

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

Engineering and Computer Graphics

MODULE HANDBOOK

Field of knowledge:	700000	– Engineering, energy and construction
Educational field:	730000	– Architecture and construction
Education program:	60730300	– Civil engineering

Module title	Engineering and Computer Graphics
Code (if available)	ICG1M14, ICGM24
Semester(s) of module teaching	1,2
Responsible for the module	Kadirov Murod Yusupovich, Department of Architecture and Computer Graphics, Senior Lecturer
Language of instruction	Uzbek, Russian
Connection to the curriculum	Compulsory
Teaching methods	Lectures, practical classes, independent study
Study load (including classroom and independent study hours)	Total: 240 hours Auditorium hours: 96 hours Lectures – 14 hours, practical classes – 82 hours, independent study – 144 hours
Credit units	8
Required and recommended prior knowledge for studying the module	Mathematics, geometry, drawing, computer science and information technology
Goals and expected results of the module	The goal of the module is to provide students with the knowledge, skills and abilities required by state educational standards and reflecting the latest achievements in domestic and foreign science and technology, necessary for the development of engineering thinking and the successful implementation of ideas of any complexity using modern computer-aided design systems. The practical task is to master the skills of creating and editing drawings of various profiles in the AutoCAD system. The objectives of the discipline include: – mastering the design of technical documentation, drawing and editing using computer programs; – acquiring skills in using software modules to create three-dimensional objects; – familiarisation with software that allows the creation of the most accurate models of objects and the preparation of a complete set of project documentation in accordance with international standards based on modern information technologies; – training in methods for creating electronic versions of design documents, constructing drawings, printing finished drawings, and using individual and standard blocks. In the discipline ‘Engineering and Computer Graphics’, students must master methods for constructing graphic models of space based on central and orthogonal projection, as well as be able to apply these graphic models to independently solve positional and metric problems of spatial objects and their mutual arrangement. Requirements for students' knowledge, skills and abilities Students must: • Master methods for constructing flat models of spatial forms • Master graphic methods for solving geometric problems in drawings

	• <i>Be able to represent spatial images and their position based on given flat drawings, as well as construct their visual images</i> • <i>Be able to produce parts, products and other objects based on ready-made drawings</i> • <i>Be able to produce drawings of parts, products and other objects based on real-life examples</i> • <i>Be able to develop drawings of newly created parts, products and other objects</i>
Content	<i>Module 1. Simple geometric surfaces. Geometric analysis of a product.</i> <i>Explicit images and projections of simple geometric surfaces. Drawing of a simple product and its geometric analysis. Theoretical foundations of construction in engineering and computer graphics.</i> <i>Module 2. Fundamentals of projection. Projections of points, straight lines and planes. Monge's method.</i> <i>Projections of points, straight lines and planes. Diagrams of points, straight lines and planes by coordinates. Straight lines. Straight lines in special positions. Traces of straight lines. Mutual position of two straight lines. Plane. Positions of planes.</i> <i>Module 3. Polyhedra and surfaces.</i> <i>Polyhedra and their types. Developments of polyhedra onto a plane. Formation of surfaces. Surfaces and their types. Developments of surfaces.</i> <i>Module 4. Mutual intersection of surfaces.</i> <i>Intersection of surfaces with a plane. Real size of the intersection. Intersection of surfaces with a straight line.</i> <i>Module 5. Axonometric projections.</i> <i>Isometric and dimetric projections.</i> <i>Module 6. Shadows in orthogonal projections.</i> <i>Direction of the light beam. Own and cast shadows of a point, a straight line and a flat figure. General information about shadows. Own and cast shadows of objects. Direction of the light beam. Shadows in orthogonal projection. Shadows of points, straight lines and flat figures.</i> <i>Shadows of geometric bodies and architectural details. Own and cast shadows of basic geometric bodies. Shadows of architectural elements (cornices, columns, projections) in orthogonal projection. Choosing the direction of light rays, constructing own and cast shadows of geometric bodies.</i> <i>Shadows in axonometric projection. Direction of light rays. Shadows of points, lines and flat figures in axonometry.</i> <i>Shadows of groups of geometric bodies in axonometry. Own and cast shadows of geometric bodies and architectural elements (cornices, columns, projections) in axonometric projection. Choosing the direction of light rays, constructing real and cast shadows in axonometry.</i>

