

Course description

Tempus project EcoBRU

Course name
The protection of the hydrosphere from human impact in the training courses of technical specialists (for teachers of technical schools and colleges)

Expected lecturer qualifications
Teaching experience having an interdisciplinary relationship with the environment (safety-of vital activity, complex using and protection of water resources, hydrology, hydrochemistry, technosphere safety-, environmental engineering, construction, mining, metallurgy, engineering, farming, land reclamation) at least one year. Computer skills (user level)
Knowledge of methods of general and vocational training, conducting lectures, laboratory sessions interactive.
Possession of pedagogical and information technologies.

Lecturer	Educational Institution
<p>Course Director: Orekhova Natalya Nikolaevna, d.t.s., associate professor of Minerals enrichment department»</p> <p>Other team members: Gorlova Olga Evgenyevna c.t.s., associate professor of Minerals enrichment department»</p> <p>Fadeeva Natalya Vladimirovna c.t.s, associate professor of Minerals enrichment department»</p>	Nosov Magnitogorsk State Technical University

Deficit definition

Knowledge of strategies for the hydrosphere protection in the concept of sustainable development. Knowledge of modern techniques and methods using the study and evaluation of pollution of the hydrosphere. Knowledge of modern classification of water bodies, methods using water purification. Presentation of hydrosphere protection as an interdisciplinary task. The ability to link the protection of the hydrosphere with the integrated management of water resources. Representation of the effect on the degradation of biota aqueous media of different types of human and man-made pollution, on trends in the state of elements of the hydrosphere. Identification of global interconnectivity of water quality and "quality of life". Ability to explain the need for the use of a particular technology to protect the hydrosphere in the utilities, agriculture and industry. Knowledge of specific embodiments of the hydrosphere protection technologies and results. Skills assessment, in terms of ecology, literacy, problem solving protects water from contamination. Knowledge of European experience in organizing excursions to objects of protection within the hydrosphere, environmental education.

Required space in the training	Course level	Course type
The course can be used as a standalone module or after completion of the course "Fundamentals of the concept of assessing the impact on the environment" through an integrated program of training of teachers colleges / technical schools.	Used in the course didactic units of the course based on the «concept of impact assessment on the environment». For the development of the course, participants desirable domain-knowledge to the concept of protection and resource conservation.	Professional development. Course format in Moodle – «Structure».

Target group	Duration	Languages

College teachers	36 hours	Russian
------------------	----------	---------

Conditions	
Conditions: Computer room availability with access to the Internet, providing interactive learning tools, the presence of trained computer with video conferencing.	Other requirements (if applicable) The basic literature existence, its availability in electronic libraries.

Ladderpoints (1 un.=36 h)	Total Hours	Class work	Independent work (h)
1	36	26	10

Topicality for EcoBRU**
The specific link with the professional activity: Examples of pollution assessment of the hydrosphere, cleaning of domestic and industrial waters serve as an a source of information and give useful experience, which can be used in teaching of ecological block in different disciplines and then - in future professional activity of college graduates.

Course objectives
Awareness of steady development as a global standard of the future. Acquisition of skills and abilities to disclose the questions of defense of hydrosphere consistently - from understanding the sources and types of pollution to technological solutions to reduce impact. Increased knowledge of teachers for better preparation of specialists in various fields, expanding outlook of students, achieving understanding of the relationship of civilization and the state of the hydrosphere, the formation of professional competency skills, improving ecological education.

	Educational objectives of the course (see list of verbs used for educational objectives formulating)	Methods and forms of educational process organization	Monitoring forms and evaluation
Special knowledges	<p>Remember basic information about the hydrosphere and its components;</p> <p>Represent global prospects pollution of the hydrosphere;</p> <p>Learn advanced strategies and approaches to the protection of the hydrosphere and evaluation of pollution of water;</p> <p>Determine water purification devices;</p> <p>Reproduce the engineering receptions of protection of water basin to address specific environmental problems of protection the hydrosphere;</p>	<p>Interactive learning with a computer:</p> <p>Work with text of distance course with the creation of its own notes.</p> <p>Virtual excursion on water treatment plant.</p> <p>Reading in a distance course scientific and journalistic presenting articles.</p> <p>Online discussions.</p> <p>Preparing for classes in the computer lab and to the development of the material using the guidelines.</p> <p>Performing in the com-</p>	<p>Tasks completing for the input of intermediate and final tests (Passed 60% points of the total).</p> <p>Participation in communication teacher - student, helps to clarify the understanding of the basic theoretical positions apprentice course and systematize knowledge of the controlled section of the program.</p> <p>Check the results of independent assignments. (Passed for the answer, showing not only the result, but the process achieving the result with</p>

Methodological and didactic competence

Represent the defense of the hydrosphere as an interdisciplinary task.

puter lab assignments specified in methodological recommendations with the course materials.

reference to the previously studied material).

