

DESCRIPTION OF THE COURSE

Name of the course: Computer Aided Design	Code: BIE46	Semester: 5
Type of teaching: Lectures and laboratory work Course work	Lessons per week: L 1.5 hours; LW 1.5 hours	Number of credits: 5

COURSE STATUS IN THE CURRICULUM: Compulsory for the students specialty Industrial Engineering BEng programme of the English Language Faculty of Engineering.

AIMS AND OBJECTIVES OF THE COURSE: To present the CAD foundations to the students with the focus on developing the proper attitudes and approaches of utilizing the existing CAD technology in engineering. To provide the methodology of geometrical modelling as well as to develop some practical skills while utilizing a particular CAD system for real design projects.

DESCRIPTION OF THE COURSE: The main topics concern: CAD and the design process. Typical product cycle and industrial look at CAD techniques. Computer Aided Design Hardware. Mainframe and microcomputer based systems. Introduction to CAD Software. Graphic standards. Data structure. Database. Database management system. User interface. Software modules. Rasterization and line drawing algorithms. Integer Bresenham's algorithm. Circle generation - Bresenham's algorithm. Representation of points. Transformations and matrices. Transformation of points and lines. Rotation. 3 - D Transformations. Solid models. Solid entities. Solid representation. Fundamentals of solid modelling. Solid manipulations. Feature based 3D parametric modelling. Assembly modelling. Representation schemes. Generation of assembly sequences. Assembly analysis. Design and engineering applications. Visual RealismHidden lines and hidden surfaces removal. Z-buffer algorithm. Rendering. Simple illumination model. Determining the surface normal and the reflection vector. Efficient use and choosing of CAD software. Software tools and languages - Mechanical Desktop, SolidWorks, MATLAB, etc.

PREREQUISITES: Computing I, Mathematics I, Applied Geometry and Engineering Graphics.

TEACHING METHODS: Lectures, illustrated by slides, case studies. Laboratory exercises performed by developing geometrical models working with a particular CAD system and using a laboratory manual. The course work is performed in teams of six students working on the same project.

METHOD OF ASSESSMENT: Two two-hours assessments (test) at mid and end of semester (70%) plus laboratories (15%) plus course work (15%).

INSTRUCTIONAL LANGUAGE: English.

BIBLIOGRAPHY:

1. Shoishiro, Nakamura, Numerical Analysis and Graphic Visualization with MATLAB, Prentice Hall, 2002;
2. Etter, Delores M. Engineering problem solving with MATLAB. Prentice-Hall, International Inc. 1997;
3. Watt, Alan. 3D Computer Graphics. Addison Wesley. 1999;
4. McMahan, Chis, Jimmie Browne. CAD/CAM principles, Practice and Manufacturing Management Addison-Wesley Publishing Company, 1998;
5. Rogers, David F., J. Alan. Mathematical Elements for Computer Graphics. McGraw-Hill, Inc. 1990;
6. Rogers, David F. Procedural Elements for Computer Graphics McGraw-Hill, Inc. 1985;
7. Kalameja, Alan J., John Wilson, AutoCAD 2002: 3D Modeling: A Visual Approach Autodesk Press, 2001.