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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA
RUDN University**

Academy of Engineering

(educational division (faculty/institute/academy) as programme developer)

Department of Construction Technology and Structural Materials

(department realizing the PhD program)

COURSE SYLLABUS

Hydrotechnical structures, hydraulics and engineering hydrology

(course title)

Scientific specialty:

2.1.6 Hydrotechnical structures, hydraulics and engineering hydrology

(scientific speciality code and title)

The course instruction is implemented within the PhD programmes:

Hydrotechnical structures, hydraulics and engineering hydrology

(PhD program title)

1. DISCIPLINE (MODULE) GOAL

The purpose of mastering the discipline «Hydrotechnical structures, hydraulics and engineering hydrology» is to gain knowledge, skills, and experience in the field of calculation of structures and structures that characterize the stages of competence formation and ensure the achievement of the planned results of the development of the educational program and also preparation for the candidate's examinations and obtaining knowledge, skills and experience in the field of construction.

2. REQUIREMENTS TO PHD-STUDENTS ON FINISHING THE COURSE

Mastering the discipline «Hydrotechnical structures, hydraulics and engineering hydrology» is aimed at preparing for passing candidate exams, as well as mastering the competencies:

Proficiency in the methodology of theoretical and experimental research in the field of construction;

Proficiency in the culture of scientific research in the field of construction, including using the latest information and communication technologies;

Proficiency in methods for developing scientific and methodological foundations for research, improvement, theoretical, experimental and technical and economic justification for the use of various technical solutions and technologies in construction;

Proficiency in innovative scientifically based methods for designing structures and devices for obtaining water from natural sources, its preparation for various needs, transportation to places of consumption, subsequent processing with rational use in technological cycles, taking into account the requirements for ensuring environmental safety, increasing the cost-effectiveness and reliability of the functioning of water management systems in populated areas, industrial enterprises and territorial-industrial complexes.

3. WORKLOAD OF THE DISCIPLINE AND TYPES OF ACTIVITIES

The overall workload of the discipline «Hydrotechnical structures, hydraulics and engineering hydrology» is 3 credit units (108 academic hours).

Types of activities	Total ac. hrs.	Semesters
		3
<i>Classroom activities (total), including:</i>	60	60
в том числе:		
Lectures (LC)	30	30
Laboratory activities (LA)	–	–
Practical lessons/Seminars (PC)	30	30
<i>Independent work</i>	48	48
<i>Intermediate certification (test with assessment/exam)</i>	–	–
Overall workload	ac. hrs.	108
	credits	3

4. CONTENT OF THE DISCIPLINE

Name of the discipline section	Contents of the section (topic)	Type of study work
Section 1. Fluid mechanics	Topic 1.1. Introduction Topic 1.2. Kinematics Topic 1.3. Fluid Dynamics Topic 1.4. The main problems of the theory of laminar motion of a viscous fluid Topic 1.5. Turbulent fluid motion	LC, PC

	<p>Topic 1.6. Hydrodynamic similarity, modeling, processing and analysis of the results of experimental studies</p> <p>Topic 1.7. Calculation of the steady motion of fluid in pipes and channels</p> <p>Topic 1.8. Outflow through holes, nozzles and weirs</p>	
Section 2. Engineering hydrology	<p>Topic 2.1. General land hydrology</p> <p>Topic 2.2. Hydrometry and accounting of water resources</p> <p>Topic 2.3. Hydrological calculations</p> <p>Topic 2.4. Economic link of the water cycle</p> <p>Topic 2.5. River flow regulation</p> <p>Topic 2.6. Sediment movement and channel processes</p>	LC, PC

5. EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Room Type	Room Equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline
Class for Seminars	Room for seminar-type classes, equipped with a set of specialized furniture, board (screen) and technical / multimedia gadgets	Not necessary
Self-Work Class	Room for self-working (can be used for lecture and seminars activities), equipped with a set of specialized furniture, board (screen) and technical / multimedia gadgets and computers with an access to EIPES	Not necessary

