ITMO UNIVERSITY

LIST OF ENTRANCE EXAM QUESTIONS

FOR THE INTERNATIONAL MASTER'S DEGREE PROGRAM

INDUSTRIAL ECOLOGY

1. Hypotheses of the origin of life on the Earth. The evolution of life.
2. Natural ecosystems' balance and its mechanisms. Homeostasis, succession, and its types.
3. Types of ecosystems. Simplified anthropogenic ecosystems.
4. Global and regional environmental problems, their causes.
5. Greenhouse gases emissions and their regulations.
6. Sustainable development of the biosphere. The UN Sustainable Development Goals, 2015
7. The low carbon economy: principles and possibilities. Carbon footprint.
8. The circular economy: principles, problems, and targets.
9. The notion of sustainable consumption and production.
10. Influence of different economic activities to the environment. Classification of environmental pollutants.
11. General requirements in the field of environmental protection in the operation of enterprises. Industrial environmental monitoring.
12. The main terms of industrial impact: pollutant, source of pollutants, source of emissions of pollutants. Classification of emission sources of pollutants.
13. Norming of pollutants in the ambient air. The concept of "maximum admissible concentration".
14. Dispersion of pollutants in the ambient air. The main factors affecting the dispersion.
15. Water management at enterprises. Rational use of water resources.
16. Waste management. The waste management hierarchy. Concept of Zero waste.
17. Utilization and recycling of solid industrial and household waste.
18. Waste-to-energy: the types of equipment, its technological processes.
19. Principles and tasks of monitoring ambient air quality and natural waters.
20. Monitoring of soil pollution by harmful substances of industrial origin.
21. Environmental management. Environmental mission, policy, and aims of company/enterprise. Planning environmental activities of companies.
22. The family of international standards ISO 14000 in the field of environmental management.
23. Requirements for auditing of environmental management systems in accordance with the international standard ISO 19011.
24. Feasibility study of environmental projects.
25. Ecological taxes and fees, its roles and significance.
26. Facilities, installations and apparatus for the separation of coarse-dispersed impurities and suspensions from wastewaters.
27. Physico-chemical methods of wastewater treatment.
28. Aerobic biological wastewater treatment. The influence of external factors on the biological treatment process.
29. Anaerobic biological wastewater treatment. The influence of external factors on the process of biological treatment.
30. Purification of industrial gaseous emissions from harmful vapors and gaseous components. Adsorption method.

EXAM PREPARATION MATERIALS

1. Masters, Gilbert M. Introduction to environmental science and engineering. Upper Saddle River, NJ: Prentice-Hall, 1997.
2. Cheremisinoff, Nicholas P. Handbook of solid waste management and waste minimization technologies. Butterworth-Heinemann, 2003.
3. Clark, Robert M., Simon Hakim, and Avi Ostfeld. Handbook of water and wastewater systems protection. Vol. 2. New York: Springer, 2011.
4. Mines Jr, Richard O. Environmental engineering: principles and practice. John Wiley & Sons, 2014.
5. Hendrickson, Chris T., et al. Environmental life cycle assessment of goods and services: an input-output approach. Resources for the Future, 2006.
6. Barrow, Chris. Environmental management for sustainable development. Routledge, 2006.
7. Schaltegger, Stefan, Roger Burritt, and Holger Petersen. An introduction to corporate environmental management: Striving for sustainability. Routledge, 2017.
8. Pugh, Cedric, ed. Sustainability, the environment and urbanization. Earthscan, 1996.
9. Gaston, Kevin J., ed. Urban ecology. Oxford University Press, 2010.
10. Elmqvist, Thomas, et al. Urbanization, biodiversity and ecosystem services: challenges and opportunities: a global assessment. Springer Nature, 2013.