



Environmental Design and Expertise

Coordinator	Olga Zhuravleva
Credits	3 ECTS (compulsory course), 36 in-class hours
Lecturer	Olga Zhuravleva
Level	BSc
Host institution	Gorno-Altai State University , Department of Natural Sciences and Geography
Course duration	1 semester (the classes will be scheduled in accordance with the university timetable)

Summary

The course "Environmental Design and Expertise" is among special courses of the Bachelor programme in Ecology and Environmental Management. The course will give opportunity to understand the purpose of the environmental design and expertise, their role and place in the system of environmental management, and also to learn about their results in our country and abroad. Successful completion of the course will allow future ecologists and nature managers to apply acquainted knowledge in their practical work.

Target student audiences

Last year BSc students majoring in Ecology and Environmental Management

Prerequisites:

Required courses (or equivalents):

- Fundamentals of Environmental Management;
- General Ecology;
- Technogenic Systems and Environmental Risks;
- Environmental Protection;
- Regulation and Reduction of Environmental Pollution

Aims and objectives

The aim of the course is to provide students with knowledge about the environmental design and expertise and to teach them using methods and principles of the environmental impact assessment (EIA).

The objectives of the course:

- to introduce students to the methodology of carrying environmental expertise;
- to introduce to the history of development of the state environmental expertise in Russia and abroad;
- to introduce to the theory, methodology, and practices for environmental justification of economic and other types of activities at the phase of design and feasibility study;
- to provide insight into the legal and policy framework of the environmental design in the Russian Federation;
- to develop basic skills of expert work in geoecology.



General learning outcomes:

By the end of the course, successful students will:

- understand the key concepts of the environmental design, the aims and objectives of environmental expertise;
- understand and be able to critically evaluate the impact of one or another human activity on the environment;
- understand the specificity of environmental justification for construction, reconstruction, and maintenance of different infrastructure objects;
- understand and be able to apply principles and methods of environmental impact assessment while meeting project challenges;
- develop their skills in the processing of ecological information.

Contents

The course will cover the following aspects:

Topic 1. Environmental design. Environmental design: goals, objectives, phases, methods, and objects. A brief historical overview of design methods in Russia and the EU countries. Geocological foundations of territorial design. Legislative framework for the environmental design. Current state and prospects for the development of legislative, methodological, and institutional framework of design. Informational base for the environmental justification of the design and feasibility study. A concept of environmental risk.

Topic 2. Environmental justification in the town planning documentation. Environmental justification in the town planning documentation, its types, forms, and contents. Master plans for cities, towns, districts, and other settlements. Schemes of functional zoning of urban and suburban territories. The principles and specifics of environmental justification of town planning projects under conditions of various natural zones and provinces. The specifics of the design in the cryolithozone. District planning schemes, city general plans, and problems of capital regions. Geoenvironmental problems of engineering support of the cities and their parts: water supply, water disposal, solid waste and its utilization, atmospheric emissions, discharges of wastewater into water bodies, etc. Maximum permissible emissions (MPE) and maximum permissible discharges (MPD); their temporary norms, methods of calculation, and approval process. Variability (alternativeness) of the design and environmental justification. Restrictions and the level of reliability of justification. Contents of the proving documentation at the pre-investment stage.

Topic 3. Environmental assessment of technologies. Assessment methods, classification of industries according to the degree of their environmental hazardousness. Environmental expertise of equipment, technology, and production. Ecological passport and the Declaration of industrial safety. Ecological audit of industrial enterprises. State technology policy of the Russian Federation. Policy of foreign investors: export of "dirty" and ecologically obsolete technologies and equipment, highly toxic wastes, etc. to the Russian Federation.

Topic 4. Environmental impact assessment (EIA). Comparative analysis of Russian and foreign standards and experience in the EIA. Guidance documents and regulatory framework of the EIA. Specificity of the EIA for different economic branches. Assessment of the impact of economic



activities on the environment (impact — changes — consequences). The EIA and environmental expertise. Engineering and ecological studies at various design phases (goals, objectives, phases, structure, requirements, and a regulatory framework). Engineering and environmental studies for the development of pre-investment documentation (the concept phase, programs, sectoral and complex schemes).

