## ENS207 Engineering Graphics

| Full Course Title: | Engineering Graphics  
Tehničko crtanje |
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<tbody>
<tr>
<td>Course Code:</td>
<td>ENS207</td>
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<tr>
<td>Course Level/BiH cycle:</td>
<td>First Cycle / 2014-2015</td>
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<tr>
<td>ECTS credit value:</td>
<td>6</td>
</tr>
<tr>
<td>Student work-load:</td>
<td>(Table with hours for: Lectures; Exercise; Other; Individual learning)</td>
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<td>For the whole semester:</td>
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<tr>
<td></td>
<td>30</td>
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<tr>
<td>Length:</td>
<td>One semester</td>
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<tr>
<td>Faculty</td>
<td>FENS</td>
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<td>Course leader:</td>
<td>Ali Gursel</td>
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Phone: 211 |
| Site:             | Computer Lab II (F1.18) Building - A |
| Host Study Program: | FENS Faculty Course |
| Course status:    | Course is required for ME, IE, EE programs, elective for other FENS programs. |
| Pre-requisites:   | No                     |
| Access restrictions: | First cycle students |
| Assessment:       | Assessment is based on quizzes, midterm exams, final exam and class assignments |
The Engineering Graphics course aims at the following educational objectives:

- Comprehend general projection theory, with emphasis on orthographic projection to represent three-dimensional objects in two-dimensional views (principal, auxiliary, sections).
- Dimension and annotate two-dimensional engineering drawings.
- The application of industry standards and best practices applied in engineering graphics.
- Emphasize freehand sketching to aid in the visualization process and to efficiently communicate ideas graphically.
- Introduce CAD software for the creation of 3D models and 2D engineering drawings.

On successful completion of this course the student will be able to:

- Describe and utilize both the scientific and empirical foundations for engineering design.
- Basic geometrical relationships: parallelism, perpendicularity, angularity, co-linearity and concentricity.
- Facility with the standard units of length used in industry, inches and millimetres, and the expression of fractional and decimal values. Awareness of the uses of standard and nominal sizes in industrial literature.
- The ability to use industry-standard Computer Aided Design (CAD) software to model solid objects proceeding from basic sketching techniques to the creation of solid features through the use of extrusions, cuts, rotations, patterns and sweeps.
- Clearly and completely communicate a multi-component, conceptual design by creating drawings that follow good engineering conventions and practices.

The course provides a background in descriptive geometry, orthographic projection, engineering drawing techniques, and computer-aided engineering graphics for undergraduate students. Point line and plane relationships in projection; multi-view engineering drawings; auxiliary and section views; basic dimensioning; engineering applications.

Assessment concept is based on continuous work with students during semester. Evaluation method is based on giving points for each activity and examination during semester as well as on final exam.

Assessment will be based on following activities:

- Quizzes (x3): 30%
- Midterm exam: 20%
- Homework & Class Assignment: 15%
- Final exam: 35%
- SUM: 100%

Essential Reading:
- Engineering graphics with AutoCAD 2008 James D. Bethune PEARSON

Recommended readings:
- Engineering Graphics, Frederic E. Giesecke, Alva mitcheel, Henry Cecil Spencer PEARSON

Intranet web reference: NA

Feedback from students related to course content, deliver of the course and level of exam questions is considered regularly. Quality office in FENS’s level and University level monitors how lecture is handled based on regulations. Student evaluations is collected each semester that reflects students opinion about course material and lecturer performance. If a student feels that an exam or homework set was graded unfairly, or if there is an error in the grading, it should be brought to the attention of the grader within one week after the graded material is handed back. Scores will not be reconsidered beyond one week after they are handed back.
1 Introduction to engineering drawing. Manual drafting tools and equipment. Line types, lettering. Students will be asked to obtain required drawing tools, types of line and their applications will be studied too. No lab activities. - Chapter 3 Define fundamental line types and their applications.

