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

Engineering Academy
(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)

2024 г.

1. DISCIPLINE (MODULE) GOAL

The objective 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 FOR LEARNING OUTCOMES

Mastering the discipline is aimed at preparing for passing candidate exams, as well as mastering the following competencies:

- knowledge of the methodology of theoretical and experimental research in the field of construction;

– mastery of the culture of scientific research in the field of construction, including the use of the latest information and communication technologies;

- mastery of methods for developing scientific and methodological foundations for research, improvement, theoretical, experimental and feasibility studies for the use of various technical solutions and technologies in construction;

- possession of innovative science-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 of ensuring environmental safety, increasing the efficiency and reliability of the systems water management of 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
Classroom activities (total), including:		60	60
в том числе:			
Lectures (LC)		30	30
Laboratory activities (LA)		–	–
Practical lessons/Seminars (PC)		30	30
Independent work		48	48
Intermediate certification (test with assessment/exam)		–	–
Overall workload	ac. hrs.	108	108
	credits	3	3

4. DISCIPLINE CONTENTS

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. Main problems of the theory of laminar motion of a viscous fluid Topic 1.5. Turbulent fluid movement Topic 1.6. Hydrodynamic similarity, modeling, processing and analysis of experimental results	LC, PC

	Topic 1.7. Calculation of steady fluid motion in pipes and channels Topic 1.8. Outflow through openings, nozzles and weirs	
Section 2. Engineering hydrology	Topic 2.1. General hydrology of land Topic 2.2. Hydrometry and water accounting Topic 2.3. Hydrological calculations Topic 2.4. Economic link of the water cycle Topic 2.5. River flow regulation Topic 2.6. Sediment movement and channel processes	LC, PC

5. EQUIPMENT REQUIREMENTS AND TECHNOLOGY SUPPORT

Room Type	Room Equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline
Class for Seminars, Lectures	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
Computer class	Computer class for conducting classes, group and individual consultations, ongoing monitoring and intermediate certification, equipped with personal computers (9 pcs.), a whiteboard (screen) and technical means for multimedia presentations.	RUDN University software: Plaxis 2D Suit (Network license). Plaxis Professional (version 8) + Plaxis Dynamics Modul + PlaxFlow (version 1) - Education Registration number 90-07-019-00261-3 MS-office corporate, Registration code: 86626883 Parent program: 86493330 Status: Active

6. METHODOLOGICAL SUPPORT AND LEARNING MATERIALS

Main readings:

1. Hydraulics in two volumes. Volume 1. Fundamentals of fluid mechanics: textbook / Zuikov 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 Law [website]. — URL: https://biblio-online.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 revolution / 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 methodological manual "Fundamentals of hydrology. Calculation of maximum flows of floods and floods on watercourses." -M., RUDN University, 2015

Additional readings:

1. Edelshtein, K. K. Hydrology of continents: a textbook for undergraduate and graduate studies / K. K. Edelshtein. — 2nd ed., rev. and additional - Moscow: Yurayt Publishing House, 2019. - 297 p. — (Bachelor and Master. Academic course). — ISBN 978-5-534-08204-3. — Text: electronic // EBS Law [website]. — URL: https://biblio-online.ru/bcode/438519 (date of access: 08/31/2019).
2. Sinichenko E.K. Determination of estimated maximum water flow rates. – M.: publishing house RUDN. 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 undergraduates / B. A. Tukhfatullin. — 2nd ed., rev. 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 sourses:

ELS RUDN University and third party EBS, to which university students have accessbased 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.elsevierscience.ru/products/scopus

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

A course of lectures on the discipline «Hydrotechnical structures, hydraulics and engineering hydrology».

7. ASSESSMENT TOOLKIT AND GRADING SYSTEM FOR EVALUATION OF PHD STUDENTS' COMPETENCES LEVEL AS COURSE RESULTS

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

DEVELOPERS:

Professor A.P. Svintsov

HEAD OF THE DEPARTMENT

Director of the department S.B. Yazyev