Course Title	Construction Structures (4 ECTS)
Course/Module Code	**QK2304**
Semester(s) in Which the Course Is Taught	Semester 2/3
Assigned Instructor	Ablayeva O‘g‘iloy Shodiqulovna, Associate Professor
Language of Instruction	Uzbek
Course Type	Compulsory
Study Hours (Including Independent Study)	**Total workload – 120 hours.** **Contact hours – 48.** Lecture hours – 24. Laboratory hours –. Practical class hours – 24. **Independent study – 72 hours.**
ECTS Credits	4
Course aim, objectives and learning outcomes	**The aim of the course is to develop students' theoretical and practical knowledge of the fundamentals of design and analysis of civil buildings and structures and their structural elements.** **Course objectives:** – to teach students how to use building design documentation in the construction and erection of buildings; – to teach students to identify economically efficient design solutions for building and structural systems in construction practice. Learning outcomes: 1. Demonstrate a sound understanding of the theoretical foundations of the course and use calculation formulas and modern calculation methods to solve practical problems. 2. Select appropriate dynamic analysis models for buildings and structures and acquire basic skills in analysing them under external actions. 3. Analyse internal forces and deformations determined through calculations and demonstrate sufficient competence in ensuring the strength of buildings and structures. 4. Identify the types, functions and fields of application of structural systems and assess the strength, stiffness and stability of structural elements. 5. Use modern construction materials and technologies effectively. 6. Understand the processes of designing, analysing, selecting and operating structural systems and apply this knowledge in practice.
Course content (topics)	I. Core theoretical section (Lectures) Topic 1. Procedure for the analysis and design of structural systems. Determination of characteristic values of permanent loads and the effects of wind and snow. Topic 2. Definition of the limit state concept; design values of actions; material properties and geometric characteristics of structures; principles for checking strength and serviceability limit states. Topic 3. General information on steel structures. Structural steel sections and standard steel profiles. Topic 4. Connections in steel structures. Welded connections and their design. Bolted and riveted connections. Topic 5. Design and analysis of steel beams, steel columns and steel trusses. Topic 6. General information and design fundamentals of timber structures. Timber connections. Types of timber structures. Topic 7. General information on reinforced concrete structures. Physical and mechanical properties of concrete. Topic 8. Physical and mechanical properties of reinforcing steel. Characteristic and design strengths of concrete and reinforcement. Topic 9. Three stages of the stress-strain state of reinforced concrete structures. General information on prestressed reinforced concrete structures and their design. Topic 10. Specific features of designing reinforced concrete flexural members. Strength design of flexural members in normal sections. Strength

design of reinforced concrete flexural members in inclined sections.

Topic 11. Specific features of designing reinforced concrete compression members. Strength design of reinforced concrete compression members.

Topic 12. Masonry structures. Substructures and foundations.

II. Guidelines and recommendations for laboratory classes

The curriculum does not provide for laboratory classes.

III. Guidelines and recommendations for practical classes

Preparation for practical classes begins with the instructor's study of the initial documents (curriculum, thematic plan and other materials) and concludes with the preparation of a lesson plan. The instructor should have a clear understanding of the aims and objectives of the practical class and the amount of work each student is expected to complete.

Methodological guidelines are the principal instructional document used by the instructor when preparing and conducting practical classes.

The purpose of practical classes is to develop an understanding of theoretical material and acquire practical skills, to apply them consciously in academic and professional activities, and to develop the ability to formulate and substantiate one's own point of view.

Recommended practical topics:

1. Main properties of materials used in steel structures.
2. Fundamentals of steel structure design. Main properties of steel.
3. Loads and actions. Design of steel structures using the limit state method.
4. Design of bolted connections. Welded connections.
5. Design of centrally compressed members and centrally tensioned members. Design of steel beams.
6. Design and analysis of steel columns. Design and analysis of steel trusses.
7. Study of wood-based materials. Physical and mechanical properties of timber and timber products.
8. Fields of application of reinforced concrete.
9. Physical and mechanical properties of reinforcement and reinforced concrete.
10. Experimental fundamentals of reinforced concrete and its stress-strain behaviour. Methods for analysing reinforced concrete structures using limit state design.
11. Strength design of flexural members in normal sections. Strength design of flexural members in inclined sections. Analysis of compression members and eccentrically compressed members.
12. Methods of manufacturing and analysis of prestressed reinforced concrete structures. Design and analysis of structural elements of multi-storey buildings (beams, columns, slabs and foundations).

