

MINISTRY OF EDUCATION AND SCIENCE OF RUSSIA

Federal State Educational Institute of Higher Education
"Moscow Architectural Institute (State Academy)"

ANNOTATION TO THE WORK PROGRAM OF THE DISCIPLINE (MODULE) Analytical Mechanics and Strength of Materials (B1.O.35)

Assigned to the department:	Higher Mathematics and Structural Mechanics
Educational Level:	Bachelor
Specialization:	07.03.01 Architecture
Basic professional educational program of higher education:	Architecture
Form of study:	full-time
Hours/credits:	144 hrs (4 credits)

The work program for a discipline (module) is based on:

1. Federal State Educational Standard for Higher Education 07.03.01 Architecture, approved by the order of the Ministry of Education and Science of Russia No 509 of 08.06.2017
2. Curriculum for the specialization 07.03.01 Architecture, approved by the Academic Council of MARCHI. Minutes No 6-18/19 of 27.03.2019.

The work program of the discipline (module) was approved at a department meeting. Minutes: No 10 of 04.06.2019.

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INTRODUCTORY PART

1. Goals of Mastering the Module

The purpose of mastering the discipline is to prepare a future specialist to solve simple problems of Strength of Materials.

As a result of mastering the discipline, the student must:

Know: basic principles, provisions, hypotheses of strength of materials, methods and practical techniques for calculating rods under various forces, strength characteristics and other properties of structural materials.

Be able to: competently draw up calculation schemes, determine internal forces, stresses, deformations and movements both theoretically and experimentally, select the required cross-sectional sizes of rods given the requirements of strength, rigidity and stability.

2. The Place of the Module in the Educational Program of the Institute

2.1. Mathematics.

Required previous disciplines:

Mathematics

2.2. A list of subsequent academic disciplines that require knowledge, skills and abilities formed by this academic discipline:

Statics, Architectural structures

Subsequent disciplines:

Statics;

Architectural structures

3. Requirements for the results of mastering the discipline (module)

The study of this discipline is aimed at developing in students the following competencies in accordance with competency achievement indicators:

GPC-3. General Professional Competencies (GPC). Able to participate in complex design project based on a systematic approach, based on current legal requirements (codes), financial resources, analysis of the situation in social, functional, environmental, technological, engineering, historical, economic and aesthetic aspects.

GPC-3.1. knows how to: Participate in the development of urban and spacial planning solutions. Participate in the preparation of presentation materials, support of project documentation at the approval stages. Use methods of modeling and harmonization of artificial habitats when developing urban and spacial planning solutions. Use the techniques for preparing presentation materials for architectural projects and techniques of presenting them.

GPC-3.2. knows: Composition of design documentation drawings, social, functional and technological, ergonomic (including taking into account the characteristics of persons with disabilities and groups of persons with limited mobility), aesthetic and economic requirements for architectural objects of various types.

GPC-4. Able to apply methods for determining the technical parameters of objects being designed

GPC-4.1. is able to: Perform a summary analysis of source data, requirements for the design of a capital construction object and requirements for the development of project documentation. Conduct research for design solutions in accordance with the features of the spacial characteristics of the object being designed. Conduct calculation of technical and economic indicators of spacial solutions.

GPC-4.2. knows: Spacial requirements for the main types of buildings, including functional requirements determined by: intended use of the building, characteristics of the building site, requirements to ensure a comfortable living environment. Fundamentals of building structures. Principles of environmental qualities of a building including acoustics, lighting, microclimate, taking into account the needs of persons with with limited mobility and persons with disabilities. Basic construction and finishing materials, products and designs, their technical, technological, aesthetic and operational characteristics. Basic technologies of construction and installation works. Methodology for carrying out technical and economic calculations.

UC-1. Universal Competence (UC). Able to search, critically analyze and synthesize information, apply systematic approach to solving problems.

UC-1.1. is able to: Participate in pre-project research, including historical, cultural and sociological. Use tools and methods for working with bibliographic and iconographic sources. Document the results of work on collecting, processing and analyzing data, including using automation and computer-aided design and modeling tools.

UC-1.2. knows: The main sources of information, including regulatory, methodological, and reference sources. Types and methods of conducting pre-project research, including historical and culturological. Tools and methods for working with bibliographic and iconographic materials.

Main Part

1. Module Scope and Types of Academic Work

Type of academic work	Hours	Semesters / Trimesters			
		2	3	4	
Classroom work	104	34	34	36	
Lectures (LEC)	48	16	16	16	
Practical lessons (PR)	48	16	16	16	
Work in groups (GR)		0	0	0	
Classroom time spent during attestations (AT)	8	2	2	4	
Self-preparation for the exam (SP)	32	0	0	32	
Independent work	8	2	2	4	
Type of intermediate attestation		test	test	exam	
Total hours:	144	36	36	72	
Credits:	4	1	1	2	

1 credit = 36 academic hours.

2. Sub-modules, topics and types of educational activities

Se- mes- ter	Sub- mo- dule	Topic	LEC	PR	GR	AT	SP	Total hours
2	1	General concepts of Analytical Mechanics.	2					2
2	1	System of converging forces.	2	4				6
2	1	System of parallel forces. Determining reactions in beams	2	2				4
2	1	Arbitrary flat system of forces. Determining reactions in frames	4	4			1	9
2	1	Flat trusses calculation	4	4			1	9
2	1	Center of gravity of plane figures	2	2		2		6
Total in semester:								36
3	2	The subject of the course "Strength of Materials". Basic concepts and assumptions	2					2
3	2	Central tension and compression	6	6			1	13
3	2	Geometric characteristics of flat transverse sections	2	4				6
3	2	Flat bending of straight rods	6	6		2	1	15
Total in semester:								36
4	3	Definition of beam displacements during bending	2	2				4
4	3	The simplest statically indeterminate beams	4	4			2	10
4	3	Stability of compressed rods	4	4				8
4	3	Complex resistance	6	6		4	2	18
Total in semester:								40
Total:								112

The Fund of Assessment Tools is a mandatory section of the Work Program of the Discipline (WPD) (developed as a separate document).

Note: The Fund of Assessment Tools - a set of assessment materials as well as a description of forms and procedures designed to determine the level of student achievement of established learning outcomes.