



**ENGINEERING 131**

**City Colleges of Chicago  
Truman College**

**Course Title: Engineering Graphics and Introduction to Design**

**LENGTH OF COURSE:** 16 Weeks

**CONTACT HOURS:** 4 Contact Hours

**CREDIT HOURS:** 3 Credit Hours

**LECTURE HOURS:** 2 Lecture Hours

**LAB HOURS:** 2 Lab Hours

**WEEKLY PLAN:** 4 Hours

**CATALOG DESCRIPTION**

Graphics, both manual and computer-aided drafting and design. Introduction to design techniques in graphics and multi-view drawing, auxiliary views, selecting, tolerance dimensioning, and technical sketching. Writing assignments, as appropriate to the discipline, are part of the course.

**PREREQUISITE:**

Engineering 111, engineering 100 or 110, or consent of Department Chairperson.

**GENERAL OBJECTIVES**

1. To provide an introduction to engineering (mechanical) design.
2. To provide pre-engineering students with a required (transferable) course.
3. To provide terminal students who are pursuing a two technical program with a required course.
4. To provide part time students with one of a sequence of four courses toward a special Certificate of Completion offered by the Engineering Department.

**SPECIFIC OBJECTIVES**

1. To obtain knowledge of the recognized Standards of the Professional organizations as they apply to such subject as: Drafting, dimensioning, threads and fasteners, manufacturing processes, etc., as found in the published references of the A.S.A. (American Standards Association), the S.A.E. (Society of Automotive Engineers), the A.S.T.M. (American Society for Testing Materials), etc.
2. To be able to construct the necessary orthographic views (principle, auxiliary, sectional, etc.) that would best represent graphically a product, machine part or assembly of parts.
3. To be able to dimension a set of views
  - a) Fractional and Decimal dimensions
  - b) Tolerance dimensions (including calculating limit dimensions, clearance or interference allowances, etc.)



- c) Dimensioning Foundry Patterns and Castings.
- d) Converting to metric system dimensions and units.
- 4. To obtain a theoretical and working knowledge of Design Considerations, including:
  - a) Safety Factors (applied to find the safe load or safe stress of a material).
  - b) Reaction of a machine part to loads that induce a direct or flexure stress and calculating these stress values.
- 5. To be able to construct graphs to represent the relationship between several variables, including:
  - a) Curves that show the effect of heat treatment upon mechanical properties of metals.
  - b) Bar graphs that compare different materials on a cost/density ration basis.
- 6. To be able to construct Pictorial views of objects, either mechanically or freehand, in both Isometric and Oblique.

#### **COURSE OUTLINE**

- 1 Graphical Communications, Theory and Practice
- 2 Dimensioning: Standards and Practice
- 3 Introduction to Engineering Design
- 4 The Casting Process
- 5 Design Problem
- 6 Charts and Graphs
- 7 Graphical Analysis of Frames Trusses

#### **TEXTBOOK:**

Engineering Graphics with AutoCAD 2014 by James D. Bethune. Pearson/Prentice Hall Publisher.

#### **COURSE PLAN**

The class meets 4 periods per week. Time for lectures is two periods per week. In general, assignments such as the design problem (see specific objectives) require more lecturing time than, for example, technical sketching.

#### **ASSIGNMENTS**

A class teacher begins each assignment (see schedule) by distributing the requisite information and/or worksheets involved, and then gives the introductory lecture. Where available and appropriate, a film may follow the lecture, or the film may be shown on the next day the class meets.



### **METHOD OF EVALUATING STUDENT PERFORMANCE**

1. Class assignments, which are done by the student during the lab hours, are turned in on a “due date”. These assignments are graded by the class instructor and returned to the student with appropriate notation explaining the grade.
  - a) The schedule (attached) shows the number and kind of the class assignments.
  - b) The average grade of these class assignments will be 50% of the final course grade.
2. Evaluation also involves a series of tests given throughout the semester
  - a) The teacher has available a series of standardized objective (multiple-choice) tests covering the standard topics of engineering graphics.
  - b) The student’s ability to solve problems is evaluated by a series of departmental tests covering topics such as safety factors and safe loads, direct stresses (compressive, tensile and shear) and flexure stress.
  - c) A final exam of two parts (multiple-choice: engineering graphics and a problem solving part.

The final course grade is arrived at by combining the class assignments average together with the tests average (including the final exam), giving equal weight to both of these parts.

### **METHODS OF TREATING INDIVIDUAL DIFFERENCES**

Individual differences among students are met by brief tutoring sessions at the student’s desk while class is working on an assignment. The number of such sessions is proportional to the student’s need. In addition, students meet with the instructor during office hours.

### **AUDIO-VISUAL AIDS**

The following 16 mm sound films are available and are shown when appropriate

1. Drawings and The Shop
2. Orthographic Projection
3. Auxiliary Views (2)
4. Sections and Conventions
5. Selection of Dimensions
6. Heat Treatment of Steel
7. Cast Iron, Building of a Metal
8. Casteel