Course title	Design of Tall and Long-Span Buildings and Structures (ECTS 4)
Subject/Module Code	BKPBIL2204
Semester(s) Offered	Semester 1/2
Instructor	Alikabulov Shuxrat Abdumalikovich, Doctor of Science (DSc), Professor
Language of Instruction	Uzbek
Course Type	Elective
Study Hours (including independent study)	**Total hours – 120.** **Contact hours – 36.** Lecture hours – 18 Laboratory hours – not included Practical hours – 18 **Independent study – 84 hours**
ECTS	4
Course Aim and Objectives / Learning Outcomes	**Course aim:** To develop students' theoretical knowledge, practical skills and professional competencies in selecting structural systems, analysing and designing load-bearing members, ensuring spatial stiffness and overall stability, and accounting for wind and seismic effects in high-rise and long-span buildings and structures. **Course objectives:** to study the structural layouts of high-rise buildings, their spatial behaviour and load-transfer paths; to analyse beam, truss, arch, space-frame, cable and membrane systems used to cover long spans; to determine permanent and variable loads, wind, snow and seismic actions, and establish their combinations; to assess the strength, stiffness, stability and vibration resistance of structural members; to compare steel, reinforced concrete, prestressed and composite structural solutions; to evaluate the technical and economic efficiency of structural solutions; to take into account the sequence of erection, temporary bracing and construction safety requirements; to substantiate design solutions on the basis of analysis and modelling results. **Learning outcomes:** 1. Describes the types, structural systems, fields of application and behaviour principles of high-rise and long-span buildings and structures, and selects a system appropriate to the design conditions. 2. Determines permanent, variable, snow, wind and seismic loads acting on buildings and structures in accordance with applicable regulatory documents, and establishes load combinations. 3. Analyses the transfer paths of vertical and horizontal loads in high-rise buildings and the spatial behaviour of frame, diaphragm, core, outrigger and tubular systems. 4. Develops schemes for long-span beam, truss, arch, space-grid, cable and membrane structural systems and evaluates their efficiency. 5. Compares the strength, stiffness, durability and economic performance of steel, reinforced concrete, prestressed and composite structures. 6. Calculates the strength, stability, deformation and vibration characteristics of structural members and the overall system, and checks them against regulatory requirements. 7. Creates analytical models of structural systems using analysis and modelling software and interprets the results from an engineering perspective. 8. Takes into account the erection sequence, temporary bracing, technological constraints and safety requirements when constructing high-rise and long-span structures.
Course Content (Topics)	I. Main Theoretical Part (Lectures) – 18 hours M1. Introduction to the design of tall and long-span buildings and structures. Aim and objectives of the course.

M2. Structural systems and loads. Main structural schemes of tall and long-span buildings; permanent and variable loads, wind, snow and seismic actions; establishing load combinations.

M3. Structural systems of tall buildings. Principles of operation and selection criteria for framed, braced-frame, core, wall, tubular, tube-in-tube, mega-frame, diagrid and outrigger-belt systems.

M4. Wind and seismic effects on tall buildings.

M5. Vertical load-bearing and floor structures of tall buildings.

M6. Long-span beam, truss and arch structures.

M7. Spatial bar, shell and dome structures.

M8. Cable, membrane and prestressed structures.

M9. Modern methods for the analysis, design and construction of tall and long-span structures.

II. Guidelines and Recommendations for Organising Laboratory Classes.

Laboratory classes are not provided for in the curriculum.

III. Guidelines and Recommendations for Practical Classes – 18 hours

The instructor's preparation for practical classes begins with studying the initial documents (the curriculum, thematic plan and other materials) and is completed by preparing the lesson plan. The instructor should have a clear understanding of the aims and objectives of each practical class and the amount of work to be completed by each student.

The methodological guidelines are the instructor's principal methodological document for preparing and conducting practical classes.

The purpose of practical classes is to consolidate theoretical knowledge, perform engineering calculations, analyse structural solutions and develop the ability to apply them consciously in educational and professional activities.

Recommended practical topics:

1. Selection of a structural system for a tall building. Justification of the structural scheme based on the specified number of storeys, plan dimensions and building function.

2. Determination of loads acting on building structures. Calculation of permanent and variable loads and preparation of load combinations.

3. Development of an analytical scheme for wind effects on a tall building. Determination of wind loads and their distribution across storeys.

4. Assessment of the spatial stiffness and seismic performance of a tall building. Checking interstorey drift, overall deformation and torsional response.

5. Development of a structural scheme for a long-span steel truss. Selection of geometry, support conditions and preliminary member cross-sections.