2 Freehand drawing, pencils, lines, proportions, curves, isometric sketches. Freehand drawing will be studied. No lab activities. Sample problems (24-16) page 151 Chapter 4 Present their ideas through sketching.

3 Getting started with Computer Aided Design (CAD). AutoCAD Drawing Setup and Formatting Workspace, set up drawings, use drawing aids, save drawings, and get help when needed. AutoCAD workspace will be presented, simple drawing by using line command will be done. SP 14 page 18 Chapter 1 Understand the basic concept of CAD and CADD and draw a simple drawing on AutoCAD drawing space.

4 Geometric constructions. Drawing standards, true length, limits. Intro to Orthographic Projection. Geometric constructions will be presented and practiced. Orthographic projection methods will be shown and some typical sample problems will be discussed. Exercise problems page 204 Chapter 5 Draw given geometric constructions by knowing standards techniques related to them.

5 Basic Commands, Draw tool bar, draw lines, basic shapes, geometric constructions, and edit drawings. Fundamental drawing commands will be studied. Also editing the any CAD drawing will be covered. Exercise problems page 121 Chapter 2-3 Draw 3D drawing by using AutoCAD drawing space.

6 Advanced Command, Object & Modify tool bar, place text on drawings, insert and edit tables. Beside the drawing command, modifying commands from basics to advance will be covered in the class. As well, preparation of technical tables and title blocks will be studied. Exercise problems page 121 Chapter 3 In addition to the drawing command, operate modifying commands in advance level.

7 Orthographic projection of given objects will be obtained based on projection method between views. Further, standard orientation of view will be studied. Some intermediate level 2D drawings will be delivered to the students to draw on AutoCAD. Exercise problems page 204 Chapter 4 Become more proficient on 2D drawings.

8 Isometric Drawing. Isometric drawing will be performed using drawing tools. Exercise problems page 204 Chapter 5 Create 3D isometric drawings and present them in 2D views.

9 Dimensioning (Introduction, terminology and conventions, linear dimensions, dimension styles, aligned dimension, angular dimension, dimension edit). Dimensioning will be presented to students through some examples. Exercise problems page 341 Chapter 8 Apply dimensioning: read a given dimension and insert appropriate dimensions on existing drawing.

10 Auxiliary views, oblique surfaces, transferring lines between views. Auxiliary views will be presented based on orthographic view knowledge. Sample problems will be solved as well. Exercise problems page 266 Chapter 7 Obtain true dimension of the oblique surfaces by using section views.

11 Introduction to 3D drawing. Fundamentals of 3D drawing will be covered. Furthermore, perspective and parallel pictorial views will be studied, and sample problems will be solved. Exercise problems page 585 Chapter 14 Acquire basic knowledge of 3D drawing essentials and fundamentals commands.

12 Section views. Section lines, hatches, style of section lines, holes in section, multiple sections, half, partial and broken sectional views will be studied and sample problems will be solved. Exercise problems page 254 Chapter 6 Obtain necessary view of hidden sections by using several section view technique.

13 Creating 3D primitive and objects (box, sphere, cylinder, cone, wedge, torus, extrudes, revolve, bocken operations), and their modification. Editing options for 3D drawing will be studied. Further, sample 3D objects will be delivered to students to create them on AutoCAD. Exercise problems page 606 Chapter 16 Create 3D primitive objects and union and subtract these primitives.

14 Assembling 3D parts. Assembling commands to unite single part will be covered. Sample problems will be solved on AutoCAD. Exercise problems Page 651 Chapter 16 Assemble 3D parts into intended positions by using 3D alignment tools.

15 All lecture will be devoted for exercise on 3D drawing to foster student ability on 3D drawing space. Exercise problems Page 651 Chapter 16 Become proficient on 3D drawing skills.

16 Introduction to engineering design, computers in design, today’s engineering design models, an engineering design process, creativity and innovation in design will be covered. Necessary reading will be provided through web-site. Describe various factors that are changing the design process. Discuss the steps in design analysis problems. Explain importance of creativity and innovation in the design.