

1E9 ENGINEERING DESIGN I: GRAPHICS AND COMPUTER AIDED ENGINEERING [5 credits]

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Module organisation

The module runs for the first half (12 weeks) of the academic year and comprises of one lecture per week together with eight three-hour laboratories (total of 35 hours contact time).

Module description, aims and contribution to programme

This module is dedicated to graphics and includes two sections: Drawing and AutoCAD. The objectives are as follows:

- to understand dimensioned projections and learn how to create two-dimensional images of objects using first and third angle orthographic projection as well as isometric, perspective and auxiliary projection;
- to interpret the meaning and intent of toleranced dimensions and geometric tolerance symbolism;
- to create and edit drawings efficiently and deliver entire sets of coordinated drawings using the design and drafting software AutoCAD.

Learning outcomes

Upon completion of this module, students will be able to:

- create, develop and draw two-dimensional images of objects and structures by using projections;
- understand dimensioned orthographic and isometric projections;
- identify and interpret two-dimensional representations of objects;
- interpret the meaning and intent of toleranced dimensions and geometric tolerance symbolism;
- maintain the integrity of the display database, manage screen menus and commands using AutoCAD;
- operate data entry modes and define drawings geometrically in terms of Cartesian, polar and relative coordinates;
- design prototype drawings to be used as “templates” in the production of other drawings;
- create and edit drawings making selections of objects, discriminating by layering and using entities, object snap modes, editing commands, angles and displacements.

Course content

Drawing

- Introduction
- Orthographic projection: First angle and third angle projection
- Isometric projection
- Auxiliary projection
- Perspective projection
- Introduction to mechanical drawing
- Sketching engineering objects
- Sections, dimensions and tolerances

AutoCAD

- Management of screen menus and commands
- Introduction to drawing entities
- The co-ordinate systems: Cartesian, polar and relative coordinates
- Drawing limits, units of measurement and scale
- Layering: organizing and maintaining the integrity of drawings
- Design of prototype drawings as templates
- Editing drawings: selection of objects, using entities, object snap modes, editing commands, angles and displacements, text

Teaching strategies

This module is taught using a combination of lectures, laboratories and independent assignments.

Associated laboratory/project programme

Drawing Laboratories: 6 x 3 hour laboratories

AutoCAD Laboratories: 2 x 3 hour laboratories

Assignment 1: Drawing.

Assignment 2: AutoCAD.

Assessment

This module is assessed as follows:

- Examination: 75% (formal written two-hour end-of-year examination)
- Drawing laboratory exercises: 10%
- Individual drawing assignment: 5%
- Individual AutoCAD assignment: 10%

Required textbook

Engineering Drawing and Computer Graphics, BL Davies and A Yarwood, Van Nostrand Reinhold (UK), 1986

Technical Draughtsmanship, Éanna O Broin, Gill and Macmillan (Ireland), 1986

Technical Drawing 1: Plane and solid geometry, A Bankole and S Bland (England), 1991

DRAWING EQUIPMENT

Each student must have the following drawing equipment for the drawing exercises:

- Compass(es) - Staedler Mars 55202SK, Faber 174925 Ultra P, Rotring R530116;
- Set squares: 21cm size - one 45 degree and one 30/60 degree (or and adjustable set square) e.g. Stadedtler 56721-60 and 56721-45 or Rotring 812321 and 813321;
- Protractor: e.g. Rotring circular 821425;
- Pencils: either woodcase or clutch pencils with each of the following leads: HB, H, 2H;
- Eraser: Must be a good quality one e.g. Staedtler 52650;
- Sharpener: e.g. Dux 3307N.

Optional equipment:

- A3 drawing board;
- A3 Tee squares;
- Scale: flat or triangular including the scales - 1:1, 1:5 at least;
- Curves: French curves (e.g. Rotring 830559);
- Erasing shield e.g. Staedtler 52959;
- Portfolio or small cardboard tube for carrying drawings;
- Sandpaper block: e.g. Faber Caster 51/2;
- Drafting: tape;
- Cloth for cleaning equipment.

IMPORTANT NOTES

- Keep to the deadlines given in class. Late submissions for assignments will not be accepted unless a medical certificate accompanies them.
- The brand names and item numbers given above are only guidelines to indicate recommended quality and size.
- Drawing paper is supplied by the Engineering School Office for Drawing Office sessions only.

Further information

<http://www.tcd.ie/Engineering/undergraduate/baiyear1/modules/1E9.pdf>