ENGR 101 Spring 2019
COURSE OUTLINE

Course Description:

This course provides an overview of relevant topics in engineering analytical methods that are most heavily used in the core sophomore-level engineering courses. Topics include algebraic manipulation of engineering equations; use of trigonometry, vectors and complex numbers, sinusoids and harmonic signals, systems of equations and matrices in engineering applications; need for differentiation, integration and differential equations in engineering applications. All topics will be presented within the context of an engineering application, and reinforced through extensive examples of their use in the core engineering courses and lab exercises. This course will also provide an introduction to the engineering analysis software, MATLAB.

Textbook: Rattan and Klingbeil, Introductory Mathematics for Engineering Applications, John Wiley & Sons, 2015.

References:
1. Moore, H., *MATLAB for Engineers* (4th ed.). Prentice Hall, 2014.
2. Gilat, A., Matlab: An Introduction with Applications, 5th ed., John Wiley & Sons, 2015.

Instructors:

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Office Hours:	

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Teaching Assistants:

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Times and Venues:

Sections 02, 04 and 06 Lecture - MW 8:30 – 9:50 am, KUPF117

Section 02 Recitation: M 2:30pm – 3:50pm, KUPF207
Section 04 Recitation: T 8:30am – 9:50am, KUPF202
Section 06 Recitation: R 8:30am – 9:50am, TIER108

Section 02 Lab.: F 8:30am – 9:50am, MALL PC39
Section 04 Lab.: W 10:00am – 11:30am, MALL PC40
Section 06 Lab.: F 8:30am – 9:50am, MALL PC37

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Grading Policy:

Attendance	5%
Homework	10%
Exam 1	15%
Exam 2	15%
Exam 3	15%
Final Exam	20%
Lab	20%
	100%

Course Web Page:

All materials associated with this course will be posted on the course web page on Moodle, which can be immediately accessed at moodle.njit.edu. This includes electronic copies (PDF format) of all handouts, homework etc.. Since Moodle allows instructors to send course-related announcements to the entire class, you should plan to check the course page on a regular basis. In addition, you are expected to check your NJIT e-mail at least once every 24 hours during the work week (Mon-Fri).

Attendance Policy:

Attendance at all lectures/labs is required and is worth 5% of the total course grade. Attendance will be taken at the beginning of class/lab. Excused absence is allowable, but the instructor must be notified and has to approve it before the class/lab (in the case of an emergency, notify the instructor within 24 hours after the class/lab takes place and show evidence from doctor, police, or other relevant agencies). Each unexcused absence will result in a 1% deduction from the 5% attendance (i.e., 1/5 of the total attendance points). While an attendance grade of 0% (exactly 5 unexcused absences) is possible, any subsequent unexcused absence will result in a grade of "F" for the course. In the case of an excused absence, the student is still responsible for all the missed materials or announcements covered in the class/lab. The method of handling late or missed work will be determined by the instructor.

Homework Policy:

Homework will be assigned on a weekly basis, and is worth 10% of the final course grade. Unless otherwise noted, all weekly homework is due BEFORE the start of recitation one week from the week of assigning the homework. Your homework will be graded by your recitation TA, and will be returned during recitation so that any questions or concerns can be immediately addressed. TO ENSURE THAT YOUR HOMEWORK GETS GRADED, PLEASE INCLUDE THE NAME OF YOUR RECITATION TA AT THE TOP RIGHT-HAND CORNER. While students are encouraged to work homework problems together, copying of another student's completed homework problem(s) (including MATLAB code and/or output) is considered a violation of the University's Academic Integrity Policy and will be dealt with accordingly.

Lab Policy:

The mathematics concepts presented in lecture will be reinforced through hands-on, physical application in the laboratory. All required computations and results for each laboratory will be turned in the following week BEFORE the start of lab. Laboratory assignments will be accepted up to one week late with a penalty of 20%. Laboratory assignments more than one week late must still be completed, but will receive a grade of zero. Since the laboratory is a mandatory component of this course, THE COMPLETION OF ALL LABORATORY ASSIGNMENTS IS REQUIRED FOR A PASSING COURSE GRADE. If at all possible, students who miss a laboratory assignment should request instructor approval to attend another laboratory section.

