Course Name	Fundamentals of Computer-Aided Design (ECTS 4)
Topic/Module Code	KLA2304
Semester(s) in Which the Course Is Taught	3rd semester
Assigned Lecturer	Rahmonov Navruzbek Ergashevich
Language of Instruction	Uzbek
Course Type	Elective
Study Hours (including independent study)	Total hours – 120. Classroom hours – 48. Lecture hours – 24. Practical training hours – 24. Independent study – 72 hours
ECTS	4
Course Objectives and Tasks / Learning Outcomes	The purpose of teaching the course is to provide students with theoretical knowledge related to architectural and construction design projects, the basic concepts and standards of architectural and construction drafting, and the principles of computer-aided design, as well as to develop their skills in applying this knowledge in practice. To achieve this purpose, the course develops students' theoretical knowledge, practical skills, methodological approaches to computer-aided design, and spatial visualization skills. The course is taught on the basis of an educational and methodological complex, including modern pedagogical technologies (a technological model and process map developed taking into account the specific characteristics of the course). In teaching the computer graphics section, students master the course through practical interaction with computers. **Learning outcomes:** 1. Students acquire theoretical knowledge of the course and information related to practical competencies. 2. Students develop the ability to apply computer graphics programs in design. 3. Students develop experience in making full use of the convenience and advantages of software based on modern equipment and technologies. 4. Students develop a comprehensive understanding of projects through the use of high-quality visualization. 5. Students acquire skills in collecting, processing, and preparing data for digital design. 6. Students acquire skills in creating and editing 2D drawings and 3D digital models in AutoCAD and Revit. 7. Students acquire skills in managing digital projects, analyzing project data, and using it effectively in the design process. 8. Students acquire skills in preparing, presenting, exporting, and collaboratively developing completed digital projects using modern technologies.
Course Content (Topics)	**I. Main Theoretical Part (Lectures)** Topic 1: Fundamentals of computer-aided design. CAD systems and their role in construction. Topic 2: Geometric objects and drawing commands in AutoCAD. Topic 3: Methods of editing and modifying drawing objects. Topic 4: Layers, line types, and drawing standards. Topic 5: Creating dimensions, texts, and conventional symbols on a computer. Topic 6: Fundamentals of computer-aided design of construction plans. Topic 7: Computer-based representation of building structural elements. Topic 8: Creating sections and elevations in construction drawings. Topic 9: Development of structural drawings using computer graphics. Topic 10: Formatting drawings and preparing them for printing. Topic 11: Fundamentals of 3D modeling of building projects. Topic 12: Final project in computer-aided design and modern CAD/BIM

technologies.

II. Guidelines and Recommendations for Practical Training

Preparation for practical classes begins with studying the initial documents (curriculum, thematic plan, etc.) and ends with preparing the lesson plan. The teacher should have a clear understanding of the objectives and tasks of the practical class and the amount of work each student is expected to complete.
Methodological guidelines are the main methodological document used by the teacher when preparing and conducting practical classes.
The purpose of practical training is to apply theoretical knowledge through the use of computer technologies and to develop practical skills. It also aims to develop students' ability to consciously apply these skills in educational and professional activities and to strengthen their knowledge and skills in building design.

Recommended practical topics:

1. Introduction to AutoCAD. Working environment, menus, commands, and coordinate systems.
2. Drawing geometric shapes using Line, Polyline, Circle, Arc, Rectangle, and other basic commands.
3. Using the Move, Copy, Rotate, Mirror, Offset, Trim, Extend, Fillet, and Chamfer commands.
4. Creating layers for construction drawings and setting color, line type, and line thickness.
5. Adding dimensions and text to drawings using the Dimension, Text, Mtext, and Leader commands.
6. Drawing the axes, walls, and rooms of a single-storey building in AutoCAD.
7. Representing foundations, columns, girders, walls, and floor slabs in drawings.
8. Developing a building elevation and vertical section based on a given building project.
9. Drawing a foundation plan, structural plan, and structural details.
10. Setting up Layout, Viewport, scale, frame, and title block. Exporting the drawing to PDF format.
11. Modeling simple building elements in a 3D environment and creating a visual representation.
12. Final project: preparing and defending the building plan, elevation, section, and structural drawings.

III. Independent Learning and Independent Work

Independent learning competency helps students develop themselves independently and contributes to improving the effectiveness of their professional activities. Students complete independent assignments on their mobile devices under the guidance of the teacher, either in traditional or electronic form.
Recommended topics for independent study:

1. Computer-aided design systems (CAD) and their application in construction.
2. AutoCAD interface, working environment, and basic drawing commands.
3. Methods of creating and editing geometric objects in AutoCAD.
4. Managing layers, line types, colors, and line weights in construction drawings.
5. Formatting text, dimensions, conventional symbols, and annotations in AutoCAD.
6. Developing the plan of a single-storey residential building in AutoCAD.
7. Computer-aided design and formatting of a building elevation and vertical section.
8. Representation of building structural elements—foundations, columns, girders, walls, and floor slabs—in computer drawings.
9. Formatting construction drawings according to scale, sheet format, frame, and title block requirements.
10. Preparing layouts, viewports, and drawings for printing in AutoCAD.
11. The role of 3D modeling and BIM technologies in construction design.

	12. Final practical project: developing the building plan, elevation, section, and structural drawings on a computer.
Student Assessment	Students' knowledge is assessed during the semester and final assessment based on the level of mastery of the teaching materials (test, assignments, written and oral work results). During the Fundamentals of Computer-Aided Design course, students are assessed on a 100-point scale. Of these, 50 points are allocated to current and midterm assessment (60% of the 50 points for current assessment, 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 successfully completed the course.
Requirements for Admission to Examinations	A student must fully master the theoretical and practical concepts related to the topic and be able to correctly present the results of analysis. The student must complete the assignments given as part of independent work and current and midterm assessment. In addition, within the specified period, the student must obtain the required number of points in current assessment, midterm assessment, independent study, and final assessment. A student who fails to submit current assessment, midterm assessment, or independent study assignments, or who scores less than 30 points for these assignments and assessment types, is not admitted to the final assessment. A student who, without a valid reason, misses 25% or more of the classroom hours allocated to the course is excluded 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 receives a score in the range of "0–29.9" on this type of examination is considered to have an academic debt.
Recommended Literature	**Main Literature:** 1. N.A.Qarshiboyev "Kompyuterda loyihalash" Darslik - Toshkent: "Impress media"MCHJ bosmaxonasi, 2023. - 254 b 2. K.G.Jabborov, Sh.U.Eshonkulov, Sh.E.Eshonkulov, "Qurilishda axborot texnologiyalari" o'quv qo'llanma. "JizPI qoshidagi tipografiya", 2022-yil. 136 bet. **Additional Literature:** 3. Saydaliyev S.S Kompyuterda loyihalash fan va texnologiyalar. 2019 y. 260 bet. 4. E.Finkelstein, L.Ambrosius. AutoCAD18 J.WileyvaSons Inc. Indianapolis. 2017y. 5. Digital Cartography. Dorris Scott, Washington University. Copyright Year: 2024. ISBN 13: 9781941823200 – 5 p. **Internet Resources:** 6. www. Autodeks.com. 7. www.AutoCAD.ru 8. www.google.uz