Bachelor program,
Instrumentation Engineering (INEN) program, "Industrial machines" department

Course Unit Title	Engineering graphics and design
Course Unit Code	VTSS-B08
Type of Course Unit	Compulsory
Level of Course Unit	1 st year INEN program
National Credits	0
Number of ECTS Credits Allocated	4
Theoretical (hour/week)	1
Practice (hour/week)	2
Laboratory (hour/week)	0
Year of Study	1
Semester when the course unit is delivered	1
Course Coordinator	Tatyana Huseynova
Name of Lecturer (s)	Tatyana Huseynova
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	-

Course description:

The major focus of the EGD course is to expose students to design process, research and analysis, teamwork, communication methods, , engineering standards, and technical documentation.
Students will employ engineering and scientific concepts in the solution of engineering design problems. In addition, students use a state of the 3D solid modeling design software package to help them design solutions to solve proposed problems. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges that increase in difficulty throughout the course.

The students acquaint with the basic knowledge and skills in engineering drawings and the capability to read and interpret blue prints for manufacturing. The students can also develop an understanding of 2D and 3D computer aided drafting with the requirements of good engineering drawings and be able to apply them to their work.

Using computers at the beginning of the engineering education will help the students visualize engineering components. Appropriate sketching exercises will be done during practice hours by using a package program namely AutoCAD. The CAD software should be perceived by the student as a tool for producing engineering drawings.

Objectives of the Course:

The purpose of this course is to familiarize students with basic concepts and the use of computer technology in the design process.

Students are introduced to basic knowledge and skills in engineering and computer graphics and simulation effects in the design process.

Students have the opportunity to apply simulation effects in practical work.

Learning Outcomes

At the end of the course the student will be able to		Assessment
1.	Get information on computer design	2,3
2.	Develop assembly drawings	1,2,3
3.	Skillfully apply elements of computer graphics in the design process	1,2,3
4.	Understand the basic idea of the simulation process	1,2,3
5.	Use simulation effects in the design process	1,2,3

Assessment Methods: 1. Final Exam, 2. Presentation, 3. Seminars

Course's Contribution to Program

		CL
1	Ability to develop as a specialist in the field of fundamental sciences and apply basic knowledge.	4
2	Ability to analyze and model functional and structural schemes of various purpose devices and systems.	4
3	Ability to use modern methods and tools, creation, selection, and application of engineering and information technology tools and modern devices and equipment.	5
4	The ability to use the strategy of team cooperation in the exchange of information,	5

	knowledge, and experience to achieve the set goal.	
5	As a result of training, the ability to use engineering knowledge, mathematical models, and basic concepts of physics and chemistry in production and technological processes, automation, measurement, and control systems.	4
6	The ability to use modern software to process technical documents of devices, design their structures, and algorithmize processes.	4
7	The ability to apply artificial intelligence to improve the quality characteristics of measurement and control systems.	4
8	The ability to process information acquisition, processing, and transmission processes based on schematic and programmable logical integrated circuits.	4
9	Ability to use knowledge to improve quality indicators and environmental safety of production processes.	4
10	Self-development ability to apply theoretical and experimental knowledge in solving modern engineering problems.	3
CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)		

Course Contents

Week	Chapter	Topics	Exam
1	**Lec** [1], p. 35-41, 44-50 [2], p. 105-121 **Sem** [1], p. 4-19	**Lecture.** Introduction. The methods of projections. Orthogonal projection. Planes of projections. Point. The projections of different points to the plane of projections. Straigh line. Position of straight line relative to projection planes. Relative position of point and straight line. True lenght of straight line segment. **Seminar.** Lettering. Drawing sheet. Scales. Framing and tittle block on a drawing. Dimensioning. **Individual work№1.** Preparation of drawing.	
2	**Sem** [1], p. 20-33 [2], p. 54-64	**Seminar.** Geometric constructions. Dividing and Constructing lines and angles. Dividing of line into two equal parts. Blending of two lines. Blending of Circle and line. Blending of two circles. Internal and external blendings. **Individual work№2.** Blending between to objects.	
3	**Lec** [1], p. 52-58, 61-63 [2], p. 140-170 **Sem** [1], p. 35-41 [2], p. 105-121	**Lecture.** Planes. Projections of planes. Ways of plane representation on drawing. Traces of planes. Principal lines of plane. Two planes. Parallel and perpendicular planes. Intersection of two planes. Method of auxiliary section planes. Line cutting a plane. Conversion methods of planes of projection. **Seminar.** Considering the positions of points in the space and constructing their complex drawings. Position of straight line relative to projection planes. True lenght of straight line segment. Traces of straight line. Mutually position of two straight lines. Tasks. **Individual work№3.** Points. Coordinates of points. Position of points.	
4	**Sem** [1], p. 52-58	**Seminar.** Traces of plane. Lines and points on the given plane. Principal lines of plane. Tasks.	
5	**Lec** [1], p. 66-77 [2], p. 140-170 **Sem** [1], p. 60-62	**Lecture.** Polyhedron. Construction of the complex drawing of prism and pyramid. Intersection of a polyhedron with a plane and a straight line. **Seminar.** Intersection of two planes. Intersection of the line and plane. Tasks. **Individual work№4.** Position of straight line relative to projection planes. Principal lines of plane.	
6	**Sem** [1], p. 63-65	**Seminar.** Metric tasks. **Independent work№5.** Finding of distance between geometrical elements.	
7	**Lec** [1], p. 94-102 [2], p. 216-237 **Sem** [1], p. 66-77 [2], p. 140-170	**Lecture.** Axonometric projections. Isometric axes, isometric scales. Isometric projection of cube and circle. **Seminar.** Polyhedron. Construction of the complex drawing of prism and pyramid. **Individual work№6.** Intersection of a polyhedron with a plane and a straight line. Intersection of a solids of revolution with a plane and a straight line.	
8			Midterm
9	**Lec** [1], p. 103-118 **Sem**	**Lecture.** Joints of details. Classification of joints. Detachable joints. Threads. Thread drawing. Designation of ISO threads. Join of two detail by thread. Welding joints. Classification of welding. Representation of welding	

