**Topics of the final exam - MSc in Environmental Sciences**

**General themes**

1. The goal of environmental monitoring systems, their planning and adaptation, sampling protocols, representativity
2. Global and local environmental problems as experienced in aquatic environments
3. Environmental effects of air pollution in global, regional and local scales
4. The age of Earth and its composition, and geochemical methods for studying them
5. The formation of rock-forming minerals, their major groups, weathering and soil formation; environmental problems related to soil and weathering
6. The environmental chemistry of carbon, the trend of changes and anthropogenic effects on these processes
7. The importance of nitrogen and phosphorous, their environmental chemistry, and the effects of human activity on these processes
8. The distribution of biodiversity, its change, the correlation between biodiversity and habitat diversity
9. The boundaries of species propagation, biological invasions
10. The role of oceans in regulating mainland biospheres and climate
11. The atmosphere as a laboratory on Earth; the importance of atmospheric chemical reactions on the environment
12. Climate change and agriculture: C3 and C4 plants and environmental stress, possibilities of the plant growth in fitotron.

**Limnology specialization themes**

1. General methods of limnological research, field observations, principles of sampling, field experiments and models
2. The hydrological water cycle, water as a life medium
3. The attributes of aquatic habitats I. – lentic environments
4. The attributes of aquatic habitats II. – lotic environments
5. The environmental needs of species and their adaptation, abiotic factors, sources
6. The attributes of populations, their growth, spread, colonization, life history strategies
7. Interspecific interactions in aquatic associations
8. Study of the environmental problems with ecophysiological methods: experimental design in laboratory
9. Aquatic ecosystems, the basic processes of production and decomposition, food chains and networks.
10. Application of environmental DNA for research and biomonitoring
11. The theoretical basis and methods of Water Framework Directive

**Atmospheric chemistry specialization themes**

1. Stratospheric ozone: formation and decomposition by natural processes and the effects of human activity on these processes
2. Chemistry and atmospheric cycle of methane and carbon monoxide
3. Formation ozone in the troposphere and its role in tropospheric photochemistry
4. The sources of atmospheric sulfur, chemical reactions and atmospheric cycle of sulfur components.
5. The biogeochemical cycle of nitrogen: ammonia, nitrous oxide
6. The main reservoirs of carbon, mass transport between the atmosphere and the reservoirs, the causes and consequences of the rise of atmospheric carbon-dioxide concentration
7. Physical and chemical properties of atmospheric aerosol particles; sources of the particles
8. The climatic and other environmental effects of atmospheric aerosol
9. Cloud formation, chemistry of cloud droplets and precipitation
10. The formation and the evolution of the atmosphere