MATLAB for Engineers with Application (ME 1311) Course Syllabus

Instructor

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KENNESAW STATE UNIVERSITY
SOUTHERN POLYTECHNIC COLLEGE OF ENGINEERING AND ENGINEERING TECHNOLOGY
Department of Mechanical Engineering

Course Description

Catalog Description (Credit Hours : 3-0-3)

2 x 75 minute lectures (3 credits). This course will provide an introduction to fundamental computing principles and programming concepts. Students will use the high-level programming language, MATLAB, to develop and implement programs to solve engineering problems. Basic programming concepts covered include: algorithm design, data types, flow control, functions, sorting, plotting, simulation, and numerical methods.

Course Text/Software (REQUIRED)

The E-book, "Solving Mechanical Engineering Problems with MATLAB" written by Simin Nasseri, Linus Publications, 2023, will be used for this course. The Learning Management System (LMS) system will be part of the educational platforms on which you need to take the quizzes.

Order the E-book here:

https://linusebooks.com/product/solving-mechanical-engineering-problems/

If you have purchased the new printed Book via the Linus Learning publisher, you should contact the publisher and request a login/password for the LMS system. Please obtain the book via the publisher's websites and not the KSU bookstores, as it will be less expensive for you.

MATLAB has been installed on all Q building labs' computers and it can be downloaded to be used at home as well. Please see the instructions on D2L.

Prerequisite

MATH 1190, ME 1001L (co-Requisite).

Learning Outcomes

By the end of this course, students will be able to:

1. Apply basic concepts of Linear Algebra for vector and matrix operations in MATLAB,
2. Create 2D and 3D plots from datasets related to engineering, physics, or math.
3. Formulate and solve systems of linear equations by Gaussian elimination, and matrix inversion,
4. Write conditional statements and loops and apply to a STEM problem.,
5. Write code in MATLAB, including saving files as scripts and functions.
6. Solve the real mechanical engineering problems by using the fundamental knowledge of mathematics, science & engineering, and MATLAB.

Course content- Topic coverage:

- MATLAB environment and important commands.
- Linear Algebra, vector and matrix operations.
- Fundamental engineering computing and statistics.
- Save, load, display and fprintf and other similar commands.
- Communication with Excel.
- 2D (normal, logarithmic and subplots) and 3D plotting.
- Solutions to systems of linear equations.
- Conditional statements (if statements, also any, all, find and other commands).
- Loops (for, while loops and double loops).
- MATLAB scripts and functions.
- Polynomials, including numerical and symbolic differentiation and integration (trapz, quadl, integral, int, diff and other commands).
- Using MATLAB for simple and complicated engineering problems (applying MATLAB to solve problems related to mechanical engineering problems; thermal/fluid and solid mechanics) through a case study or Project.

ME Program Student Outcomes:

Upon completion of the course, the students should have:

https://engineering.kennesaw.edu/mechanical/degrees/bs-mechanical-engineering.php

Outcome 6) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome 7)An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusion.

Course Grade Determination:

Your grade in this course will be determined from your performance on lab assignments (in-class assignments or quizzes), case study (includes the presentation of your project), and tests. The main emphasis of the course is on gaining practical skills. For this reason, the lab sessions are essential and should not be missed. Attendance is mandatory and points will be taken off for unexcused absence.

Component	Percentage
Attendance	5% (for online class: 2% introduction discussion plus 3% participation grade)
Lab assignments	20% to max 25% (For online class: These are group assignments. Some chapter discussions are also considered towards assignments grade).
Tests/Quizzes	45% to max 50% (**This includes the LMS system's or E-book's quizzes**).
Case Study	25% (Case Study Draft 10%, Case Study Final 15%)
Total	100

[90 - 100% = A, 80 - 89% = B, 70 - 79% = C, 60 - 69% = D, Below 60% = F]

Tests will be proctored and will be announced well before the testing dates. Some are hand- written and for some you need to use MATLAB. For online modality, there will be Quizzes (on D2L and LMS) and also tests on D2L, in the form of True/False and multiple-choice.