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Seven of the lab assignments consist of a writing component, a 250-word laboratory abstract. Each single-paragraph abstract must summarize the objective, motivation, approach, results and conclusions. Guidelines on how to write an abstract will be discussed in lab. 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.

Exam Policy:

Student performance will be assessed through three midterm exams and one final exam, as indicated on the course schedule. The only materials permitted for each midterm exam are a calculator and both sides of an 8.5"x11" HANDWRITTEN cheat sheet (no electronic reproduction of any type), which must be turned in with the exam. A total of three (3) 8.5"x11" cheat sheets will be permitted for the Final Exam. ANY FORM OF CHEATING ON EXAMS WILL RESULT IN AN "F" FOR THE COURSE. This includes looking at another person's exam or copying another person's work for exams. The NJIT Honor Code (visit http://www.njit.edu/academics/honorcode.php.) will be upheld. Violations will be brought to the immediate attention of the Dean of Students. The student who compromised as well as the student who allowed will BOTH be awarded the SAME penalty.

Technology Policy:

While the professor is discussing the lecture/lab, all monitors should be turned off. If anyone caught typing or browsing internet, the student will be asked to leave the class for the day and this will count as an absence. Cell Phone use or Texting during class is NOT allowed.

Other Policy:

If a student is getting a grade lower than a C at the withdrawal deadline, he/she may be required to withdraw from the course.

MATH108 Students taking ENGR101 will be offered an opportunity to retake the math placement exam at the end of the semester. Student who do well on the placement exam will be able to skip MATH110 and place into MATH111, thereby saving a course. Please be advised that your new placement test scores will only count if you successfully complete both MATH108 (C or better grade) and ENGR101 (D or better grade).

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Tentative Course Schedule for Lectures

Week	Topic
1	Application of Algebra in Engineering - Linear Equations Application of Algebra in Engineering - Quadratic Equations
2	Trigonometry - One and Two-Link Planar Robots
3	2-D Vectors in Engineering
4	**Exam** #1 Complex Numbers in Engineering
5	Sinusoids and Harmonic Signals in Engineering
6	Systems of Equations and Matrices in Engineering
7	Introduction to Derivatives in Engineering Applications of Derivatives in Dynamics
8	**Exam** #2 Applications of Derivatives in Electric Circuits
9	Applications of Derivatives in Mechanics of Materials Further Applications of Derivatives in Engineering
10	Introduction to Integrals in Engineering Applications of Integrals in Statics
11	Applications of Integrals in Dynamics
12	**Exam** #3
13	Applications of Integrals in Electric Circuits Further Examples of Integrals in Engineering
14	Review

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Tentative Course Schedule for Labs

Week	Topic
1	Introduction and Meet the Lab TA
2	Introduction to MATLAB and Basic tools used in MATLAB.
3	Built-in MATLAB Functions. Manipulating Matrices in MATLAB.
4	Plotting in MATLAB.
5	Lab #1: Application of Algebra in Engineering: The One-Loop Circuit
6	Lab #2: Trigonometric Relationships in One and Two-Link Planar Robots
7	Lab #3: Measurement and Analysis of Harmonic Signals
8	Lab #4: Applications of Vector and Trigonometry Physical Lab
9	MATLAB: User Controlled Input and Output
10	Lab #5: Systems of Equations in Engineering: The Two-Loop Circuit
11	MATLAB: Symbolics, Selection Structure and Logical Functions
12	Lab #6: Derivatives in Engineering: Velocity and Acceleration in Free-Fall
13	Lab #7: Integrals in Engineering: Work and Stored Energy in a Spring
14	MAKE UP LAB WEEK