

**Course Outline for:** ENGR 1020 Introduction to Engineering Design**A. Course Description:**

1. Number of credits: 4
2. Lecture hours per week: 4
3. Prerequisites: MATH 1100 (C- or better) in past 5 years; OR  
MATH 1150 (C- or better) in past 5 years; OR  
Placement Level of MATH 1150/1400/1500:  
High School GPA of 2.80-3.29 and passed Pre-Calculus or a  
higher-level math course; OR  
ACT Math Sub-Score of 22+; OR  
Accuplacer Advance Algebra score of 275-289 and Quantitative  
Reason Score of 285+
4. Corequisites: None
5. MnTC Goals: None

A lower division course for students in the engineering disciplines. This course will: develop skills used by practicing engineers; provide extensive exposure to visual, written, and oral communication forms and to computer-based design tools; include substantial design projects, including prototyping construction.

**B. Date last reviewed/updated:** October 2023**C. Outline of Major Content Areas:**

1. Visual, written, and oral communication.
2. Information gathering.
3. Design process.
4. Modeling / analysis.
5. Reverse engineering.
6. Electronics and microprocessors.
7. Final design project.

**D. Course Learning Outcomes:**

Upon successful completion of the course, the student will be able to:

1. Think visually through hand sketching and CAD renderings.
2. Document designs.
3. Understand and use basic engineering graphics.
4. Use a computer-aided design program.
5. Demonstrate skills in practical electronics, computer interfacing, and microprocessor programming.
6. Design, construct, and present a computer-controlled robot.
7. Deliver a technical oral presentation.
8. Work on projects both individually and in teams.

9. Apply basic project-management tools and concepts.
10. Complete unstructured design projects with hard deadlines.
11. Apply basic physics and engineering analyses.
12. Demonstrate basic engineering writing skills.
13. Document work in an engineering notebook.
14. Devise, conduct, and report engineering measurements.
15. Understand ethical and professional responsibilities in engineering.

**E. Methods for Assessing Student Learning:**

Methods for assessment may include, but are not limited to, the following:

1. Written journal
2. Oral presentations
3. Short term projects
4. Final robot project
5. Exams
6. Quizzes
7. Homework

**F. Special Information:**

Equipment Deposit: Students will check out equipment and will be required to make an equipment deposit that will be returned when the equipment is returned. This course is required for all mechanical engineering majors and is recommended for the other engineering discipline.

Relationship to ABET Accreditation Criteria: To assist our transfer partner engineering programs in their ABET accreditation evaluation, this course teaches skills that help students achieve the following ABET outcomes (all but 9):

1. An ability to apply knowledge of mathematics, science, and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political ethical, health and safety, manufacturability, and sustainability.
4. An ability to function in multidisciplinary teams.
5. An ability to identify, formulate, and solve engineering problems.
6. An understating of professional and ethical responsibility.
7. An ability to communicate effectively.
8. A recognition of the need for, and an ability to engage in, life-long learning.
9. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.