6. METHODOLOGICAL SUPPORT AND LEARNING MATERIALS

Main readings:

1. Hydraulics in two volumes. Volume 1. Fundamentals of fluid mechanics: textbook / Zuykov A.L. - Moscow: MGSU. 2014. - 518 p. – ISBN 978-5-7264-0834-7 mgsu.ru

2. Hydraulics: textbook and workshop for secondary vocational education / V. A. Kudinov, E. M. Kartashov, A. G. Kovalenko, I. V. Kudinov; edited by V. A. Kudinov. - 4th ed., revised. and additional - Moscow: Yurayt Publishing House, 2019. - 386 p. - (Professional education). - ISBN 978-5-534-10336-6. - Text: electronic // EBS Yurayt [website]. — URL: <https://biblionline.ru/bcode/442515> (date of access: 08/31/2019). Golushko, S.K. Direct and inverse problems of mechanics of elastic composite plates and shells of rotation / S.K. Golushko, Yu.V. Nemirovsky. - Moscow: Fizmatlit, 2008. - 429 p. - ISBN 978-5-9221-0948-2; The same [Electronic resource]. - URL: <http://biblioclub.ru/index.php?page=book&id=68839>

3. Sinichenko E.K., Gritsuk I.I., Shamreeva A.A. Educational and methodical manual “Fundamentals of Hydrology. Calculation of the maximum flow rates of floods and floods in watercourses. -M., RUDN University, 2015

Additional readings:

1. Edelstein, K. K. Hydrology of the continents: a textbook for undergraduate and graduate students / K. K. Edelstein. — 2nd ed., corrected. and additional - Moscow: Yurayt Publishing House, 2019. - 297 p. — (Bachelor and Master. Academic course). - ISBN 978-5-534-08204-3. -

Text: electronic // EBS Yurayt [website]. — URL: <https://biblio-online.ru/bcode/438519> (date of access: 08/31/2019).

2. Sinichenko E.K. Determination of the estimated maximum water flow. – M.: RUDN University. 2010

3. SP 33-01-2003 Determination of the main calculated hydrological characteristics. - St. Petersburg: GGI. 2004

4. Tukhfatullin, B. A. Numerical methods for calculating building structures. Finite element method: textbook. manual for academic baccalaureate / B. A. Tukhfatullin. — 2nd ed., corrected. and additional - Moscow: Yurayt Publishing House, 2019. - 157 p. - (Series: Bachelor. Academic course). - ISBN 978-5-534-08899-1. - Access mode: HYPERLINK <https://biblio-online.ru/bcode/442338>

Internet sources:

ELS RUDN University and third party EBS, to which university students have access based signed contracts:

- RUDN Electronic Library System, <http://lib.rudn.ru/MegaPro/Web> ;
- ELS University Library Online, <http://www.biblioclub.ru> ;
- EBS Urayt, <http://www.biblio-online.ru> ;
- ELS Student Consultant, <http://www.studentlibrary.ru> ;
- EBS Lan, <http://e.lanbook.com> ;
- EBS Trinity Bridge <http://www.trmost.ru>

Databases and search engines:

- Electronic fund of legal and normative-technical documentation, <http://docs.cntd.ru> ;
- Yandex search system <https://www.yandex.ru> ;
- Google search system <https://www.google.com> ;
- Reference database Scopus , <http://www.elsevier.com/locate/scopus>

Educational and methodological materials for students' self-work studying the discipline / module:

A course of lectures on the discipline « Hydraulic engineering construction, hydraulics and engineering hydrology ».

7. ASSESSMENT TOOLKIT AND GRADING SYSTEM FOR MIDTERM ATTESTATION OF STUDENTS IN THE DISCIPLINE (MODULE)

Assessment toolkit and a grading system to evaluate the level of competences (competences in part) formation as the course results are specified on the TUIS platform.

DEVELOPERS:

Associate Professor

A.S. Markovich

HEAD OF THE DEPARTMENT

Head of Department

S.B. Yazyev