



COURSE OUTLINE

Course Number AMT 103	Course Title Blue print reading Basics	Credits 2
Hours: Lecture.lab 1/2	Co-or Pre-requisite DRA 190	Implementation Fall 2022

Catalogue Description

Introduces students to the basic and reading of manufacturing prints. Topics include views, dimensions, tolerances, geometric dimensioning and tolerancing (GD&T), surface finish, threads, casting, forging, molded part prints, welding and sheet metal prints. Lab reinforces the topics through inspection of parts using coordinate measuring machine CMM, optical comparator and metrology devices.

General Education

Category:
Not GenEd

Course coordinator:

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Required Text: **Hammer's Blueprint Reading Basics, 4th Edition**

By C. Gillis

Publisher: Industrial Press, 2017

Student Learning Outcomes (SLO):

Students will be able to:

1. Interpret and describe the technical information provided on industrial prints through drawings, dimensions, and notes. **(ILG 2,10,11 PLO,2,3,10)**
2. Visualize three-dimensional parts from the standard orthographic projections found on prints. **(ILG 11 PLO,2,10)**
3. Navigate the total manufacturing print including lines, scale, language, symbols, title blocks and other components. **(ILG 2,10,11 PLO,2,3,10)**
4. Determine part dimensions and tolerances according to American Society of Mechanical Engineers (ASME) standards including geometric dimensioning and tolerancing. **(ILG 2,10,11 PLO,2,3,10)**
5. Understand drawing features, symbols and notes unique to welding, gears, splines, cams, castings, forgings and molded part prints. **(ILG 4,10,11 PLO,2,9,10)**

Institutional Learning Goals (ILG)

Institutional Learning Goal 2 Mathematics: Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Institutional Learning Goal 3 Science: Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Institutional Learning Goal 4 Technology: Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Institutional Learning Goal 10 Information Literacy: Students will recognize when information is

needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Institutional Learning Goal 11 Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes (PLO)

1. Maintain a safe and organized workspace.
2. Interpret blueprints to manufacture parts.
3. Apply shop and tool room mathematics as needed.
4. Complete part inspection using appropriate instruments such as micrometers, calipers, and scales.
5. Set up and operate a manual drill press, lathe, milling machine, grinder and press brake.
6. Set up and operate CNC machines (lathe and mill).
7. Use NC programming (G and M codes) to control movement and cutting processes.
8. Understanding of statistical quality control.
9. Understanding of the broad spectrum of manufacturing technologies.
10. Pursue NIMS certification.

Unit Objectives

Unit 1 The Basics of Manufacturing Prints (SLO 1,2,3)

The student will be able to:

- Explain what blueprints are and why they are used.
- Identify the three key elements of a manufacturing print.
- Explain the manufacturing cycle and role of prints.

Unit 2 The Total Manufacturing Print (SLO 1,2,3)

The student will be able to:

- Recognize which projection system is used on a drawing. Distinguish the third angle projection and first angle projection system.
- Identify an isometric view of a part from multiple projected views.
- Identify edges and faces from isometric views or multiple projected views of the same part.

Unit 3 Views (SLO 1,2,3)

The student will be able to:

- Learn the various elements of prints: borders, title block, revision history block and drawing number.
- Identify general notes and local notes that apply to a specific item or area on the drawing.
- Find and interpret the information in a title block, assembly bill of materials and a revision history block.

Unit 4 Dimensions (SLO 1,2,3)

The student will be able to:

- Interpret orthographic and auxiliary views.
- Recognize view arrows and labels and know how they are used.
- Interpret section views based on various cutting plane lines.

Unit 5 Dimensions (SLO 1,2,3)

The student will be able to:

- Interpret dimensioning of common features such as chamfers, round holes, counterbored holes, countersunk holes, counter drilled holes, spot faces, machining centers, key seats, keyways, flats, undercuts, bosses and pads.
- Mathematically interpret dimensions not on the print.
- Convert dimensions between fraction and decimal inch units, and between millimeters and inches.
- Interpret common dimensioning arrangements such as chain, baseline, polar, ordinate, common feature, tabulated and combined.

Unit 6 Tolerances (SLO 4)

The student will be able to:

- Identify when tolerances are indicated symbolically and determine the tolerance values.
- Calculate minimum and maximum allowable values for dimensions considering tolerances.
- Interpret tolerances applied to angular surfaces, tapers, and radii.
- Recognize the limitations of size tolerances and understand the need for geometric tolerances.

Unit 7 Geometric Dimensioning and Tolerancing (SLO 4)

The student will be able to:

- Define Maximum Material Condition and Least Material Condition and calculate their values for a feature.
- Identify datum feature identifiers applied to surfaces and axes.
- Identify and interpret geometric controls on orientation, location, profile and runout.

Unit 8 Surface Finish (SLO 5)

The student will be able to:

- Determine minimum and maximum allowable roughness height for English and metric prints, including alternative measures of roughness height.
- Interpret symbols specifying production method, sampling length, lay, roughness width, machining allowance and waviness.
- Interpret notes specifying surface treatments and surface coatings.

Unit 9 – Threads (SLO 5)

The student will be able to:

- Identify threaded features on drawings when shown using realistic, symbolic or simplified representations.
- Recognize threaded feature indications on drawings and interpret their meaning.
- Identify thread details including nominal major diameter, pitch, tolerance class and hand (left hand or right hand).

Unit 10 - Machine Terms and Manufacturing Processes (SLO 5)

The student will be able to:

- Define machine terms used on manufacturing prints including chamfer, deburr, knurl, serrate, key seat, keyway, neck, undercut, groove and sawcut.
- Identify terms used in manufacturing holes including drill, ream, bore and broach.
- Identify terms used in manufacturing methods such as mill and grind.

Unit 11 - Casting, Forging and Molded Part Prints (SLO 5)

The student will be able to:

- Identify features common to forged and molded parts such as parting line, draft, mismatch, die closure, flash, fillets and rounds, ejector pins, gates, shrink, warp and defects.
- Identify whether all information required to make the part is found on one print or several prints.
- Identify and interpret notes and symbols indicating parting line, draft angles, fillets and rounds specified using several common symbols and notes.

Unit 12 - Welding and Sheet Metal Prints (SLO 5)

The student will be able to:

- Identify the common types of welded joints, the types of welds used to join them, and finishing and post-processing.
- Interpret the basic AWS weld symbol indicating common weld types, including details such as size, length and pitch, finish contour and welding process.

Unit 13 - Gears, Splines, and Cams (SLO 5)

The student will be able to:

- Calculate gear tooth dimensions needed for manufacturing that may not appear directly on the print.
- Identify the relevant data for manufacturing gear teeth, spline teeth and cams on the print.

Unit 14 - Types of Manufacturing Prints (SLO 5)

The student will be able to:

- Identify types of prints used in industry and the information they contain.
- Visualize assembly and parts from an assembly and part print and properly interpret the information on the print.

Method of Instruction

Learning will take place via classroom instruction, demonstrations, and student activities, as well as through textbook reading and homework assignments. Lab activities will augment this. Use of equipment and manual skills will be developed in the lab.

Student Evaluation

Students' achievement of the course objectives will be evaluated through the use of the following:

- Three-unit tests assessing students' comprehension of terminology, calculations and practices related to the unit objectives.
- Lab grade based on shop projects and lab assignment results.
- In class participation, homework and attendance.

Evaluation Tools	Percentage of Grade
3 Unit Tests	50%
Lab Assignments/ Shop Projects	25%
Homework / In-Class Assignments	25%
Total	100%

