



Course Number and Name: EGG 101 Section Name - *Intro Engineering: Math & Applications*

Term Dates: Section Start Date - Section End Date

Meeting Location: Section Meeting Building Section Meeting Room

Meeting Days & Times: Section Meeting Days; Section Start Time - Section End Time

Lecture/Lab Hours: 3.00 Lecture Hours and 3.00 Lab Hours

Credits: 4.00

Course Description: This course is an application-based introduction to engineering and advanced mathematics topics through experiential, hands-on engineering labs. This course includes a laboratory section that has experiments and activities specifically designed to facilitate knowledge acquisition of course subject matter. Activities include algebraic manipulation of equations, trigonometry, vectors, sinusoids, matrices, differentiation and integration. Engineering applications are reinforced through extensive problem-solving by using math in context. MATLAB, an engineering analysis software, will be introduced and supported in lab applications. Laboratory emphasizes the use and understanding of basic instrumentation and measurement techniques and applications used. Students must register for the lab component of this course.

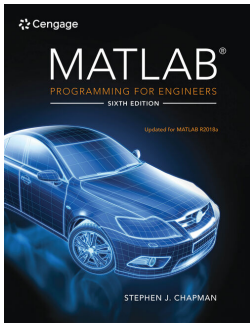
Course Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Discuss and apply the technical aspects of chosen engineering field and schooling requirements.
2. Identify, analyze and evaluate issues in engineering and technical information and demonstrate proficiency through the presentation of appropriate combination of words, symbols, tables and graphs.

3. Build a strong foundation for advanced physics and engineering courses by identifying the various elements of a mathematical or statistical model and applying model to a real-world problem.
4. Interpret and draw conclusions from graphical, tabular, and other numerical or statistical representations of data research and summarize and justify analyses of mathematical/statistical models and problems.
5. Use computer applications and computer based programming and simulation software to enhance the laboratory experience (ie MATLAB, Simulink)

Course Materials



MATLAB Programming for Engineers - Included in Cengage Unlimited

ISBN: 978-0-357-03039-4

Authors: Stephen J. Chapman

Publisher: Cengage Learning

Publication Date: 2020

Edition: 6th

Course Requirements

- **Lectures:** Attend lectures, take notes, and participate in class discussions. Lectures will introduce key concepts, demonstrate problem-solving techniques, and answer student questions.
- **Homework (assigned weekly):** Regular problem sets will consist of questions applying the covered concepts.
- **Quizzes:** Short in-class quizzes will assess understanding of recently covered material and identify areas needing improvement.
- **Labs:** Participate in hands-on experiments that apply the theoretical concepts to real-world situations. Labs will involve data collection, analysis, and report writing.
- **Midterm Exam:** A comprehensive exam covering the first half of the semester material.
- **Final Project:** Students will choose a research topic related to the course, conduct research, and present their findings in a written report and a poster presentation.

Evaluation Methods

Participation 10%

Homework/assignments 10%

Midterm Exams: 35%

Poster presentation 20%

Final Exam 25%

Grading

Letter Grade	Percentage
A	90-100
B+	87-89
B	80-86
C+	77-79
C	70-76
D+	67-69
D	60-66
F	< 60

Class Schedule

Week	Unit/Content	Lecture Learning Activities	Laboratory Activities
1	Introduction to Engineering – Majors and Collegiate Requirements Application of Algebra in Engineering – Linear, Quadratic Equations	Evaluation and Selection of Scientific/Engineering Trade Non Fiction Book Resume Writing Lecture, Discussion Practice Homework Problems	Introduction to Lab MATLAB Estimation and Reasonableness – Fermi Questions figures, measurements Assigned Reading Marian, Weir

Week	Unit/Content	Lecture Learning Activities	Laboratory Activities
2	Trigonometry - One-Link Planar Robot, Two-Link Planar Robots	Lecture, Discussion Practice Homework Problems	Lab #1: Application of Trigonometry in Engineering: The RLC Circuit
3	2-D Vectors in Engineering Complex Numbers in Engineering	Lecture, Discussion Practice Homework Problems	Lab #2: Trigonometric Relationships in Complex Plane for a Two-Link Planar Robot
4	Engineering Ethics	Discussion Boards - TED Talks, Engineering Disasters - Review of Proper Methodology to write a Book Review for selected trade text Resume Review	Matlab Supplemental Instruction #1
5	Sinusoids and Harmonic Signals in Engineering	Lecture, Discussion Practice Homework Problems	Lab #3: Measurement and Analysis of Harmonic Signals
6	Systems of Equations and Matrices in Engineering	Lecture, Discussion Practice Homework Problems	Lab #4: Systems of Equations in Engineering: The RLC Circuit
7	Introduction to Derivatives in Engineering, Dynamics	Exam 1	Matlab Supplemental Instruction #2
8	Applications of Derivatives in Electric Circuits	Lecture, Discussion Practice Homework Problems	Lab #5: Derivative Applications in Engineering: Velocity and Acceleration in Free Fall
9	Applications of Derivatives in Mechanics of Materials	Lecture, Discussion Practice Homework Problems	Matlab Supplemental Instruction #3 The Martian movie assignment completion
10	Introduction to Integrals in Engineering, Applications of Integrals in Statics	Lecture, Discussion Practice Homework Problems	Lab #6: Integrals in Engineering: Work and Energy in a Spring
11	Applications of Integrals in Dynamics	Lecture, Discussion Practice Homework Problems	Matlab Supplemental Instruction #4