Topic 5. Engineering and environmental studies. Engineering and environmental studies at the phase of preparation of town planning documentation (schemes and projects of district planning, city masterplans). Specificity of engineering and environmental studies for environmental justification of investment in construction (an investment justification phase) and for the development of construction projects (a "project" phase). Landscape and ecological mapping in assessing the current ecological state of the territory. Methods of assessing the anthropogenic impact on the environment. Integrated indicators of the anthropogenic impact on the landscape. Assessment of industrial development and waste emissions of different economic branches, and their environmental hazard to people and landscape. Principles of zoning with account of intensity of the anthropogenic impact on the environment. Territorial zoning with account of complexity and seriousness of ecological situation.

Topic 6. State environmental expertise. Goals, objectives, objects, and types of environmental expertise. Legal and regulatory frameworks. The Federal Law "On environmental expertise." The provision on the procedure for conducting a state environmental expertise, regulations on the expertise, and regulations on the expert commission. Geoecological principles of design and expertise, and their interrelation. The state environmental expertise and its interrelation with departmental and public expertise. The procedure, principles, and methodological and organizational issues of the state environmental expertise. Normative and methodological framework of the expertise.

Topic 7. European and Russian experience in conducting the expertise of large-scale projects. The expertise of the ecological justification of the pre-project and project documentation for construction. The logic of decision-making on investment projects. Investment phases and environmental expertise.

E-learning module

Topic 8. Economic regulation in the sphere of environmental protection. Ecological planning and prediction. General characteristics of economic regulation in the sphere of environmental protection. Charges for the negative environmental impact. Entrepreneurship in the sphere of environmental protection. Environmental audit and environmental insurance.

Topic 9. Principles of the best available technologies protecting the environment. State registration of objects negatively affecting the environment (ONAE). The best available environmental technologies (ET). ONAE referred to the objects where ET should be used. Regulatory frameworks and prerequisites for implementing ET in the Russian Federation. Approval of guidelines for referring a technology to ET. Sources of information about the spheres where ET can be used. Criteria for categorizing a technology (equipment) as ET.



Overview of sessions and teaching methods

The course will include lectures followed by seminars and practical training. Special attention will be paid to innovative issues of technological and environmental design, as well as to functional and environmental aspects of analyses of best technological solutions to be used in the EIA projects. The topics of lectures will be closely connected with the problematics of practical trainings and seminars.

At the practical trainings the students will learn how to solve expert-analytical and graphical calculation tasks. They will also participate in the professional simulation (role-playing) games with the elements of brainstorming while solving various expert analytical tasks to make a preliminary environmental impact assessment of a project. To do that, the students will be divided into teams of specialists having different functional roles. The interactive group discussion of the results of the practical assignments will help students develop skills necessary to participate in the public discussion of the EIA materials and environmental projects.

At the seminars, a partly moderated discussion of the most interesting and problematic issues of methodological support of the basic variants of the EIA projects will be organized, and the impact of town planning and innovation projects on the basic components of the environment will be analyzed.

Presentation of final papers (written reports) and completion of expert-analytical and graphical calculation tasks started at the in-class practical trainings will be the core of the self-guided work. The topic and the structure of the research paper, as well as the list of information sources to be used and methodological questions to be analyzed, will be discussed during personal consultations with the teacher. During the paper presentation (defense) special attention will be paid to the systematicity of the carried-out analysis of information sources, the completeness of the declared topic, validity of the conclusions, and the logic of answers to additional questions asked during the discussion.

While working on e-learning module, the students should watch the suggested videos, study the suggested theoretical material, and complete on-line tasks.

