

**Department:**

Engineering Graphics and Technologies

**Course Description:**

This course teaches the basic concepts of print reading for machine trades. The student shall be able to interpret blueprints, and shop drawings, including interpreting geometric dimensioning and tolerancing symbols. Completion of this course the student shall be able to solve a construction problem utilizing shop drawings or blueprints.

**Course Competencies:**

Upon completion of the course, the student should be able to:

1. Define basic blueprint terminology such as title block, views, notes, revision blocks, etc.
2. Differentiate between dimensions of location and size. These dimensions may be represented as ordinate, base line, tabular, etc.
3. Identify general note symbols and their applications within a manufacturing environment.
4. Locate notes on a print using industry standards with 100% accuracy.
5. Interpret commonly used abbreviations and terminology used on prints in the manufacturing environment.
6. Distinguish the tolerance that applies to a specific dimension using a drawing.
7. Identify the representation of the various lines found on a drawing.
8. Interpret the following information from a blueprint title block: company name, part name and number, material, name of designer and checker, revision history, and other important information regarding the part.
9. Interpret the meaning of revision block symbols and notations. Match the revision block components with the actual drawing features.
10. Recognize the three basic views represent the drawing: front, top, right side.
11. Identify a drawing containing orthographic and isometric views.
12. Identify all appropriate views on an orthographic drawing according to their position or placement on print.
13. Visualize one or more views from a given isometric or pictorial representation of an object.
14. Determine physical scaling of view, and standard drawing scale of view.
15. Identify a series of drawings, some of which contain revisions and proper notation, properly identify which ones are the most current revisions, and identify which drawings do not contain revisions.

**Course Content:**

- A. Introduction to Print Reading
  1. Identify terminology related to Print Reading
  2. Understand the relationship of Computer Aided Drafting to the engineering and manufacturing technology industry.
  3. Understand and define tolerance and related information.
  4. Identify and read print scales.

5. Understand and read items on prints related to zoning, title block information, and the drawing field.
- B. Communication with a Sketch
1. Sketch lines, circles, and arcs.
  2. Sketch objects using correct proportions.
  3. Sketch irregular shapes.
  4. Make basic multiview sketches.
  5. Prepare isometric sketches of an object.
- C. Metrology
1. Develop the ability to read standard metric and inch engineering scales.
  2. Develop the ability to read micrometers.
  3. Read digital, dial calipers and indicators.
  4. Describe scales and precision measuring instruments.
- D. Reading Lettering and Lines on a Drawing
1. Identify the ANSI standard for line conventions and lettering.
  2. Locate and read notes on prints.
  3. Locate and identify line types on prints.
- E. Reading Multiview and Auxiliary Views
1. Identify the American National Standards Institute, standards for multiview and auxiliary view drawings.
  2. Read and understand prints containing standard multiview and auxiliary view drawings.
  3. Read and understand enlargements on a print.
  4. Identify third-angle and first angle projections.
- F. Manufacturing Materials and Processes
1. Identify manufacturing materials from written descriptions.
  2. Identify casting, forging, and machining processes used in the manufacturing industry.
  3. Read prints to identify manufacturing materials, features, and processes.
  4. Identify surface finishes on a print.
  5. Develop an understanding of tooling.
  6. Develop an understanding of computer numeric control (CNC) and computer integrated manufacturing (CIM).
  7. Develop an understanding of statistical process control (SPC).
- G. Reading Dimensions
1. Identify the ASME standard for dimensioning applications.
  2. Read prints displaying a variety of dimensioning applications.
  3. Read and calculate dimension tolerances on a print.
  4. Determine the maximum material condition of given features.
  5. Calculate clearance and allowance between mating features.
  6. Ability to understand basic fits.
  7. Read casting and forging dimensions and related information.
  8. Read information given in surface finish and symbols.
- H. Reading Drawings with Fasteners and Springs
1. Identify the ANSI standards for screw thread representations.
  2. Define screw thread terminology.
  3. Read prints with screw thread representations and thread notes.
  4. Read and identify the parts of metric and Unified and American National threads.
  5. Identify fastener head types.
  6. Read and understand prints with regards to pins, rivets, washers, retaining rings, keys, keyways, and keyseats.
  7. Define spring terminology and read prints with spring terminology.

