

AEN 1105 ENGINEERING DRAWING

Course Name Engineering Drawing
Course Code: AEN 1105

Course Level: Level 1
Course Credit: 4 CU
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Teaching Assistant

Brief Course Description

This course introduces students to basic drawing office practice and is a prerequisite for Computer Aided Design.

Course Objective

The course objectives are to:

- Comprehend the science of Engineering drawing, so that they are able to convey their creative ideas effectively.
- Link from conventional 2D and 3D drawings to computer based commercial software.
- Gain experience in transforming ideas into 2D and 3D drawings.

Course content

Lecture	Topic	Content	Methods	Tools/ equipment
1.	Introduction to Engineering graphics as a language	<ul style="list-style-type: none">• The language of industry, typical branches of engineering graphics, drawing standards and careers in engineering graphics	Interactive lecture (2 hrs)	Chalk/ Blackboard, LCD
2.	The drafting office	<ul style="list-style-type: none">• Manual drafting equipment, keeping drawings clean, basic equipment, CAD equipment and computer aided manufacturing	Interactive lecture (2 hrs)	Chalk/ Blackboard, LCD
3.	Drawing media, filing, storage and reproduction	<ul style="list-style-type: none">• Drawing media and format, standard drawing sizes, title blocks and tables, filing and storage, folding of prints, drawing reproduction, reproduction equipment	Lecture (2 hrs)	Chalk/ Blackboard, LCD
4.	Basic drafting skills	<ul style="list-style-type: none">• Line work, lettering, circles and arcs, irregular curves, sketching, inking and scribing	Lecture (2 hrs)	Chalk/ Blackboard, LCD
5	Tutorial 1	<ul style="list-style-type: none">• Fastening paper to board, Components of a CAD system, , getting acquainted with CAD	Practical (3hrs)	Laptop, LCD
6	Theory of shape description	<ul style="list-style-type: none">• Shape description by views, pictorial views, orthographic projection, orthographic systems, ISO projection symbols, arrangement of views, third angle projection.	Lecture (2 hrs)	Chalk/ Blackboard, LCD
7	Theory of shape description	<ul style="list-style-type: none">• Use of a miter line, representation of all surfaces parallel and all edges and lines visible, hidden surfaces and edges, inclined surfaces, circular features, oblique surfaces, first angle orthographic projection, one and two view drawings, partial views, rear views and enlarged views	Lecture (2 hrs)	Chalk/ Blackboard, LCD

8	Applied geometry	<ul style="list-style-type: none"> • Straight lines, arcs and circles, polygons, ellipse, helix and parabola 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
9.	Tutorial 2	<ul style="list-style-type: none"> • Use of CAD to draw arcs and circles, polygons and conic sections 	Practical (3 hrs)	Laptop, LCD
10.	Basic dimensioning	<ul style="list-style-type: none"> • Dimension and extension lines, leaders, notes, units of measurements, standard items (fasteners and threads, hole sizes), dual dimensioning, angular units, reading direction, basic rules for dimensioning, symmetrical outlines, reference dimensions, not to scale dimensions, operational names and abbreviations 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
11.	Basic dimensioning	<ul style="list-style-type: none"> • Dimensioning circular features (diameters, radii, rounded ends, chords, arcs and angles, spherical features, cylindrical holes, slotted holes, countersinks, counter bores and spot faces, dimensioning common features (repetitive features and dimensions, symmetrical outlines, chamfers, slopes and tapers, knurls, formed parts, undercuts, limited lengths and areas, wire sheet metal and drill rod) 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
12.	Basic dimensioning	<ul style="list-style-type: none"> • dimensioning methods, limits and tolerances, surface texture, surface texture symbols and machined surfaces 		Chalk/ Blackboard, LCD
13.	Tutorial 3	<ul style="list-style-type: none"> • Use of CAD to dimension drawings 	Practical (3hrs)	Laptop, LCD
14.	Sections and conventions	<ul style="list-style-type: none"> • Cutting plane lines, full sections, section lining, two or more section views on one drawing 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
15.	Sections and conventions	<ul style="list-style-type: none"> • Half sections, threads in section, assemblies in section, offset sections, ribs, holes and lugs in section, revolved and removed sections, spokes and arms in section, partial or broken out sections and phantom or hidden sections 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
16.	Sections and conventions	<ul style="list-style-type: none"> • Conventional representation of common features, conventional breaks, materials of construction, cylindrical intersections, foreshortened projection, intersections of unfinished surfaces 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
17.	Tutorial 4	<ul style="list-style-type: none"> • Use of CAD to place section views, detailed view and conventions 	Practical (3 hrs)	Laptop, LCD
18.	Detail and assembly drawings	<ul style="list-style-type: none"> • Detail drawings (shape description, size description and specifications), drawing checklist (dimensions, scale, tolerances, standards, surface texture and material) 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
19.	Detail and assembly drawings	<ul style="list-style-type: none"> • Multiple detail drawings, drawing revisions, assembly drawings, exploded assembly drawings, detailed assembly drawings and sub assembly drawings 	Lecture (2 hrs)	Chalk/ Blackboard, LCD

