5. Land degradation: What are causes and consequences of land degradation and how can we improve long-term (natural) and anthropogenic degradation during restoration and reclamation (explain these concepts and define what the target and reference ecosystem means)?
6. Forest and grassland restoration: Describe main factors which should be implemented in forest and grassland landscapes to improve ecosystem functions, services and biodiversity.

Recommended literature:

Bates, B.C. et al. (2008) Climate Change and Water. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva. <https://archive.ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf>

Chin D. A., 2013: Water-Resources Engineering, Pearson Education Limited, pp. 960. ISBN: 0273785923, 9780273785927.

Comín, F. A. (Ed.). (2010). Ecological restoration: a global challenge. Cambridge University Press.

Deininger, Klaus; Selod, Harris; Burns, Anthony. 2012. The Land Governance Assessment Framework : Identifying and Monitoring Good Practice in the Land Sector. Agriculture and Rural Development. World Bank. © World Bank. <https://openknowledge.worldbank.org/handle/10986/2376>
License: CC BY 3.0 IGO.

Grafton Q., Hussey K., 2011: Water Resources Planning and Management, Cambridge University Press. ISBN: 978-0-521-76258-8.

Jongepierová-Hlobilová, I. (Ed.). (2012). Ecological restoration in the Czech Republic. Nature Conservation Agency of the Czech Republic.

Perrow, M. R., & Davy, A. J. (Eds.). (2002). Handbook of ecological restoration (Vol. 2). Cambridge University Press.

Řehounek, J., Řehouňková, K., & Prach, K. (2010). Ecological restoration of areas disturbed by mining and industrial repository.

The International Bank for Reconstruction and Development / The World Bank, 2008. Sustainable Land Management Sourcebook

Mays L. W, 2019: Water Resources Engineering. John Wiley and Sons, pp. 752. ISBN: 978-1-119-49057-9.