ENGR 101 Fall 2025
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, and integration 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, Klingbeil and Baudendistel, Introductory Mathematics for Engineering Applications, John Wiley & Sons, 2021. ISBN: 9781119604426. (**Can also work with first edition**)

References:
1. Moore, H., *MATLAB for Engineers* (6th ed.). Pearson Education, 2022. ISBN: 9780137627981
2. Gilat, A., MATLAB: An Introduction with Applications, 5th ed., John Wiley & Sons, 2014.

Instructors:

Lecture: Dr. David Lubliner Office: FENS218
E-mail: David.j.lubliner@njit.edu
Office Hours: TBD

Lab: Sections 01 and 05
Ms. Anuradha Perumalsamy Office: TBD
E-mail:. anuradha.perumalsamy@njit.edu
Office Hours: By appointment

Sections 03 and 07
Dr. Prateek Shekhar Office: FENS 211
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Office Hours: By appointment

Coordinator: Dr. Jaskirat Sodhi Office: FENS217
E-mail: jaskirat.sodhi@njit.edu
Office Hours: By appointment.

Teaching Assistants:

TBD

Times and Venues:

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ENGR101 Analytical Methods for Engineering Applications **4 Credits**

Lecture: Sections 01 and 03- MR 11:30 am - 3:50 pm in KUPF 205 (Led by Dr. David Lubliner)
Sections 05 and 07- MR 1 - 2:20 pm in KUPF 205 (Led by Dr. David Lubliner)

Recitation: Section 01 F 2:30 -3:50 pm in FMH 409
Section 03: F 10-11:20 am in FMH 412
Section 05: F 4-5:20 pm in KUPF 206
Section 07: R 2:30-3:50 pm in FMH 305

Laboratory: Section 01: T 11:30 am-12:50 pm in PC Mall 37 (Led by Ms. Perumalsamy)
Section 03: W 10-11:20 am in PC Mall 36 (Led by Dr. Shekhar)
Section 05: T 1-2:20 pm in GITC 2315C (Led by Ms. Perumalsamy)
Section 07: W 11:30 am-12:50 pm in PC Mall 36 (Led by Dr. Shekhar)

Grading Policy:

Class Participation and Active Learning Assessments	15%
Homework	15%
Exam 1	10%
Exam 2	10%
Exam 3	10%
Final Exam	20%
Lab	20%
	100%

Course Web Page:

All materials associated with this course will be posted on the course web page on Canvas, which can be immediately accessed at canvas.njit.edu. This includes electronic copies (PDF format) of all handouts, homework etc. Since Canvas 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/recitations is required and counts towards the class participation grade. Excused absence is allowable, but the instructor must be notified and has to approve it before the session (in the case of an emergency, notify the instructor within 24 hours after the session takes place and show evidence from doctor, police, or other relevant agencies). In the case of an excused absence, the student is still responsible for all the missed materials or announcements covered in the session. 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 15% of the final course grade. Homework will be assigned and collected on Canvas. 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 on Canvas by the due date provided. 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.
Several 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.
Even though some labs will be done as a team, the work you submit on Canvas must be your own and prepared by you alone.

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. There will be no make-up exams. Taking the Midterm and Final Exams are mandatory to receive a final grade in the course.
Any form of cheating on exams will result in an "F" for this course. This includes looking at another person's exam or copying another person's work for exams. The NJIT Honor Code 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/recitation, refrain from using an electronic device for any other purpose. If anyone caught doing so, 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.

Academic Integrity Policy:
"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found here.
Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"

Diversity Statement:
It is our intention that students from all backgrounds and perspectives will be well served by this course, and that the diversity that students bring to this class will be viewed as an asset. We welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive

environment for every other member of the class. Your suggestions are encouraged and appreciated.

Generative AI:

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities. It is not permitted to be used in the assignments noted by the instructor, as doing so would undermine student learning and achievement of course learning outcomes. Additionally, if and when students use AI in this course, the AI must be cited as is shown within the NJIT Library AI citation page for AI. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

Other Policy:

If a student is getting a grade lower than a C at the withdrawal deadline, they may be recommended to withdraw from the course.

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Tentative Course Schedule for Lectures

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

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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 (Onramp)
3	Built-in MATLAB Functions. Manipulating Matrices in MATLAB (Onramp)
4	Lab #1: Application of Algebra in Engineering: The One-Loop Circuit
5	Lab #1a: Application of Algebra in Engineering: The One-Loop Circuit (Physical Lab)
6	Lab #2: Trigonometric Relationships in One and Two-Link Planar Robots
7	MATLAB: Plotting and User Controlled Input and Output
8	MATLAB: Selection Structure
9	MATLAB: Symbolic Math and Logical Functions
10	Lab #3: Applications of Vectors and Trigonometry (Physical Lab)
11	Lab #4: Measurement and Analysis of Harmonic Signals
12	Lab #5: Penny-wise problem (Physical Lab)
13	Lab #6: Systems of Equations in Engineering: The Two-Loop Circuit (Physical Lab)
14	Lab #7: Derivatives in Engineering: Velocity and Acceleration in Free-Fall