Department of Mechanical Engineering Technology

Course number/name:
MECH 1222 Engineering Drawing II

Credits/contact hours:
2 credits, 1 class hours, and 3 lab hours.

Instructor/coordinator:
Gaffar Gailani, Professor of Mechanical Engineering Technology

Text book/title/author/year
Engineering Graphics with AutoCAD 2011, James D. Bethune, Prentice Hall, ISBN: 0138015910

Specific course information

Catalog description:
The application of the principles developed in IND 1112 to more complex detail and assembly drawings. Subject areas covered are: direct and geometric tolerances for interchangeable manufacturing, detail drawings for production and assembly, and graphical kinematics which includes the design and layout of gears, gear trains, cams, and linkages. Laboratory work utilizes Computer-aided Drafting (CAD) systems.

Pre/Corequisites:
IND 1112 / MAT 1275

Required/elective/selected elective:
Required for Mechanical Engineering Technology and Industrial Design Technology

Course learning objectives:
1. Mastery of the knowledge in fundamental mechanical design principles.
2. Ability to apply concurrent design and engineering principles and use of the state-of-the-art CAD software.
3. Ability to identify, analyze, and solve technical problems related to the manufacturing and designing of mechanical systems.
4. A desire and recognition of the need to incorporate the latest technology in the course work – ability to engage in lifelong learning.
5. A commitment to quality, timeliness and continuous improvement

Course addresses ABET student outcomes:
SO1. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to Mechanical Engineering Technology;
SO2. an ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;
SO3. an ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature
SO4. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results; and
SO5. an ability to function effectively as a member of a technical team.

Brief list of topics to be covered:

- Dimensioning: A review of the dimensioning toolbar, dimensioning of 2D shapes and orthographic views. The dimensioning terminology and conventions. Using of Dimension Style tools, and applying dimensions to drawings.

- Tolerancing. Direct Tolerances Tolerance Studies: Concepts of tolerances and allowances. Coordinate tolerance methods (limit dimensioning, plus and minus tolerancing, inch tolerances, and millimeter tolerances. Rectangular tolerance zone. Use of fixed and floating condition in designing shaft to fit toleranced holes.
- Standard Fits (Metric values): Understand types of fits. Skills in determining International Tolerance (IT) Grade, Fundamental deviation. Fit symbol. Hole basis and shaft basis fits systems. Determine allowances (clearance and interference).

- Standard Fits (Inch value): Correct application of running and sliding fits, locational fits (locational clearance fits, locational transition fits, and locational interference fits), and drive and force fits.

- Geometric Tolerances: Understand basic geometric tolerances. Tolerances of Form. Tolerances of Orientation. Positional tolerances, Understand MMC, LMC, RFS, and CV.
- Working Drawings: Assembly drawings. Details drawings. Drawing formats. Parts list. Design layout.

- Gears: Types of gears. Gear nomenclature. Calculation of pitch diameter, diametric pitches, and center to center distance in US units. Calculation of modules, pitch diameter, circular pitches in SI systems.

- Gear Motion Analysis: Speed Ratio. Simple Gear Trains. Compound Gear Trains.
- Cams: Cams and Cam followers. Displacement diagram. Uniform motion. Harmonic motion. Parabolic motion.

- Linkages: Motion of links. Displacement, path, velocity and acceleration. Translation motion and rotational motion.