

**BMSTU, RU**  
**DESCRIPTION OF THE PROMENG Curricula/Module**

TITLE OF THE MODULE	Code
Module "Environmental Protection"	

Teacher(s)	Department
<b>Coordinating:</b> Navasardian E.S. <b>Others:</b> Simakova E.N.	Department E9 of BMSTU

Study cycle	Level of the module	Type of the module
Master	The variable part of the curriculum	Elective course

Form of delivery	Duration	Langage(s)
lectures	one semester	Russian

Prerequisites	
<b>Prerequisites:</b> lectures: «Life Safety»	<b>Co-requisites (if necessary):</b> No

Credits of the module	Total student workload	Contact hours	Individual work hours
4	136	68	68

Aim of the module (course unit): competences foreseen by the study programme
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the formation of the professional masters of integrated environmental competence as an integrative characteristics, including the knowledge, abilities and skills of activities in the field of protection of the environment and the personal attitude to the environment, responsibility for their actions and deeds, as well as the personal qualities of the person providing the conscious and the environmentally sound use of natural resources.

Learning outcomes of module (course unit)	Teaching/learning methods	Assessment methods
<b>Know:</b> the system of identification and classification of industrial emissions into the atmosphere; the properties and characteristics of polydisperse systems, methods of the analysis of disperse composition of mechanical impurities; principles of separation of suspended particles from the air flow in a force field: gravity, inertia, centrifugal, electrostatic; physico-chemical basis of sorption purification of air from chemical pollution; physico-chemical basis of thermo-catalytic neutralization of gaseous contaminants; methods and devices of air cleaning from particulate and gaseous contaminants.	Lectures, seminars, Individual work	Interim certification, the final pass
<b>Know:</b> principles of creation of low-waste technology; the classification of types and kinds of waste including hazardous industrial waste; the method of calculating the class of hazardous waste; organize the collection, storage, recycling, neutralization and disposal of waste; principles of progressive technological processes and production complexes in the communication with the waste.	Lectures, seminars, Individual work	Interim certification, the final pass
<b>Know:</b> the values of negativity technosphere, the species composition and the effects of the technosphere on the biosphere; the structure of the industries and the composition of each sector of industrial production and power engineering (heat-power engineering, hydropower, nuclear power, machine-building production, ferrous metallurgy,	Lectures, seminars, Individual work	Interim certification, the final pass

<p>non-ferrous metals); specific indicators of emissions and discharges into the environment from technological processes and industrial equipment; criteria for establishing cleaner industrial production; schemes of devices and systems, intended for the reduction of emissions, discharges of harmful substances, solid waste management, reduction of energy impacts on the biosphere of the industrial enterprises; the characteristics of the self-purification from harmful influences of the various regions of the biosphere.</p>		
<p><b>Know:</b> the existing system of normative-legal acts and control system of the protection of the environment (at all levels: Federal, regional, local, and local), the basic mechanisms of supervision and control of the protection of the environment</p>	<p>Lectures, seminars, Individual work</p>	<p>Interim certification, the final pass</p>
<p><b>Be able to:</b> choose a basic scheme of system of cleaning of air-gas emissions; calculate an individual design parameters of the apparatus of the cleaning system, to ensure the required efficiency of catching pollutants.</p>	<p>Lectures, seminars, Individual work</p>	<p>Interim certification, the final pass</p>
<p><b>Be able to:</b> evaluate the nature and quantity of waste of various production processes; calculate the toxicity class of industrial waste, determine the method of processing, neutralization or their disposal; fill out the passport of hazardous wastes and other necessary documentation for setting limits and standards of waste formation.</p>	<p>Lectures, seminars, Individual work</p>	<p>Interim certification, the final pass</p>
<p><b>Be able to:</b> choose the optimal scheme solutions for the reduction of emissions, discharges of harmful substances, solid waste management, reduction of energy impacts on the biosphere of the industrial enterprises; evaluate the potential of self-purification of the territory of an industrial object; create a sustainable natural-industrial complexes.</p>	<p>Lectures, seminars, Individual work</p>	<p>Interim certification, the final pass</p>
<p><b>Be able to:</b> navigate the current system of normative-legal acts depending on the nature of the task to be solved;</p>	<p>Lectures, seminars, Individual work</p>	<p>Interim certification, the final pass</p>
<p><b>Possess skills::</b> skills determine the efficiency of the capture of pollution; the skills of choosing the optimal technological process of neutralization of industrial emissions of specified composition with the required efficiency.</p>	<p>Lectures, seminars, Individual work</p>	<p>Interim certification, the final pass</p>
<p><b>Possess skills:</b> the wording of the requirements of environmental security to the technologies of processing and neutralization of waste; skills optimization of choice of technologies of the waste treatment.</p>	<p>Lectures, seminars, Individual work</p>	<p>Interim certification, the final pass</p>
<p><b>Possess skills:</b> the skills of calculating the quantity of pollutants that are emitted in the course of technological processes at the enterprises of different branches of industry and power engineering; to determine the potential</p>	<p>Lectures, seminars, Individual work</p>	<p>Interim certification, the final pass</p>

ecological reserve of production at the enterprises of different branches of industry and power engineering;		
<b>Possess skills:</b> the official conceptual-terminological apparatus in the field of protection of the environment, the skills of filling of the main forms of state statistical reporting in the field of environmental protection.	Lectures, seminars, Individual work	Interim certification, the final pass