Week	Unit/Content	Lecture Learning Activities	Laboratory Activities
12	Applications of Integrals in Electric Circuits	Exam 2	Lab #7: Differentiation in Engineering: The Leaking Bucket
13	Introduction to Differential Equations – The Leaking Bucket, Differential Equations in Mechanical Systems	Lecture, Discussion Practice Homework Problems Book Review Due	Lab #8: Differentiation in Engineering: Spring Vibration
14	Applications of Differential Equations – Electrical Systems	Lecture, Discussion Practice Homework Problems	Poster Presentation
15		Final Exam	

Experiential Learning

Students must complete an experiential learning activity that connects course content to career applications. This activity may be a content specific assignment or practical skill that is applied within a course assignment. This assignment supports the general education learning outcomes of scientific/critical thinking and quantitative reasoning; oral and written communication; and information literacy/technological competency.

Academic Policies

See College Catalog for more information: <http://onlinecatalog.ucc.edu/index.php>

Americans with Disabilities Act (ADA)

UCNJ Union College of Union County, NJ offers reasonable accommodations and/or services to persons with disabilities. Any student who has a documented disability and wishes to self-identify should contact the Director of Universal Accessibility Services and Veterans Affairs at (908) 709-7164, or email accessibility@ucc.edu. Accommodations are individualized and in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992. In order to receive accommodations, students must be registered with Disability Support Services. Students should register with the office as soon as possible. Accommodations are not official until the Faculty Accommodations Alert Form(s) are issued from the student to his/her instructor(s).

Family Educational Rights and Privacy Act (FERPA)

The FERPA Statement can be found at <https://www.ucc.edu/admissions/the-family-education-rights-and-privacy-act/>.

Equal Opportunity Statement

UCNJ Union College of Union County, NJ does not discriminate and prohibits discrimination, as required by state and/or federal law, in all programs and activities, including employment and access to its career and technical programs.

UCNJ Union College of Union County, NJ Mission Statement

Transforming Our Community. . . One Student at a Time

Suggested Teaching Methodologies

1. Lectures: question and answer sessions will provide interactivity between students and instructor.
2. Class Discussions: students will actively participate in discussions and critiques. (e.g Book Review, The Martian)
3. Homework
4. Reading Assignments: students will engage and review topics related to project requirements.
5. Speaking Assignments: students will present research individually or in groups using current technology to support the presentation (e.g., PowerPoint presentation, Scientific Poster Presentation)
6. Exams: Intended to assess student understanding of reading assignments, mathematical concepts and programming language.
7. Laboratory Assignments: hands on physics

Mapping Course Learning Outcomes to Learning Activities and Evaluation Methods

Course Learning Outcomes	Learning Activities	Evaluation Metho
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(CLOs)		
<p>Build a strong foundation for advanced physics and engineering courses by identifying the various elements of a mathematical or statistical model and applying model to a real-world problem.</p> <p>Interpret and draw conclusions from graphical, tabular, and other numerical or statistical representations of data research and summarize and justify analyses of mathematical/statistical models and problems.</p> <p>Use computer applications and computer-based programming and simulation software to enhance the laboratory experience (ie MATLAB, Simulink)</p>	<ul style="list-style-type: none"> • Lecture • Homework/Assignment • Laboratory Assignments 	<ul style="list-style-type: none"> • Graded Assignnn • Discussion • Presentation of Projects • Exams • Graded Labs
<p>Discuss and apply the technical aspects of chosen engineering field and schooling requirements.</p> <p>Discuss and Apply the technical aspects of chosen engineering field and schooling requirements.</p>	<ul style="list-style-type: none"> • Discussion Board Entry • Book Review • Information Literacy Project • Resume • "The Martian Project" 	<ul style="list-style-type: none"> • Graded Assignnn • Presentation of Projects • Scientific Poster Presentation

Please note: all programs must integrate in one or more courses, discipline-specific course learning outcomes that reflect the College learning outcomes of scientific/critical thinking and quantitative reasoning, oral/written communication, and information literacy.

Visit <https://app.teachinghow2s.com/library/science-technology-engineering-math-stem> to access evidence-based-teaching techniques for this course.