	<i>Module 7. Perspective and shadows.</i> <i>Perspective construction apparatus. Perspective of a straight line, flat figure and geometric body. General information about shadows in perspective.</i> <i>Methods of constructing perspective. The architects' method. Methods for constructing perspective.</i> <i>Constructing shadows in perspective. Own and cast shadows of geometric bodies in perspective. Rules for constructing shadows in perspective. Methods for constructing shadows in perspective.</i> <i>Module 8. Projections with digital designations.</i> <i>Projection of a point. Projection of a straight line. Projections with digital designations. Projection of a point with digital designations. Projection of a straight line with digital designations.</i> <i>Module 9. Determining the boundaries of earthworks. Cross-section of a construction site.</i> <i>Constructing planes on mountain and hill slopes. Determining the boundaries of earthworks. Construction site section. Determination of lines of intersection with the relief (horizontals).</i> <i>Module 10. Connections. Detachable and non-detachable connections. Threads.</i> <i>Threaded connections. Calculation of connection element dimensions. Symbols.</i> <i>Connections. Detachable and non-detachable connections. Threads and their types. Thread designation. Metric thread. Inch thread. Threaded connection. Calculation of connection element dimensions. Symbols. Calculation of bolt and key connection parameters.</i> <i>Module 11. Architectural drawing.</i> <i>Contents of architectural drawings. Names and markings of architectural drawings. Scales and structural elements. General information about architectural drawing.</i> <i>Dimensioning in architectural drawings. Basic symbols used in architectural drawings.</i> <i>Building plan. Types and thickness of walls, location of doors and windows, symbols. Rules for constructing a building plan.</i> <i>Building section. Constructing a section and depicting stairs in a section. Elevation dimensions. Building facade. Symbols. Rules for constructing a building section and depicting stairs.</i> <i>Drawings of building structures. Their types and symbols. Drawings of reinforced concrete and metal structures. Symbols. Drawings of wooden structures and their symbols.</i> <i>Module 12. Computer graphics.</i> <i>Purpose of AutoCAD and Compass 3D graphic editors.</i> <i>Starting the programme. Main elements of the AutoCAD and Compass 3D working window.</i> <i>Main panels of AutoCAD and Compass 3D.</i> <i>Entering commands and operations. Types of objects on the</i>
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	<i>properties toolbar.</i> <i>Setting thickness and colour, commands for deleting and scaling objects in real time. Saving and opening drawing files.</i> <i>Description of the commands on the standard toolbar. Learning all the commands on the drawing toolbars using examples.</i> <i>Learning all the commands on the editing toolbars using examples.</i> <i>Learning all the commands on the object snap toolbar using examples.</i>
Forms of assessment	<i>Oral questioning, practical assignments and final exams..</i>
Requirements for study and assessment	<i>To successfully complete the module, students must attend classes and achieve the minimum required marks in the interim and final assessments.</i>
Bibliography	Sh. Murodov, L. Khakimov, A. Kholmurzaev. <i>Descriptive Geometry</i>. Tashkent, 2008. A.A. Kholmurzaev, A.N. Valiev. <i>Course in Descriptive Geometry</i>. Sh.K. Murodov, textbook. Tashkent, 'History and Page', 2022. – 540 p. S.S. Saidaliyev. <i>Descriptive Geometry and Engineering Graphics</i>. Tashkent State Pedagogical University Press, 2017. S.S. Saidaliyev, M.M. Khamrakulova. 'Construction Drawing.' Tashkent State Pedagogical University Press, 2017. A.A. Karimov. <i>Engineering and Computer Graphics</i>. Textbook. Tashkent, 'Donishmand Ziyosi,' 2022. – 312 p. M.M. Khamrokulova. <i>Descriptive Geometry and Engineering Graphics</i>. Textbook, 2021, 256 p. V.N. Karimova. <i>Descriptive Geometry and Engineering Graphics</i>. Textbook. 2019. A.N. Valiev et al. <i>Drafting</i>. Textbook. 2020. N.Kh. Gulomova. <i>Drafting</i>. Textbook. 2019. R.R. Umirzakov et al. <i>Engineering Drawing and Sketching</i>. Textbook. 2018. E.I. Ruzyev, R.O. Taganova. <i>Drawing Geometry and Graphic Tasks in Perspective</i>. Textbook. 2019. Anil M. Bisen. <i>Engineering Machine Drawing</i>. Guide English. 744 B72. 978-81-224-5706-3. London: Globally, 2020
Reviewers	A.M. Khusanboev — Associate Professor, Department of Architecture and Computer Graphics, Fergana State Technical University B.M. Kurbanova — Head of the Department of Fine Arts, Fergana State University, PhD