- I. Welding Processes and Reading Welding Representations
  - 1. Develop an understanding about welding processes.
  - 2. Identify the elements of welding symbols.
  - 3. Identify types of welds on prints.
  - 4. Read symbols and information to destructive (DT) and nondestructive tests(NDT).
  - 5. Read and understand welding specifications.
- J. Reading Sections, Revolutions, and Conventional Breaks.
  - 1. Identify the ANSI standard for multiview and sectional view drawings.
  - 2. Identify types and read prints with sections, revolutions, and conventional breaks.
  - 3. Read and identify section line symbols.
- K. Reading Geometric Tolerancing
  - 1. Identify the ASME standard for dimensioning and tolerancing.
  - 2. Read prints containing geometric dimensioning applications.
  - 3. Provide datum identification as given on actual prints.
  - 4. Read datum target points, lines, area, and related datum target symbols.
  - 5. Calculate the geometric tolerance a given produced sizes based on the material condition symbol.
  - 6. Read and explain the information given in the feature control frames presented on the prints.
  - 7. Calculate the virtual condition for given applications.
- L. Reading Cam, Gear, and Bearing Drawings
  - 1. Define cam terminology, identify cam types and cam followers.
  - 2. Read information on plate cam prints.
  - 3. Read a drum cam print.
  - 4. Identify bearing elements and types.
  - 5. Determine bearing specifications from bearing selection charts based on given information.
  - 6. Develop an understanding of bearing finish, lubrication, mountings, and gear assemblies.
- M. Reading Working Drawings
  - 1. Read detailed drawings.
  - 2. Read assembly drawings and parts lists.
  - 3. Identify types of assembly drawings.
  - 4. Develop an understanding related to engineering changes.
- N. Reading Pictorial Drawings
  - 1. Identify types of pictorial drawings.
  - 2. Read pictorial drawing prints.
- O. Reading Precision Sheet Metal Drawings
  - 1. Read sheet metal prints.
  - 2. Develop an understanding of metal bending, seams, and chassis layout.
  - 3. Calculate bend allowance.

## Learning Assessments:

Competencies may be evaluated by multiple measures, including chapter tests, class participation, quizzes, and a comprehensive final.

## Instructional Materials:

Textbook: Hammer, W. (2001). *Blueprint Reading Basics: Manufacturing Print Reading* (3<sup>rd</sup> ed.). Industrial Press, Inc. ISBN-13: 978-0831131258

## **Guidelines for Requesting Accommodations Based on Documented Disability or Medical Condition**

It is the intention of Highland Community College to work toward full compliance with the Americans with Disabilities Act, to make instructional programs accessible to all people, and to provide reasonable accommodations according to the law.

Students should understand that it is their responsibility to self-identify their need(s) for accommodation and that they must provide current, comprehensive diagnosis of a specific disability or medical condition from a qualified professional in order to receive services. Documentation must include specific recommendations for accommodation(s). Documentation should be provided in a timely manner prior to or early in the semester so that the requested accommodation can be considered and, if warranted, arranged.

In order to begin the process all students **must** complete the “Disabilities Self-Identification Form” on our [Disability Services website](#).

This form can also be accessed at the Highland Community College homepage under Students Services/Student Resources/Disability Service or by contacting the Disabilities Coordinator.

### **A Note on Harassment, Discrimination and Sexual Misconduct**

Highland Community College seeks to assure all community members learn and work in a welcoming and inclusive environment. Title VII, Title IX, and College policy prohibit harassment, discrimination and sexual misconduct. Highland Community College encourages anyone experiencing harassment, discrimination or sexual misconduct to talk to report to the Vice President for Student Services, the Human Resources Director or complete an [online report](#) about what happened so that they can get the support they need and Highland Community College can respond appropriately.

There are both confidential and non-confidential resources and reporting options available to you. Highland Community College is legally obligated to respond to reports of sexual misconduct, and therefore we cannot guarantee the confidentiality of a report, unless made to a confidential resource. Responses may vary from support services to formal investigations. As a faculty member, I am required to report incidents of sexual misconduct and thus cannot guarantee confidentiality. I must provide our Title IX coordinator with relevant details such as the names of those involved in the incident. For more information about policies and resources or reporting options, please review our [Equity Grievance Policy](#).