Themes	Contact work hours						Time and tasks for individual work		
	Lectures	Consultations	Seminars	Practical work	Laboratory work	Placements	Total contact work	Individual work	Tasks
1. Physico-chemical properties of substances, polluting the atmospheric air (density, abrasion, wettability, combustibility, specific electric resistance, the dispersion of dust)	2	0	0	0	2	᠑᠑	4	1	1. Methods of definition of fractional composition of particles
2. The General theory of the dedusting: the number of Knudsen, the speed of dust loss, the resistance movement of the particles in the curvilinear motion, co-resistance of air movement of aerosol cloud, the resistance of the air uneven motion of aerosol particles	2	0	0	0	0	᠑᠑	2	1	1. Diffusion aerosol particles.
3. The main characteristics of purification devices: cleaning efficiency (absolute, fractional), hydraulic resistance, performance, service life, the dust holding capacity.	2	0	2	0	0	᠑᠑	4	2	1. Classification of consolidation of purification devices.
4. The principle of action and basis of dry precipitators: gravitational camera, centrifugal separators, filters, electrostatic precipitators.	2	2	2	0	0	᠑᠑	6	3	1. The calculation of the inertial scrubber (cyclone)
5. The principle of action and basis wet precipitators (scrubbers): hollow газопромыватели, bubble газопромыватели, Packed scrubbers, scrubbers shock-inertial actions Venturi scrubbers.	2	2	2	0	0	᠑᠑	6	3	1. The calculation of the Venturi scrubbers.
6. The principle of action of the apparatuses for the disposal of gaseous impurities: adsorbers, absorbers, thermal oxidation.	2	0	0	0	0	᠑᠑	2	2	1. Biochemical methods of cleaning 2. Catalytic neutralization of emissions
7. Industrial waste : transportation, processing, disposal, processing of certain types of waste.	6	1	0	0	0	᠑᠑	7	9	1. Technology reprocessing certain types of waste: neutralization of gas-discharge lamps.
8. Consumer waste: environmental problems of the modern city, the choice of technology of neutralization of solid waste.	6	1	0	0	0	᠑᠑	7	9	1. Thermal methods of neutralization and disposal of solid waste: types of furnaces, waste-heat boilers.
9. The ecological characteristics of the modern	6	1	0	0	0	᠑᠑	7	9	1. Environmental

industrial production: heat-power engineering, machine-building production,									impact assessment of the Russian economy (gross emissions and discharges).
10. Improve the environmental performance of industrial enterprises: the principle of creation of малоотходного production,	6	1	0	0	0	39	7	9	1. The principles of the formation of stable natural-industrial complexes.
11. Hierarchy and the types of regulations in the field of environmental protection in Russia.	4	0	2	0	0	39	6	5	1. Objects environment 2 Types of standards in the field of environmental protection. 3. The technical regulation as a mechanism to ensure environmental safety
12. The system of environmental management in the Russian Federation on the federal level: the powers of the executive branch.	2	0	2	0	0	39	4	4	1. The division of powers in the field of ca-rounding the medium between the federal-governmental bodies of executive power, bodies of subjects of federation and the local level executive authority. 2. Supervision and control of environmental
13. The environmental management system: standard-setting and regulatory framework, the essence, principles, organizational structure	2	0	0	0	0	39	2	2	1. Deming Cycle. 2. The quality management system. ISO 14000
14. The company's activities in the field of environmental protection: document management, forms of state statistical reporting	2	2	2	0	0	39	4	7	1. Methods of filling out the form 2TP-air (homework)
<b>Iš viso</b>	<b>46</b>	<b>10</b>	<b>12</b>	<b>0</b>	<b>2</b>	<b>39</b>	<b>68</b>	<b>68</b>	<b>136</b>

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Issues in practical classes	20%	The end of practice session	Current Rating
Protection of homework	30%	End of topic	An interim pass
The final pass	50%	End of semester	The final pass

Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
<b>Compulsory literature</b>				
Koziakov AF Simakova, EN	2009	Security management activity. Textbook (neck UMO)		Moscow: Publishing Bauman. NE Bauman, 2009. - 42
Ksenofontov BS, Pavlikhin GP, Simakova, EN	2012	Industrial Ecology. Textbook (neck UMO)		Moscow: Publishing House Forum
<b>Additional literature</b>				
Edited by S. Belov	2010	Life Safety. A textbook for higher educational institutions (neck UMO)		Moscow: Higher School - 2010

Module is monitored and approved at the Department of Ecology and Safety MSTU \_\_\_\_\_ Protocol № \_\_\_\_\_.

Scientific Secretary of the Department of E9

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Head of Department,  
Prof.

Pavlikhin G.P.