Course workload

The table below summarizes course workload distribution:

Activities	Learning outcomes	Assessment	Estimated workload (hours)
In-class activities			
Lectures	Understanding theories, concepts, methodology and tools	Class participation	16
Moderated in-class discussions	Understanding the purpose of conducting environmental design and expertise; knowledge of methods and principles of assessing the impact made by economic and other activities on the environment	Class participation and preparedness for discussions	6
In-class assignments	Understanding the purpose of conducting environmental design and expertise; knowledge of	Class participation and preparedness for assignments	14



	methods and principles of assessing the impact made by economic and other activities on the environment		
Independent work			
Reading and discussion of assigned papers for seminars and preparation for lectures	Familiarity with and ability to critically and creatively discuss key concepts, tools and methods as presented in the literature	Class participation, creative and active contribution to discussion	30
Final paper preparation and presentation	Ability to soundly and reasonably summarize the information on specificity of conducting the environmental design and expertise; ability to cover the topic in-depth, to present the material logically and consistently, and to state one's own opinion properly	Completeness and accuracy of the information presented, visibility and informativeness of the presentation	12
Preparation for and conduction of a professional simulation (role-playing) game	Ability to comprehensively address the problem of impact of a hydropower plant on the environment; to find relevant literature and data; to interpret the information; to use concepts, tools, and methods presented in the course; and to draw the appropriate conclusions	Quality of preparation of key players	20
E-learning module	Understanding information presented in the E-learning module	Quality of the tasks completion	20
Total			108

Grading

The students' performance will be based on the following:

- Level of preparedness for participation in class discussions and seminars (20 %);
- Contribution to preparation and conduction of a professional simulation (role-playing) game and performance of the course assignments (20 %);
- Quality of the final paper (20%);
- E-learning module (20%);
- Results of the final test (20%).

Course schedule

All the classes will be taught in accordance with the university timetable.

Classes	Topics
1	Lecture: Environmental design.
2	



3	Seminar: A legal framework of environmental design and expertise.
4	Lecture: Environmental justification in the town planning documentation.
5	Seminar (use of the interactive teaching method "Press conference"): Formation of the environmental awareness and development of the institution of the environmental expertise in the Russian Federation and EU countries.
6	Lecture: Environmental assessment of technologies.
7	Practical training: Calculation of the amount of air pollutants from stationary sources.
8	Lecture: Environmental impact assessment (EIA).
9	Practical training: Health and hygiene standards for the air quality.
10	Practical training: Standardization of the quality of natural water bodies.
11	Lecture: Engineering and environmental studies.
12	Practical training: Matrix method for the assessment of impact of economic activities on the environment (case study).
13	Lecture: State environmental expertise.
14	Seminar: State environmental expertise: objects, levels, and conducting procedures.
15	Lecture: European and Russian experience in conducting the expertise of large-scale projects.
16	Professional simulation (role-playing) game: Conducting the environmental expertise for the project to construct a large-scale hydropower plant in the Altai Republic.
17	Practical training: Methods and tools of the environmental expertise (case study).
18	Practical training: Step-by-step scheme of environmental impact assessment (case study).
E-learning module	
Economic regulation in the sphere of environmental protection	
Principles of the best available technologies protecting the environment	

Course assignments

- Assignment #1 – Calculation of pollutants released by stationary sources into the atmosphere
- Assignment #2 – Health and hygienic regulations of air quality
- Assignment #3 – Regulations of quality of natural water bodies

Assignment #1 will help students understand what a stationary pollution source is; what pollutants from fuel combustion are taken into account, and what parameters underlie the subdivision of fuel types used in the heat power industry. The analyzed calculation examples help estimate the degree of impact from various sources on the environment.

Assignment #2 deals with a very important issue of health and hygienic regulations of air quality. The students will learn in detail what indicators are used for sanitary evaluation of air pollution; what the complex air pollution index (API) is, how it is calculated, and for what values of API the territory is referred to environmental disaster areas.

While performing **Assignment #3**, the students will study the issues of regulating the quality of natural waters that is made in order to determine maximum permissible impact, which guarantees ecological safety of the population and genetic conservation, and provides rational



use and restoration of water resources under the conditions of sustainable economic development. They will also become familiar with several calculation methods enabling to give a quantitative estimate of the negative impact on the water environment.

Literature

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