Course title	**Computer Modelling (ECTS 4)**
Course/module code	**KM2706**
Semesters of instruction	Semester 4/8
Assigned instructor	Khalikov Sanjar Ravshanovich, assistant
Language of instruction	Uzbek
Course type	Compulsory
Academic hours (including independent study)	**Total hours – 120.** **Classroom hours – 60.** Lectures, hours – 0 Laboratory classes, hours – 0 Practical classes, hours – 60 **Independent study – 60 hours**
ECTS	4
Aim and objectives of the course / learning outcomes	**Aim of the course** – the aim of teaching the course "Computer Modelling" is to develop in students of the 60730100 – Architecture (by types) programme the knowledge, skills and competencies for modelling architectural objects in two and three dimensions using modern computer programs, and for depicting and presenting a project in digital form. **Objective of the course** – the main objective of teaching the course "Computer Modelling" is to teach students the capabilities of CAD, BIM and visualization programs, to ensure harmony of forms in the volumetric-spatial modelling of a building and its surroundings, to instil the skills of preparing drawings, photorealistic images and materials for model making from a digital model, and also to develop a creative approach to creating the modern appearance of a project. **Learning outcomes:** 1. Acquires practical skills in 2D and 3D modelling of architectural objects on the computer. 2. Knows the capabilities of modern CAD, BIM and visualization programs and is able to choose the program suited to a project task. 3. Is able to ensure harmony of forms in the volumetric-spatial modelling of a building and its surroundings. 4. Acquires the skills of preparing photorealistic images and project documentation on the basis of a digital model. 5. Is able to use the computer model effectively in model making and in presenting a project.
Course content (topics)	**I. Main theoretical part (lectures)** Lectures are not provided for in the standard curriculum of the course. **II. Guidelines and recommendations for organizing laboratory classes.** Laboratory classes are not provided for in the standard curriculum of the course. **III. Guidelines and recommendations for practical classes**

	The instructor's preparation for a practical class begins with the study of the source documents (curriculum, thematic plan, etc.) and ends with the drawing up of a lesson plan. The instructor must have an understanding of the aim and objectives of the practical class and of the volume of work that each student must complete. The methodological guidelines are the instructor's main methodological document when preparing and conducting practical classes. The aim of the practical class is the understanding of theory and the acquisition of skills. It consists in developing the ability to apply them consciously in educational and professional activity and to formulate one's own point of view convincingly. **Recommended topics for practical classes:** 1. Introduction to computer modelling. Aims and objectives of the course. Types of software (CAD, BIM, 3D modelling and visualization programs) and their role in architectural design. 2. The computer modelling environment: interface, units of measurement, coordinate system, basic settings and file formats. 3. Preparing 2D drawings in AutoCAD: lines, layers, blocks, scale and print settings. 4. Drawing plans, facades and sections on the computer; adding dimensions, symbols and annotations. 5. Preparing existing drawings for modelling: import, cleaning, scaling and separation into layers. 6. The basic tools of SketchUp. Creating simple volumetric forms. 7. Modelling the volume of a building: walls, floors, roof and floor heights. 8. Modelling doors, windows and other openings. Working with groups and components. 9. Modelling complex forms: curved surfaces, offset, extrusion and other methods. 10. Creating a model of the territory and site: relief, streets and pathways, placement of the building. 11. Applying materials and textures; adjusting and managing them. 12. Lighting and shadows. Setting up sunlight according to geographic location, date and time. 13. Scenes and cameras. Preparing perspective and orthogonal views. 14. Fundamentals of BIM modelling (Revit): project template, system of levels and grids. 15. Creating wall, floor, ceiling and roof elements in Revit. 16. Element families, specifications and the preparation of schedules. 17. Modelling the landscape and the environment: plants, paving, water bodies and small architectural forms. 18. Modelling the interior: rooms, furniture and decorative elements. 19. Photorealistic visualization (rendering): lighting, camera and quality settings. 20. Image post-processing: adjusting colour and contrast and adding environment elements in Photoshop.

	21. Using the model for model making (maketlash): preparing unfoldings, and exporting for laser cutting and 3D printing. 22. Final project: composing the presentation board, finishing the model and defending the work. **IV. Independent study and independent work.** The independent-learning competence helps students in their independent self-development and in increasing the effectiveness of their professional activity. Students carry out independent work on their mobile devices under the guidance of the instructor, in traditional or electronic form. **Topics recommended for independent study:** 1. The history of the development of computer modelling and its significance in architecture. 2. Comparison of modern CAD and BIM programs. 3. Types of computer graphics: vector and raster graphics. 4. File formats (DWG, DXF, SKP, RVT, OBJ, FBX) and their conversion. 5. The layer system and drawing standards in AutoCAD. 6. Rules for finishing drawings and choosing a scale. 7. Working with components and dynamic components in SketchUp. 8. Methods of modelling complex architectural forms. 9. Methods of digital modelling of relief and territory. 10. Building a library of materials and textures. 11. Fundamentals of natural and artificial lighting; rendering settings. 12. The essence and advantages of BIM technology. 13. Creating and editing element families in Revit. 14. Automatic generation of project documentation (specifications, schedules). 15. Modelling landscape elements and working with a plant library. 16. Placing furniture and light fixtures in interior modelling. 17. Capabilities of real-time visualization programs. 18. Image post-processing and preparation of presentation materials. 19. The use of virtual and augmented reality technologies in architecture. 20. Creating a physical model from a digital model: laser cutting and 3D printing technologies.
Student assessment	The assessment of students' knowledge is based on indicators of the mastery of the learning material during the semester and on the final assessment (results of tests, assignments, and written and oral work). In the course "Computer Modelling", students are assessed on a 100-point system. Of these, 50 points are allocated to the result of ongoing and interim assessment (of the 50 points, 60% is ongoing assessment and independent study, and 40% is interim assessment), and 50 points to the result of the final assessment. Students whose total result for ongoing and interim assessment is below 30 points are not admitted to the final examination. A student who scores 30 or more points in the final assessment is considered to have mastered the course.
Examination requirements	The student must fully master the theoretical and practical concepts on the topic and be able to reflect the results of analysis correctly. The student

	must complete the tasks given in the ongoing and interim forms of assessment, as well as the independent work. In addition, within the established deadlines the student must score the required number of points in ongoing assessment, interim assessment, independent study and final assessment in the relevant course. A student who has not completed the tasks of ongoing assessment, interim assessment and independent study, and who has scored less than 30 points for these tasks and types of assessment, is not admitted to the final assessment. In addition, a student who, without a valid reason, misses 25 or more percent of the classroom hours allocated to the course is removed from the course, is not admitted to the final examination, and is considered not to have earned the corresponding credits for the course. A student who fails the final examination or scores in the range "0–29.9" in these types of examination is considered to have an academic debt.
Recommended literature	**Main literature:** 1. Ching F.D.K. Architectural Graphics. 6th ed. – Hoboken: Wiley, 2015. 2. Ching F.D.K. Architecture: Form, Space, and Order. 4th ed. – Hoboken: Wiley, 2014. 3. V.V. Talapov. Fundamentals of BIM: An Introduction to Building Information Modelling [Талапов В.В. Основы BIM: введение в информационное моделирование зданий]. – Moscow: DMK Press, 2011. **Additional literature** 4. A.A. Turdiyev. Model Making (Maketlash and Modelling). Study guide. – Tashkent, 2024. **Internet resources** 5. https://help.sketchup.com 6. https://help.autodesk.com 7. https://docs.blender.org