#### GE 130: Introduction to Engineering

**Department:** Office of the Provost

**Designation:** Required

**Prerequisites:** MATH 102

**Catalog Data:** (1-1) 2 credits. Prerequisite: MATH 102. This course serves as an introduction to engineering profession and to its various disciplines. This course is designed to give students the opportunity to learn how to solve engineering analysis and design problems. Students will develop various computational skills, sharpen communication skills, and be exposed to professional development in the form of team building, technology tools, and project management. In addition, students will have the opportunity to learn from professional engineers and scientists through interaction with industry.

# Text: *GE 130 Introduction to Engineering*

**Course Learning Outcomes:**

1. Understand an engineering program enough to work with an Academic Advisor and commit to a major and create an education/career plan
2. Become an effective team member and campus leader
3. Develop the communication skills necessary to package their technical and professional skills to succeed in an engineering practice.
4. Be able to use Excel tools to analyze and solve engineering problems
5. Be able to understand the difference between analysis and design

**Topics:** Introduction to the engineering profession and its various disciplines

Solving engineering analysis and design problems

Computational skills

Communication skills

Team building

The use of technology tools

Project management

Professional and ethical practice in engineering

**Class Time** T, R 10:00 – 11:00 a.m., 12:00-1:00 p.m. (EP 255)

Mentorship – In addition to class attendance you will be required to meet with one of the instructors twice during the semester.

**Contribution to Criterion 5:** 2 credits of “engineering topics”

**Relationship of Course Outcomes and Assignments to the ABET (a) – (k)**

The following table indicates the relative strengths of the 12 main course activities and assignments (detailed below) in addressing the ABET a through k outcomes. A designation of “3” indicates a strong level of emphasis.

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| **GE 130** | | ABET Outcomes a-k | | | | | | | | | | |
| A | B | C | D | E | F | G | H | I | J | K |
| Course Assignments | 1 | 1 |  |  | 1 |  | 2 |  | 2 | 1 | 1 |  |
| 2 | 2 |  |  | 2 | 2 | 3 | 1 | 2 |  | 2 |  |
| 3 |  |  |  |  |  |  |  |  |  |  | 1 |
| 4 |  |  |  |  |  |  |  |  |  |  | 3 |
| 5 |  |  |  |  |  |  |  |  |  |  | 3 |
| 6 | 1 |  | 2 |  | 2 |  |  |  |  |  |  |
| 7 | 2 |  |  | 3 | 2 |  | 1 |  |  |  | 2 |
| 8 |  |  |  | 2 |  |  |  |  |  |  |  |
| 9,a | 1 |  |  | 3 |  | 2 | 3 | 2 | 1 | 3 |  |
| 9,b | 1 |  |  | 3 |  | 1 | 2 | 3 | 1 | 3 | 1 |
| 10 | 3 | 3 | 2 | 3 | 3 |  | 3 |  |  |  | 2 |
| 11 |  |  |  |  |  |  | 3 |  | 1 | 2 |  |
| 12 |  |  |  |  |  |  |  | 1 | 1 |  |  |

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|  | **Homework Assignments** | **Outcomes of assignment or activity** |
| 1 | "Who Wants to Be An Engineer" - Responseware game with teams focused on reading “What is Engineering?,” Engineering Careers & Disciplines,” and “Studying Engineering: The Keys to Success.” Game involves researching SDSM&T Engineering Department web pages and highlights great engineering feats . | 1. Class begins to work in teams. 2. Effective method of presenting general information without lecturing. Students are actively involved. 3. Game allows for determination of topics that need further discussion during class and/or follow up. 4. Provides familiarization of department web sites.  5. Final round in game involve teamwork as students wager points on knowledge of great engineering feats. |
| 2 | Engineering Ethics Problem | Addresses subject of "Can you be an Engineer Without Studying Ethics?" Teams break up to discuss and determine best course of action to address engineering problem and discuss what engineering ethical theories were used to come up with course of action. Teams will present solutions to class and field questions. |
| 3 | Microsoft Excel Basics | Familiarization with Excel |
| 4 | Formulas and Functions | Create formulas in a worksheet, locate and use Excel's predefined functions, use absolute and relative cell references in formulas and functions and debug formulas. Extra Credit offered for those with prior Excel experience |
| 5 | Working with Excel Charts | Familiarization with which chart to use. Create and manipulate charts, determine best fit trend lines. |
| 6 | Engineering Design Problem Statement and Criteria for Success | Define engineering problems in clear and unambiguous terms. Determine specifications a design solution must meet or attributes it must posess to be considered successful. Students are encouraged to look at a need or problem within their anticipated field of study. |
| 7 | Trebuchet/Catapult Tournament - In conjunction with Project 2, students modify their designed trebuchet or catapult to launch a tennis ball into a garbage can 50 ft away. | Application of principles of physics and open-ended thinking to modify final design to reach target. |
| 8 | Team survey for Project 2 | Determine individual involvement in team. |
| 9 | **Project 1**  Part a: Greatest Challenge Affecting Engineers in the 21st Century part b: First semester classes have the choice of the above or Dollars and Ton game offered by the Metallurgy Department - ( game developed & conducted by Nucor Steel over the course of 3 evenings) | a. First major team project involving research and formal PowerPoint presentation. Application of communication skills needed to give an effective presentation and field questions from the type of audience they are addressing. b. Dollars and Tons Game provides a team approach to project management and the interplay between engineering and finance. |
| 10 | **Project 2**  Trebuchet or Catapult Design - Basic kit provided | Provide opportunity for hands-on application of the principles of physics (analysis) and the opportunity for creativity (design) in a team setting. Provides further opportunity to use communication skills and teamwork to design and analyze trebuchet/catapult, give presentation, field questions, and write engineering report. |
| 11 | Research Paper | Follow up to department presentations. Student answers the following questions: 1) What field do I want to become educated in? 2) Why have I chosen this field?, and 3) What kind of employment do I hope to gain in this field? |
| 12 | Mentorship Session | Determine students adjustment to SDSM&T. Encourage involvement with Academic advisors, Professors, and Peer Advisors. Encourage involvement in campus/community activities depending on their interests. Discuss any problems students might be experiencing. Answer questions or find answers to their questions. |

**Prepared By:** Kathleen Hanley, Instructor; June 1, 2010