6. Analysis of a long-span beam or arch structure. Determination of internal forces and deformations, and selection of the cross-section.

7. Design of a space-grid structure. Selection of the module, geometry, member arrangement and joint solution.

8. Analysis of a cable or membrane structural system. Evaluation of the load-transfer scheme and the functions of supports and tension members.

9. Comparison of alternative structural solutions for a tall or long-span building. Presentation of analysis results, material consumption, ease of erection and the proposed design solution.

IV. Independent Study and Individual Work – 84 hours

Independent learning helps students develop their capacity for self-directed improvement and enhances the effectiveness of their professional activities. Students complete independent assignments under the instructor's guidance in traditional or electronic form.

Recommended topics for independent study:

1. History of the development of tall buildings and their modern structural systems.

	2. Comparative analysis of frame, core and hybrid systems in tall buildings. 3. Wind loads and aerodynamic factors affecting tall buildings. 4. Structural solutions and regulatory requirements for tall buildings in seismic regions. 5. Floor systems, transfer floors and column systems in tall buildings. 6. Advantages and limitations of steel, reinforced concrete and composite structural systems. 7. Structural solutions for beam and truss systems in long-span buildings. 8. Behaviour principles of arch, dome and shell structures. 9. Space-grid and double-layer grid structures. 10. Cable and membrane roof structures: types and applications. 11. Joints, connections and erection splices in long-span structures. 12. Vibration, deformation and stability issues in long-span structures. 13. Erection sequence and temporary bracing of tall and long-span structures. 14. Study of the structural solution of a tall building or long-span structure from international practice and preparation of a presentation.
Student Assessment	Student assessment is based on the level of mastery of the course materials during the semester and final assessment (tests, assignments, and written and oral work). Throughout the course Design of Tall and Long-Span Buildings and Structures, students are assessed on a 100-point scale. Of this total, 50 points are allocated to current and midterm assessment (60% of the 50 points for ongoing assessment and independent study, and 40% for midterm assessment), while 50 points are allocated to the final assessment. Students whose combined current and midterm score is below 30 points are not admitted to the final examination. A student who obtains 30 or more points in the final assessment is considered to have passed the course.
Examination Requirements	The student must have fully mastered the theoretical and practical concepts related to the topics and be able to present the results of analyses correctly. The student must complete the assignments given as independent work and within the current and midterm assessment formats. In addition, the student must obtain the required scores in current assessment, midterm assessment, independent study and final assessment in the relevant course within the prescribed period. A student who has not submitted the current assessment, midterm assessment and independent study assignments, or who has scored less than 30 points for these assignments and assessment components, is not admitted to the final assessment. Furthermore, a student who misses 25 percent or more of the contact hours allocated to the course without a valid reason is excluded from the course, is not admitted to the final examination and is considered not to have earned the relevant credits for the course. A student who fails the final examination or obtains a score in the range of “0–29.9” in this examination is considered to have an academic debt.
Recommended Literature	1. Taranath B.S. Tall Building Design: Steel, Concrete, and Composite Systems. CRC Press, 2016. – 872 p. 2. U.U.Djurayev “Temirbeton va tosh konstruksiyalari” Darslik. Jizzax 2022-yil 3. Asqarov B.A, Nizomov Sh.R., Temirbeton va tosh-g‘isht konstruksiyalari. Darslik. Toshkent., Iqtisod-moliya, 2008-yil 4. Yusupxodjayev S.A. “Qurilish konstruksiyalari” Darslik Toshkent. “O‘zbekiston faylasuflari milliy jamiyati” 2019-yil 5. SHNQ 2.01.07-21. Yuklamalar va ta’sirlar. O‘zbekiston Respublikasi

	qurilish me’yoriy hujjati, 2024. 6. SHNQ 2.03.05-23. Po‘lat konstruksiyalar. Loyihalash talablari. O‘zbekiston Respublikasi Qurilish va uy-joy kommunal xo‘jaligi vazirligi, 2024. 7. SHNQ 2.03.01-24. Beton va temir-beton konstruksiyalar. O‘zbekiston Respublikasi Qurilish va uy-joy kommunal xo‘jaligi vazirligi, 2024. 8. SHNQ 2.03.10-24. Tomlar va tom qoplamalari. O‘zbekiston Respublikasi Qurilish va uy-joy kommunal xo‘jaligi vazirligi, 2025. 9 https://lex.uz – O‘zbekiston Respublikasi qonunchilik ma’lumotlari milliy bazasi; https://gov.uz/oz/mc/pages/shaharsozlik-normalari-va-qoidalari – shaharsozlik normalari va qoidalari.