	[1], p. 80-88	on Technical Drawing. **Seminar.** Views of details. Sectioning.Types of sections.	
10	**Sem** [1], p. 89-93	**Seminar.** Construction of the sketch of three views of a detail, its sectioning and dimensioning. **Independent work№7.** Construction of the sketch of three views of a detail.	
11	**Lec** [2], p. 288-315 [3], p. 53-87 **Sem** [1], p. 89-93	**Lecture.** Introduction to Computer Aided Sketching. Role of CAD in mechanical design. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars. **Seminar.** Construction of the third projection of detail on two given projections, its sectioning and dimensioning. **Independent work№8.** Construction of the third projection of detail on two given projections.	
12	**Sem** [1], p. 103-115	**Seminar.** Joints of details. Classification of joints.Permanent and non-permanent joining. Threads. Types of threads. Profiles and basic parameters of threads. Representation of threads on Technical Drawing. Symbolic representation of threads on Technical Drawing. **Individual work№9.** Joining of thread details.	
13	**Lec** [2], p. 288-315 [3], p. 87-143 **Sem** [2], p. 288-315 [3], p. 87-143	**Lecture.** Draw and modifying commands. Blocks, hatchings Adding block attributes. **Seminar.** Creation of 2D environment. Selection of drawing size and scale. Object color, select of type and weight of lines	
14	**Sem** [2], p. 288-315 [3], p. 87-143	**Seminar.** Application of drawing and modifying commands for design of details Dimensioning, line convention, material conventions and lettering.	
15	**Lec** [2], p. 288-315 [3], p. 842-934 **Sem** [2], p. 288-315 [3], p. 842-934	**Lecture.** Creation of 3D environment. Modelling. Commands of Solid Editing bar: Extrude faces, offset faces, move faces, rotate faces, taper faces, shell. **Seminar.** Designing details in the 3D system. **Individual work№10.** Detail design with CAD.	
16			Final exam

Recommended Sources

TEXTBOOK(S)

1.Habibov I.A., Bagirova G. Engineering drawing, Baku, 2016

2. K.Vehkata Reddy Textbook of Engineering Drawing.

3. Gerge Omura, Brian C.Benton Mastering AutoCAD 2019.

Assessment

Attendance	0%	Less than 75% class attendance results in NA grade
Individual work	20%	
Lab. works	0%	
Course work	0%	
Quiz	10%	
Midterm Exam	20%	Written Exam
Final Exam	50%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Academic Regulations of Azerbaijan State Oil and İndustry University for undergraduate studies

Course Policies

1. Attendance of the course is mandatory.
2. Material presented in the lecture as well as assigned readings will be included in testing.
3. Late assignments will not be accepted unless an agreement is reached with the lecturer.
4. Cheating and plagiarism will not be tolerated.
5. Cheating will be penalized according to the Azerbaijan State Oil and Industrial University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload (hour)
Course duration in class (including midterm)	14	3	42

Individual work	10	1	10
Self-study	14	1	14
Tutorials	14	1	14
Midterm Examination	1	3	3
Preparation for midterm exam	1	10	10
Final Examination	1	3	3
Preparation for final exam	1	24	24
Total Workload			120
Total Workload/30(h)			4
ECTS Credit of the Course			4