EGR 1010 Introductory Mathematics for Engineering Applications

I. College/School: College of Engineering and Computer Science
Department:

II. Course Information

Course Title: Introductory Mathematics for Engineering Applications
Course Abbreviation and Number: EGR 1010
Course Cross Listing(s) Abbreviation and Number:
Check ("x") all applicable:
General Education Course___X__ Writing Intensive Course___X__ Service Learning Course_____
Laboratory Course__X___ Ohio TAG (Transfer Assurance Guide) Course _____
Ohio Transfer Module Course_____ Others (specify)_____

III. Course Registration

Prerequisites: ((MPL 5 or ACT Math 25) and Trigonometry in High School) or MTH 1340
Corequisites:
Restrictions: Intending CECS majors must be first or second-year students (less than 60 hours); No restriction on intending majors outside CECS.
Other:

IV. Student Learning Outcomes

Upon completing this course, students will be able to:

- Solve problems involving applications of algebra and trigonometry in engineering.
- Solve problems involving applications of vectors and complex numbers in engineering.
- Solve problems involving applications of systems of equations and matrices in engineering.
- Solve problems involving applications of derivatives in engineering.
- Solve problems involving applications of integrals in engineering.
- Solve problems involving applications of differential equations in engineering.
- Use MATLAB to solve a variety of introductory engineering mathematics problems.
- Conduct a variety of physical experiments using engineering laboratory equipment.
- Write proper technical abstracts for engineering laboratory assignments.

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V. Suggested Course Materials

Textbook: Gilat, A., *Matlab: An Introduction with Applications*, 3rd ed., John Wiley & Sons, 2007.

VI. Suggested Method of Instruction

Lecture, Lab and Recitation

VII. Suggested Evaluation and Policy

Attendance 5%, Weekly Homework 10%, Exam #1 20%, Exam #2 20%, Final 20%, Lab 25%

VIII. Suggested Grading Policy

A course average within each of the following ranges will guarantee you *at least* the corresponding letter grade: A: 90-100, B: 80-90, C: 70-80, D: 60-70, F: <60.

IX. Suggested Assignments and Course Outline

Lecture:
Week 1: Application of Algebra in Engineering
Week 2: Application of Trigonometry in Engineering
Week 3: Introduction to Vectors in Engineering
Week 4: Introduction to Complex Numbers in Engineering
Week 5: Sinusoids and Signals in Engineering
Week 6: Systems of Equations and Matrices in Engineering
Week 7: Introduction to Derivatives in Engineering; Exam #1
Week 8: Application of Derivatives in Engineering
Week 9: Application of Derivatives in Engineering; Introduction to Integrals in Engineering
Week 10: Application of Integrals in Engineering
Week 11: Application of Integrals in Engineering; Exam #2

Week 12: Introduction to Differential Equations in Engineering
Week 13: Application of Differential Equations in Engineering
Week 14: Application of Differential Equations in Engineering; Summary and Review

Lab:
Week 1: Introduction and Meet the Lab TA's
Week 2: Lab #1: Application of Algebra in Engineering: The One-Loop Circuit
Week 3: Matlab Supplemental Instruction
Week 4: Lab #2: Trigonometric Relationships in One and Two-Link Planar Robots
Week 5: Matlab Supplemental Instruction
Week 6: Lab #3: Measurement and Analysis of Harmonic Signals
Week 7: Lab #4: Systems of Equations in Engineering: The Two-Loop Circuit
Week 8: Lab #5: Derivatives in Engineering: Velocity and Acceleration in Free-Fall
Week 9: Matlab Supplemental Instruction
Week 10: Lab #6: Integrals in Engineering: Work and Stored Energy in a Spring
Week 11: Matlab Supplemental Instruction
Week 12: Lab #7: Differential Equations in Engineering: The Leaking Bucket
Week 13: Lab #8: Differential Equations in Engineering: Spring-Mass Vibration
Week 14: Make-Up Lab Sessions

X. Other Information

Wright State Core: EGR 1010 is designated as a Wright State Core course and satisfies the following learning outcomes for Element 2:

2. Mathematics *The foundational skills required to use and interpret mathematics and statistics*	a. Identify the various elements of a mathematical or statistical model b. Determine the values of specific components of a mathematical/statistical model or relationships among various components c. Apply a mathematical/statistical model to a real-world problem d. Interpret and draw conclusions from graphical, tabular, and other numerical or statistical representations of data e. Summarize and justify analyses of mathematical/statistical models for problems, expressing solutions using an appropriate combination of words, symbols, tables or graphs

Integrated Writing Policy: EGR 1010 is designated as an Integrated Writing (IW) Wright State Core course, and consequently includes a writing component. *Students will be expected to produce writing that*

- *Demonstrates their understanding of course content,*
- *Is appropriate for the audience and purpose of a particular writing task,*
- *Demonstrates the degree of mastery of disciplinary writing conventions appropriate to the course (including documentation conventions), and*
- *Shows competency in standard edited American English.*

The writing component consists of eight 250 word laboratory abstracts, which correspond to the eight laboratory assignments. Each single-paragraph abstract must summarize the objective, motivation, approach, results and conclusions. Guidelines on how to write an abstract (including a sample abstract) will be posted on the course web page. The abstracts will be graded for form, style, correctness, and overall writing proficiency, and will constitute a portion of the total laboratory grade. Students will receive graded feedback on each laboratory abstract, which wil allow for continuous improvement throughout the course*. In order to ensure that the IW component is satisfied, the completion of ALL laboratory abstracts is required for a passing course grade.

*Note: Laboratory sections will not exceed 20 students, which will allow for ample individual feedback.