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.

V. Suggested Course Materials

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:

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<th>2. Mathematics</th>
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| 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 will 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.*