

REPUBLIC OF UZBEKISTAN
MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS
FERGANA STATE TECHNICAL UNIVERSITY

Seismic resistance of buildings and structures

MODULE HANDBOOK

Field of knowledge:	700000	- Engineering, manufacturing and construction
Field of education:	730 000	- Architecture and construction
Education program (Major):	60730300	- Civil engineering

Module title	<i>Seismic resistance of buildings and structures</i>
Code (if available)	<i>ERBSM84</i>
Semester(s) of module teaching	<i>8</i>
Responsible for the module	<i>Abobakirova Zebuniso Asrorovna, PhD, associate professor, department of civil engineering</i>
Language of instruction	<i>Uzbek</i>
Connection to the curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical training and independent study</i>
Study load (including classroom and independent study hours)	<i>Total hours: 120 hours</i> <i>Auditorium hours: 48 hours, including:</i> <i>Lectures – 14 hours</i> <i>Practical training – 34 hours</i> <i>Independent work: 72 hours</i>
Credit units	<i>4</i>
Required and recommended prior knowledge for studying the module	<i>Structural design, structural mechanics, and soil mechanics</i>
Module objectives/intended learning outcomes	Module Objective: <i>The objective of this module is to equip students with the knowledge and skills to determine the internal stresses in structures caused by dynamic loads and to ensure their seismic resistance. Students will study the causes of earthquakes, their main characteristics, and the consequences of strong seismic events. The course covers seismic waves, earthquake force and energy, methods for determining seismic intensity, seismic scales, and the currently used seismic scale in Uzbekistan.</i> <i>Students will also learn about seismic zoning and microzoning, as well as the influence of soil properties on the seismic resistance of buildings and structures. Furthermore, they will acquire the necessary knowledge and competencies to perform seismic analysis of buildings and structures in accordance with current regulatory documents, specifically QMQ 2.01.03-19.</i> <i>By the end of the course, students are expected to acquire the following knowledge, skills, and competencies:</i> <i>– The student should be able to study scientific and technical literature related to structural design in the process of planning buildings and structures, prepare concise analytical reports or summaries, and apply appropriate research methods. They must also be capable of generalizing and analyzing theoretical and practical research results, and using computers for data processing based on engineering calculation techniques.</i> <i>– The student should be proficient in determining seismic loads acting on the structural elements of buildings under construction or in use; analyzing the calculation results; and demonstrating competence in the design and structural development of buildings and facilities. They must also possess knowledge about population distribution in specific regions and principles of urban planning.</i> <i>– The student must develop skills in evaluating the impact of the country's natural-climatic and socio-economic</i>

	<i>conditions on urban development systems, and in selecting suitable areas for urban settlement.</i>
Content	Module 1. Earthquakes – Introduction. Importance and methods of the course – Seismic Resistance of Buildings and Structures – Brief history of the subject's development – Interdisciplinary connections with other technical sciences – Consequences of major earthquakes – Seismic waves Module 2. Seismic Scales – Earthquakes and their impact on buildings and structures – Causes of earthquakes – Main characteristics of seismic events – Seismic force and energy – Methods for determining earthquake intensity – Seismic scales currently in use in Uzbekistan – Seismic zoning and microzoning Module 3. Modern Calculation Methods – Influence of soil properties on the seismic resistance of buildings and structures – Modern analytical methods for evaluating seismic response – Theoretical foundations of seismic resistance – Development of seismic resistance theory for buildings and structures Module 4. Regulatory Framework for Seismic Design – Seismic design of buildings and structures in accordance with regulatory document QMQ 2.01.03-19 – Methods for restoring buildings and structures damaged by earthquakes Module 5. Earthquakes and Their Structural Impact – Fundamental principles of designing earthquake-resistant frame buildings – Design principles for earthquake-resistant masonry buildings – Design principles for earthquake-resistant large-panel buildings
Forms of assessment	<i>Oral assessments, presentations, written assignments, practical tasks, and final examinations.</i>
Requirements for study and assessment	<i>Successful completion of the module requires the student to actively participate in classes and obtain the minimum passing scores in formative (current), midterm, and final evaluations in accordance with the course assessment criteria.</i>
Bibliography	1. Sh.A. Umarov, Z.A. Abobakirova. <i>Seismic Resistance of Buildings and Structures. Textbook for the specialty 70730301 – Construction of Buildings and Structures (by type of structure). Published based on Order No. 388 dated November 25, 2022, Reg. No. 263. CLASSIC Publishing House, ISBN: 978-620-0639-639. Fergana, 2022.</i> 2. E.M. Yunusaliyev, I.N. Abdullayev, Sh.M. Davlyatov, Z.A. Abobakirova. <i>Seismic Resistance of Buildings and Structures. Study guide for undergraduate students of the</i>

	<i>specialty 5340300 – Urban Construction and Economy. CLASSIC Publishing House, ISBN: 978-9943-7532-3-5, UDC: 568.66.23, 2021.</i> 3. <i>Z.A. Abobakirova. Seismic Resistance of Buildings and Structures. Textbook for undergraduate students of the specialty Construction of Buildings and Structures (by type of structure). Published based on Order No. 391 dated August 25, 2023, Reg. No. 377706.</i> 4. <i>A.I. Rusakov. Fundamentals of Structural Mechanics, Dynamics, and Stability. Slovak edition. Taylor & Francis Group, LLC, 2021.</i> 5. <i>T.R. Rashidov, S.V. Kuznetsov, B.M. Mardonov, I. Mirzaev. Applied Problems of Structural Seismic Dynamics. Book 1: The Impact of Seismic Waves on Underground Pipelines and Foundations Interacting with Soil Medium. Tashkent: “Navro’z”, 2019, 268 pages.</i>
Reviewers	<i>E.M.Yunusaliyev - Doctor of technical sciences (DSc), associate professor, department of civil engineering, Fergana state technical university</i> <i>O’J.Raxmonov - Head of the department for construction testing laboratory and technical assessment of buildings and structures, regional inspection for construction and housing-communal services, Fergana region</i>