20.	Auxiliary views	<ul style="list-style-type: none"> Primary auxiliary views, dimensioning auxiliary views, circular features in auxiliary projection, multi- auxiliary view drawings and secondary auxiliary views 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
21.	Tutorial 5	<ul style="list-style-type: none"> Use of CAD to generate auxiliary views 	Practical (3 hrs)	Laptop, LCD
22.	Pictorial drawings	<ul style="list-style-type: none"> Axonometric projection, isometric drawings, curved surfaces in isometric (circles and arcs, irregular curves, isometric sectioning, fillets and rounds, threads, break lines and isometric assembly drawings 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
23.	Pictorial drawings	<ul style="list-style-type: none"> Oblique projection, inclined surfaces, oblique sketching, dimensioning in oblique drawing, common features in oblique (circles and arcs, oblique sectioning), treatment of conventional features (fillets and rounds, threads and breaks) 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
24.	Pictorial drawings	<ul style="list-style-type: none"> Perspective projection, types of perspective drawings (parallel, angular and oblique, pictorial line drawings, line application (thick, medium and thin lines) and screw threads 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
25.	Tutorial 6	<ul style="list-style-type: none"> Use of CAD to make pictorial drawings in isometric, perspective and oblique 	Practical (3 hrs)	Laptop, LCD
26.	Descriptive geometry	<ul style="list-style-type: none"> Reference planes, point, lines in space, true length of an oblique line by auxiliary projection, point on a line, point-on-point view of a line, planes in space, locating a point on a plane, cutting plane method and auxiliary view method 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
27.	Descriptive geometry	<ul style="list-style-type: none"> Establishing visibility of lines in space, distances between lines and points, edge and true view of planes, angle between lines and planes 	Lecture (2 hrs)	Chalk/ Blackboard, LCD
28.	Tutorial 8			

Assessment:

- Assignments (10%)
- Projects (10%)
- Tests (20%)
- Final university examination (60%)

References

- Jensen C and Helsel J.D (1998). "Engineering Drawing and Design". Fifth Edition. Mc Graw - Hill, Inc.
- Hart K.R (1975). "Engineering Drawing with Problems and Solutions". Edward Arnold, London, UK.
- Parker M.A and Pickup F (1990). "Engineering Drawing with Worked Examples (1 and 2)". Third edition. Century Hutchinson limited, Melbourne, Australia.
- Sidheswar N., Kannaiah P. and Sastry V.V.S (1980). "Machine Drawing". Tata Mc Graw-Hill Publishing Company Limited.
- Morgan J.O, Horner J.E and Biney P.O (2003). "Design Modeling Using Solid Edge for Engineers and Designers. Kendall/ Hunt Publishing Company.

Other Resources

- Computer laboratory connected to internet
- University library
- Faculty and department book banks
- Solid Edge and unigraphics laboratory
- Mechanical workshop