ENGR 13100
TRANSFORMING IDEAS TO INNOVATION I

Course Outcomes [Related ME Program Outcomes in Brackets]

1. Examine and analyze career information from various resources to make informed decisions about which engineering discipline to pursue. [A1]
2. Explain the critical role of cross-cultural and multidisciplinary teamwork in nurturing diverse perspectives and the creation of innovative engineering solutions that meets the needs of the diverse users. [B2, C3]
3. Reflect on your teamwork and leadership abilities, recognizing how your behavior impacts the whole team, and making team process adjustments whenever necessary. [B2]
4. Explain critical and diverse uses of modeling in engineering to understand problems, represent solutions, compare alternatives, make predictions, etc. [A2]
5. Use multiple models, estimation, and logic to triangulate and evaluate information coming from various data sources. [A1, A3]
6. Collect, analyze, and represent data to make informative explanations and persuasive arguments. [A3]
7. Implement iterative processes, rich information gathering, and multiple modes of modeling when solving complex design problems. [A2]
8. Use systematic methods to develop design solutions and compare design alternatives. [A4]
9. Consider the interconnectedness among social, economic, and environmental factors (in the context of sustainability or systems) when solving engineering problems. [A6]

Excel & MATLAB Modeling
1. Software Interface Familiarity
2. Basic Math/Trig. Functions
3. MATLAB Vectors and Matrices
4. Data Structures, Data Creation, and Manipulation
5. Files and Templates
6. Reading Files (CSV, TXT, DAT)
7. Basic & Formatted Graphics/Plotting
8. Descriptive Statistics
9. Histograms

Modeling: Model Eliciting Activities (MEA)
1. Developing mathematical models for real-world problems
2. Using models to solve engineering problems
3. Reviewing Peers’ Work

Professional Habits: Teaming
1. Teaming
2. Diversity
3. Contributing to Multi-Disciplinary Teams by Understanding Other Engineering Disciplines

Intro to Prof. Schools
1. AAE/ABE/BME
2. ChE/CE/CEM
3. IDE/IE/MDE
4. ME/MSE/NE

Design
1. Problem Framing/ Information Literacy
2. Understanding the Broader Context
3. Ideation and Idea Fluency
4. Representing Ideas Through Deep Drawings and Models
5. Balancing Benefits and Trade-Offs
7. Design as an Iterative Process
8. Design as a Reflective Process
1. COURSE NUMBER AND NAME: ENGR 13100 Transforming Ideas to Innovation I

2. CREDITS AND CONTACT HOURS: 2 credits
   a. Studio – 2 day per week at 110 minutes for 16 weeks

3. COURSE COORDINATOR OR INSTRUCTOR:
   M. Cardella & M. Ohland

4. TEXTBOOK:
   Ideas to Innovation, 3rd Edition, H. Moore/Purdue;

5. SPECIFIC COURSE INFORMATION:
   a. Course Description: A partnership between Schools and Programs within the College of Engineering, introduces students to the engineering profession using multidisciplinary, societally relevant content. Developing engineering approaches to systems, generating and exploring creative ideas, and use of quantitative methods to support design decisions. Explicit model-development activities (Engineering eliciting activities, EEAs) engage students in innovative thinking across the engineering disciplines at Purdue. Experiencing the process of design and analysis in engineering including how to work effectively in teams. Developing skills in project management, modern engineering tools (e.g., Excel and MATLAB).
   b. Prerequisites:
      None
   c. Status: Required

6. SPECIFIC GOALS FOR THE COURSE
   a. Course Outcomes: [Related ME Program Outcomes in Brackets]
      1. Examine and analyze career information from various resources to make informed decisions about which engineering discipline to pursue. [A1]
      2. Explain the critical role of cross-cultural and multidisciplinary teamwork in nurturing diverse perspectives and the creation of innovative engineering solutions that meets the needs of diverse users. [B2, C3]
      3. Reflect on your teamwork and leadership abilities, recognizing how your behavior impacts the whole team, and making team process adjustments whenever necessary. [B2]
      4. Explain critical and diverse uses of modeling in engineering to understand problems, represent solutions, compare alternatives, make predictions, etc. [A2]
      5. Use multiple models, estimation, and logic to triangulate and evaluate information coming from various data sources. [A1, A3]
      6. Collect, analyze, and represent data to make informative explanations and persuasive arguments. [A3]
      7. Implement iterative processes, rich information gathering, and multiple models of modeling when solving complex design problems. [A2]
      8. Use systematic methods to develop design solutions and compare design alternatives. [A4]
      9. Consider the interconnectedness among social, economic, and environmental factors (in the context of sustainability or systems) when solving engineering problems. [A6]

   b. Related ME Program Outcomes:
      A1. Engineering Fundamentals; B3. Prof/Ethical Responsibility;
      A3. Experimental Skills; B5. Life-Long Learning;
      A4. Modern Engr Tools; C1. Leadership;
      A5. Design Skills; C2. Global Engineering Skills;
      A6. Impact of Engr Solns; C3. Innovation;
      B1. Communication Skills; C4. Entrepreneurship
      B2. Teamwork Skills

7. LIST OF TOPICS: See following page.