Interpret practical experience of defense of hydrosphere from position of saving resource;

Explain the physical and chemical nature of the methods of protection the hydrosphere;

Explain the value of ecological preservation of hydrosphere for a biosphere;

Apply environmental and engineering concepts;

Illustrate the lecture material with practical examples;

Make clear necessity of defense of hydrosphere from anthropogenic influence;

Implement an interdisciplinary approach to the analysis and justification of decisions;

Classify the facts and phenomena related to change of state of the hydrosphere;

Classify contaminated water to select the method of cleaning;

Make conclusions about the reasons of change of the ecological state of hydrosphere; **Project** the current state of the hydrosphere on water availability of new generations;

Lead a discussion about the problems of ecological safety of the hydrosphere, environmental behavior, environmental management, the efficiency of technological solutions;

Describe the international experience in the field of protection of the hydrosphere;

Simulate the effects of accidental pollution water objects based on the analysis of available practice;

Develop a program of training courses with the inclusion of environmental topics.

The program lecture development on the subject includes materials about protection of the hydrosphere.

Prepare a presentation which will be available revealing for students of the college the point technological solution the protection of waters against pollution of 5-10 slides (on the instructions of the curator).

Online conference.

(Credit for active participation in the conference with a report and presentation to the developed lectures and discussions on the work of other participants).

Interdisciplinary competence, social competence

Demonstrate the capabilities of the basic sciences for solving applied problems of protection the hydrosphere;
Use knowledge and skills from different disciplines to organize protection of the hydrosphere from human impacts in the future professional activity;
Use the conceptual apparatus and vocabulary communicating sciences and industries - understanding of the links between the different disciplines and psychological readiness to apply knowledge of relevant disciplines in the study of others;
Demonstrate a conscious positive attitude to ecological orientation of technical activities within a specific specialty.

Online conference.

Online discussion with experts from different fields of knowledge.

Themes / Content	Class work	Hours and tasks for independent work
<p>1. Environmental problems of the hydrosphere/ Water - one of the main resources of the planet and the human environment. Types of anthropogenic impacts on the hydrosphere. Reasons for change in the water regime and pollution-treatment. Sources of water pollution. Sources of wastewater. The main polluters. Trends in the ecological state of the elements of the hydrosphere.</p>	2	1
<p>2. Influence pollution of the hydrosphere on biota and human organism/ Biosphere and technospheric processes. Vulnerable links ecological systems of natural water bodies. Ecology of small rivers of Russia. Effect on biota degradation of aquatic environments of different types of human and man-made pollution. Identification of global interconnectivity of water quality and "quality of life".</p>	2	1
<p>3. Evaluation changes in the state of elements of the hydrosphere / Techniques and methods for studying the pollution of the hydrosphere. Devices and methods for water quality control. Standards for water quality. Methods for assessing sustainable and integrated management of water resources. Examples and the results of scientific research.</p>	2	1
<p>4. Methods and ways of cleaning and disinfection of water / Contaminated water as multicomponent solutions. Classification of contaminated water, classification methods of purification. The essence of the most common methods of purification (sedimentation, filtration, adsorption).</p>	4	2
<p>5. Protection water bodies from anthropogenic impact /</p>	6	2