IV. Independent study and individual work

Independent study helps students develop the ability to learn independently and improve their professional effectiveness. Students complete independent assignments on their mobile devices under the instructor's guidance, in traditional or electronic format.

Recommended independent study topics:

1. Corrosion of metals and its types. Methods for identifying and inspecting corrosion in steel structures. Aluminium structures: advantages and disadvantages.
2. Flexural and compression steel structures.
3. Fundamentals of steel structure design.
4. Standard steel sections. General information on standard structural profiles.
5. Classification and grades of steel. Methods of increasing steel strength. Chemical composition of steel.
6. Design of structural systems according to the first group of limit states.
7. Loads and actions. Characteristic and design loads; load combinations (combined effects). Characteristic and design resistance of steel. Material reliability factor. Importance factor according to the building's intended use.
8. Design of structures according to the second group of limit states.
9. Welded connections. Types of welding. Design of welds.
10. Bolted and riveted connections. Behaviour and design of bolted connections.
11. Beams and beam structures, their types. Methods of connecting beams to one another.
12. Requirements for the overall and local stability of a main beam. Requirements

	for the composite action of the beam flange and web. 13. Columns. Centrally compressed columns. 14. Solid columns and their cross-sections. Design model of columns; selection of cross-sections for solid columns. Behaviour and design of the column core under compression. 15. Top and bottom parts of centrally compressed columns. Design of connected elements in built-up columns. Calculation of the cross-sectional area of centrally compressed columns. 16. Column base and head details. Systems of bracing elements between columns. 17. Structures of single-storey industrial buildings and their requirements. Structural schemes of the main load-bearing elements and frames of single-storey industrial buildings. 18. Roof structures of single-storey industrial buildings. Main structural elements and schemes (with purlins and without purlins). 19. History of concrete, reinforced concrete and steel structures. Creep and relaxation of concrete. Design of prestressed reinforced concrete structures. 20. Strength design of flexural members with T-shaped and I-shaped cross-sections in normal sections. Strength of reinforced concrete members subjected to combined bending and torsion.
Student assessment	Students' knowledge is assessed during the semester and at the final assessment on the basis of their mastery of the learning materials (tests, assignments, written work and oral responses). Throughout the Construction Structures course, students are assessed on a 100-point scale. A total of 50 points is allocated to current and midterm assessment (of these 50 points, 60% is allocated to current assessment and independent study, and 40% to midterm assessment), while 50 points are allocated to the final assessment. Students who score less than 30 points in the combined current and midterm assessments are not admitted to the final examination. A student who scores 30 points or more in the final assessment is considered to have passed the course.
Examination Requirements‘	Students must fully master the theoretical and practical concepts covered in the topics and be able to present the results of their analyses correctly. Students must complete the independent work and assignments set for current and midterm assessment. They must also obtain the required scores in current assessment, midterm assessment, independent study and final assessment within the specified period. Students who fail to submit current assessment, midterm assessment or independent study assignments, or who score less than 30 points for these assignments and assessment components, are not admitted to the final assessment. Furthermore, a student who, without a valid reason, misses 25% or more of the contact hours allocated to the course shall be removed from the course, shall not be admitted to the final examination and shall be considered not to have earned the credits assigned to the course. A student who fails the final examination or scores between "0–29.9" points in this assessment is considered to have an academic debt.
Recommended Literature	1. Yusupxodjayev S.A. "Qurilish konstruksiyalari" Darslik. Toshkent. "O‘zbekiston faylasuflari milliy jamiyati" 2019-yil 2. U.U.Djurayev "Temirbeton va tosh konstruksiyalari" Darslik. Jizzax 2022-yil 3. Ablayeva O‘.Sh. "Qurilish konstruksiyalari" Jizzax. Darslik. 2021-yil. 4. Asqarov B.A, Nizomov Sh.R., Temirbeton va tosh-g‘isht konstruksiyalari. Darslik. Toshkent., Iqtisod-moliya, 2008-yil 5. B.I.Matniyazov, O‘.Sh.Ablayeva, B.U.Sagatov, A.A.Gulomov., Qurilish konstruksiyalari fanidan masalalar to‘plami. Jizzax.O‘quv qo‘llanma 2022-yil 6. SHNQ 2.01.07-21. Yuklamalar va ta'sirlar. Toshkent., 2021 7. QMQ 2.03.01-24. Beton va temirbeton konstruksiyalari. Toshkent, 2024 8. www.gow.uz 9. www.ZiyoNet.uz