ENGR 12700 – Engineering Fundamentals I

Type of Course
Required for all undergraduate engineering programs

Catalog Description
This course introduces students to engineering applications, analysis, experimentation, and design. The key focus is on the application of mathematical analysis in solving engineering problems. The course includes a project-oriented studio that emphasizes team work, communication, project management, and professional/ethical responsibilities. Significant writing is included. A computer laboratory component introduces engineering computer tools for visualization and spreadsheet calculation. The course provides an overview of the engineering profession and preparation for success in engineering study.

Credits
4

Contact Hours
2 Lecture, 2 Project Studio, 2 Laboratory

Prerequisite Courses

Corequisite Courses
MA 16500

Prerequisites by Topics
Algebra

Prerequisites by Topics
Trigonometry

Provided Coursebook
Bridging into Engineering by Rebecca Essig, Ph.D.

Course Objectives
This course seeks to prepare students for the study of engineering through learning how to: 1) effectively approach the study of engineering, 2) rigorously apply of mathematical techniques in engineering particularly algebra, trigonometry, descriptive statistics, & simple derivatives, 3) carry out a disciplined engineering project, 4) prepare and use graphical objects (graphs, tables, drawings, charts) for technical communication, and 5) use spreadsheet and CAD software.

Course Learning Outcomes

After successfully completing the First-Year Engineering Program, students should be able to:

Overall Curriculum Outcomes (2-term/all components)

1. solve and document the solution of problems involving elements or configurations not previously encountered (e.g. a new geometric arrangement, a new term to include in an analysis, a new type of starting condition)

2. solve problems using multiple approaches including (e.g., equations including varied analytic approaches, diagrams, formal solution steps or simple computer programs)

3. describe the broad nature of various engineering majors and the engineering profession and use this information to make appropriate career choices (4)

A student who successfully completes ENGR 127: Engineering Fundamentals I will be able to:

Analysis & Success Outcomes

A.1. formulate and solve engineering problems using linear and quadratic equations

A.2. formulate and solve engineering problems using trigonometry in planar systems

A.3. formulate and solve engineering problems using descriptive statistics

A.4. formulate and solve engineering problems using derivatives

A.5. formulate and solve engineering problems using systems of equations

A.6. explain and apply appropriate study and success strategies, concepts & habits to be successful in an engineering major and exhibit the work ethic necessary to succeed in engineering (7)

Project Outcomes

B.1. plan and carry out a disciplined experimental study following a systematic project process of project planning and management (6)

B.2. utilize appropriate analytical and computer tools in project work (6)

B.3. communicate effectively using simple memos, properly formatted tables and properly formatted figures following an engineering format and style guideline (3)

B.4. identify and demonstrate the behaviors of an effective team member and/or leader, prepare a project schedule (5)

B.5. explain and apply the concepts of professional and ethical responsibility, evaluate ethical issues in engineering practice in terms of a Code of Ethics and apply to ethics as an engineering student (4)

Computer Outcomes

C.1. represent a physical object in single-view and multi-view orthographic projections (3)

C.2. dimension parts according to convention (3)

C.3. create pictorial (isometric) representations of a physical object (3)

C.4. create and use drawings and diagrams to solve a problem and to document its solution

C.5. setup and use a spreadsheet to carry out repetitive calculations using formula

C.6. explain and use appropriate spreadsheet functions in solving engineering problems

C.7. calculate and use descriptive statistics and plot histograms

C.8. produce and use clear and effective computer graphs

C.9. clearly format a spreadsheet calculation to communicate a problem solution (3)

Lecture Topics
1. Student success
2. Applications involving linear & quadratic equations
3. Applications involving trigonometry & 2-dimensional vectors
4. Applications involving descriptive statistics
5. Applications involving systems of equations
6. Applications involving simple derivatives
7. Engineering majors & careers

Computer Laboratory Topics
1. CAD creating & modifying 2-dimensional drawings
2. Orthogonal projections of 3-dimensional objects
3. Dimensioning
4. Pictorial representations
5. Spreadsheet calculations
6. Spreadsheet graphs

Project Studio Topics
1. Project process and planning
2. Simple memos
3. Formatting tables, figures and equations
4. Teamwork
5. Professional and ethical responsibilities

Computer Usage
High

Laboratory Experience
Medium

Design Experience
Low

Coordinator
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