Impact of technologies main industries and agriculture in Russia on natural water bodies. Organization environmentally sound and resource-saving water. Apparatus and installations water purification from impurities. Examples and results of the implementation of environmentally sound water-saving and water conservation technologies.		
6. Protection of waters against pollution from urban areas / The specificity of effect of the settlement on natural water bodies. Protection of catchment areas. Organization environmentally sound and resource-saving water. Apparatus and installations treatment of urban waste water from contamination. Examples and results of the implementation of environmentally sound water-saving and water conservation technologies in the utilities sector. Features of the organization sanitation and water management in the environmental reconstruction of residential areas (european experience).	6	1
7. Presentation of methods and technologies to protect the hydrosphere in teaching technical disciplines / Techniques and methods of forming ideas and concepts during studying the protection of the hydrosphere. Organization research work of students for the Protection of the hydrosphere. Methods of development creative potential of students on the basis synthesis of theoretical and practical knowledge. A rough plan of lectures with elements of environmental education in the field protection of hydrosphere. Plan excursions to the treatment plant. Using virtual tours.	4	2
In total	26	10

Forms of control and assessment			
Control form	Percentage ratio	Dates	Criteria assessment
Testing	40	Beginning, middle and end of the training	60% correct answers – credit.
Creative activity	20	The second half of training	Seminar development on the profile subject of teacher passing retraining, with the inclusion of her materials on the protection of hydrosphere. Presentations preparation available reveals the essence of a particular technological solution for protection of waters against pollution. 5-10 slides - credit.
Online conference	20	At end of the training	Active participation in an online conference with a report and presentation developed lectures, presentations, discussion of other participants - credit.
Online discussion	20	At end of the training	Actively participate in discussions with professional terminology - credit.

Terms and conditions of access to monitoring and assessment of knowledge (exam)

Successful development of learners of all elements of the program, performance of assessment knowledge criteria

Document type certifying the successful course viiting (Certificate?)

Certificate

Organizational guidelines

Place: Computer class, personal computers for students.

The recommended number of participants: 15

Literature and educational materials

Author	Year	Title	Pages number	Place of publication, publisher or an online link
Main literature				
Koronkevich N.I., Zaitseva I.S.	2003	Anthropogenic impacts on water resources of Russia and neighboring states	367	Moscow, publisher: « Science »
Hwan T.A, Shinkina M.V.	2015	Ecological bases of nature	320	Moscow, publisher: «Yurayt »
Golik V.I., Shevchenko E.V., Komashenko V.I., etc .	2012	Rationalization of natural resources in the development strategy of industrial enterprises	384	Moscow, publisher: "Academic Project, Culture"
Shahov I.S.	2000.	Water resources and their rational use	289	Ekaterinburg
Krivoshein D.A., Kukin P.P., Lapin V.L., etc.	2003	Engineering protection of surface waters from industrial effluents	344	Moscow, publisher: «Graduate School»
Budykina T.A., Emelyanov S.G.	2010	Processes and devices of protection the hydrosphere	288	Moscow, publisher: «Academia »
Nikanorov A.M.	2005	Scientific basis of water quality monitoring	576	St. Petersburg: Publishing: "Gidrometeoizdat "
Slastunov S.V., Koroleva V.N., Koliakov K.S. .ets.	2001	Mining engineering and the environment	272	Moscow, publisher: «Logos»
Tetior A. N.	2013	Ecology of the urban environment	352	Moscow, publisher: «Academy»
Further literature				
Dana Desonie	2007	Hydrosphere: Freshwater Systems and Pollution (Our Fragile Planet).	194	Chelsea House Pub (Library)
Lvovich M.I.	1986	Water and Life	254	Moscow, publisher: «Think»
Danilov- Danilyan V.I., K.S.Losev	2006	Water consumption: environmental, economic, social and political aspects	221	Moscow, publisher: «Science»
Serdutskaya L.F.	2009	System analysis and mathematical modeling of ecological processes in aquatic ecosystems	144	Moscow, publisher: «Librocom»
Khaustov A.P	2006	Basics of valuation of anthropogenic impact on the underground hydrosphere	100	Moscow, publisher : «Russian University friendship of peoples»
Dushkova D.O., Evseev A.V.	2011	Environment and human health. Regional researches	216	Moscow, publisher: «Faculty of Geography MGU»

		in the European North of Russia.		
Water resources assessment	1997	Handbook for review of national capabilities	153	Paris, WMO, UNESCO, http://www.eea.europa.eu/publications/water-resources-across-europe
Nikolaeva S.N .	2002	Theory and methodology of ecological education of children	336	Moscow, publisher: «Academy»
Andreeva N.D., Solomin V.P., Vasilyeva T.V.	2009.	Theory and methods of teaching ecology	203	Moscow, publisher: «Academy»