LATVIA UNIVERSITY OF LIFE SCIENCES AND TECHNOLOGIES

FACULTY OF ENVIRONMENT AND CIVIL ENGINEERING

APPROVED
by the academic staff meeting of
Department of Environment and Water Management
March 7, 2018

Environmental Engineering

Jelgava

Programme

Code of the study course at LLU IS Register**: VidZ5014**

3.0 CP (48 h): lectures 24 h, practical works 24 h, Examination.

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Compulsory course of the academic Master's degree level full-time and part-time study programme "Environment, Water and Land Engineering Sciences".

Abstract

The course is intended to provide students with the ability to recognize and understand a complex character of environmental engineering and distinguish the role of specific disciplines in research and development. Students will learn about the possibilities of conducting the research in a broad range of disciplines, including hydrology, water management, water and air protection, noise and radioactive pollution, and waste management.

The aim of the study course

The main aim of the course is to provide in-depth knowledge of environmental engineering in the study process as well as to promote the effective use of knowledge in research, practical and organizational work.

Learning Outcomes (knowledge, skills and competence)

Upon completion of the course students will gain:

1. **Knowledge** and understanding in various disciplines of environmental engineering and main research problems;
2. **Skills** to select relevant methods and technology to solve specific tasks in environmental engineering;
3. **Competence** to apply methods and technology in professional work and specific study courses, as well as to conduct independent research in disciplines of environmental engineering.

Relation of the study course with other subjects:
Not required.

Requirements for individual work:
Individual studies of the theoretical material of the course included in the list of the bibliography.

Assessment of knowledge:
Participation in seminars on the topics covered during lectures.

Requirements for the admission to the examination/test:
The type of assessment: Examination. Students should have relevant theoretical knowledge and understanding of its practical application.

***Procedure and requirements for settling missed lectures*:**
The missed lectures should be settled according to the procedures approved by the LLU Studies Regulation and internal regulation of the Faculty of Environment and Civil Engineering as well as in cooperation with the respective member of academic staff.

Extended content of the programme

Complex nature of environmental engineering and relation with other branches of science. A complex sector of science. Environmental resources and basic principles of their management. Anthropogenic loading of the environment. Sustainable use and preservation of resources. Integrated management of river basins.

Hydrology (water circulation and balance). Hydrology, hydrogeology and groundwater hydrology, their place in environmental sciences. Water circulation in nature. Water reserves and water resources. General characteristics of groundwater. Groundwater reserves and resources.

Hydrology (hydrometric measurements). Relationship between precipitation and runoff.

Hydrology (hydrological calculations and applications, basic principles of hydraulics).

Water management (water quality). Soil composition and classification. Soil moisture properties. The role of land drainage in arid and humid climatic conditions. Land drainage techniques. Land drainage systems in Latvia.

Water management (water pollution). Water pollutants and pollution types. Pollution control and water protection. Water supply systems and their elements. Water quality assurance.

Water management (water purification). Sewer systems. Waste water treatment and influx into watercourses. Treatment and use of sewage sludge. Impact of agriculture on water quality.

Atmosphere (components and processes).

Atmosphere (air pollution). Pollution control. Reduction of pollution.

Atmosphere (Problems of global air pollution). Pollution control. Reduction of pollution.

Sound and sound pollution. Pollution control. Reduction of pollution.

Radioactivity and radioactive contamination. Pollution control. Reduction of pollution.

Waste management (classification and composition). Types of waste, their characteristic parameters. Waste effects on the environment and human beings. Waste management, recycling and disposal. Hazardous waste.

Waste management (landfills).

List of practical works: (8 hours)

1. Visualization of drainage systems and determination of catchment areas using digital drainage cadastral information and ArcGIS software.
2. Land-use type analysis and its impact on water quality: an example of the Bērze river using Corine Land Cover, the results of monitoring of agricultural runoff and ArcGIS software.
3. Surface Tools application in the analysis of surface runoff risks.
4. Determination of the vegetation index using publicly available geospatial information and ArcGIS software.

Bibliography

Compulsory reading:

1. Mihelcic J.R. Fundamentals of Environmental Engineering. USA: John Wilei & Sons, Inc., 1999. 335 p.
2. Davis M.L., Cornwell D.A. Introduction to Environmental Engineering. Third Edition. USA: McGraw-Hill, Inc., 1998. 919 p.
3. Linsley R.K., Franzini J.B., Freyberg D.L., Tchobanoglous G. Water Resource Engineering. Fourth Edition. USA: McGraw-Hill, Inc., 841 p.
4. Vide un ilgtspējīgā attīstība. M. Kļaviņa un J. Zaļokšņa red. Rīga: LU akadēmiskais apgāds, 2010. 334 lpp.

Further reading:

1. Vides tehnoloģijas. D. Blumbergas red. Rīga: Latvijas Universitāte, 2010. 212 lpp.
2. Ryden L., Migula P., Anderson M. Environmental Science. Uppsala, Sweden: The Baltic University Press, 2003. 824 p.

Periodicals and other sources of information:

1. Vides vēstis: Vides aizsardzības kluba žurnāls. Rīga: Vides aizsardzības klubs. ISSN 1407-2939.
2. Vides aizsardzības un reģionālās attīstības ministrijas mājas lapa [tiešsaiste]. [Skatīts 21.02.2018.]. Pieejams: http://www.varam.gov.lv
3. USGS publiski pieejamo ģeotelpisko datu mājas lapa [tiešsaiste]. [Skatīts 21.02.2018.]. Pieejams:: https://earthexplorer.usgs.gov/