Lab assignments are from the previous practice labs and other materials taught in class. Students should work on practice lab problems to get ready for tests and lab assignments. You need to prepare the list of MATLAB commands and use them during the lab assignments. During the allocated time, you answer the questions by typing appropriate commands and then print the assignment sheet in the lab. Some assignments will be hand-written.

Information about **case studies** will be given in detail. You will use MATLAB to solve some engineering problems. You can make a GUI (Graphical User Interface) if you wish. A manual will be provided by me. This is actually a self-training step in finishing this MATLAB course via which you learn how to create a program which communicates with the user graphically. Besides, students are encouraged to use image processing (and maybe sound processing) in their case studies and related instructions will be provided for them.

Tentative Schedule for lab assignments and tests:

You can use your list of commands for these assessments.

Check this file frequently on D2L as it might get changed.

Weeks	Chapters	D2L Quiz/lab Assignment/Test	Quizzes on LMS (End of the week)
Week 1	Ch 1-Ch 2		Ch 1 quiz
W2	Ch 2	Quiz 1	Ch 2 Quiz
W3	Ch 2- Ch 3		Ch 3 Quiz
W4	Ch 3- Ch 4	Quiz 2	Ch 4 Quiz
W5	Ch 4	Chapter 4 Discussion	
W6	Ch 4- Ch 5	Quiz 3	
W7	Ch 5		Ch 5 Quiz
W8	Ch 7	Midterm (chs 2, 3 and 4) This week or next	
W9	Ch 7	HW Assignment	
W10	Ch 7	Break for the Spring Semester	
W11	Ch 6- Ch 8	HW assignment	Ch 7 Quiz
W12	Engineering Problems Ch 8	Discussion on ch 6 Selecting the Case Study	Ch 6 Quiz
W13	Ch 9		Ch 8 Quiz
W14	Ch 9	Ch 8 discussion- Case study Draft	Ch 9 Quiz
W15	Ch 9- Ch 10	Break for the Fall Semester	Ch 10 Quiz
W16	Ch 10	Chapter 9 test- Case Study Final Presentation/submission	

Tentative Schedule for lab assignments and tests: (labs are for f-2f classes)

Online Class:

Lab Assignment /Quiz/Test	Chapters of the book
Quiz 1	Chapters 1 and 2
Lab 1 (if needed)	Chapters 2
Quiz 2	Chapter 2 and 3
Quiz 3	Chapter 4
Test 1 (Midterm)	Chapters 2, 3 and 4
Lab 3 (Homework Assignment)	Chapter 5 (and previous ones)
Lab 4 (Homework assignment)	Chapter 5, and 7 (and previous ones)
Test 2 (For f-2-f class only)	Chapters 2 to 7 (mainly 5 and 7)
Case study (Instead of final exam)	All
Test	Chapter 9

Face-2-face class:

You can use your list of commands for these assessments.

Lab Assignment /Quiz/Test	Chapters of the book
Online Quiz 1	Chapters 1 and 2
Lab 1	Chapter 2
Online Quiz 2	Chapters 2 and 3
Lab 2	Chapter 4
Test 1	Chapters 2, 3 and 4
Lab 3	Chapter 5 (and previous ones)
Lab 4 (Homework assignment)	Chapters 5, and 7 (and previous ones)
Test 2	Chapters 2 to 7 (mainly 5 and 7)
Case study (Instead of final exam)	All
Test 3	Chapters 9 and 10

Case Studies Guidelines:

Your case studies weigh 25% of your total grade. These can either be related to engineering (eg. Bernoulli's Equation and Pump Performance Charts, etc.) or physics problems or anything else related to your jobs. Remember that each case study should be more difficult than the problems I give you in lab or the ones assigned as homework. You should first get your case studies approved by me.

First Draft: About mid April (Spring Semester), and Mid November (Fall Semester) Print out the engineering problem + the MATLAB function.
Final project (presentations): Early May (Spring Semester), Early December (Fall Semester).

Points will be taken off for late submission. Follow these guidelines for submitting your case studies reports:

1. As the first page of your report, choose a suitable title for your case study, write your name, my name, name of the class, date, etc.,
2. Clearly state the problem. Use a couple of figures to clarify the problem chosen and place your flowchart (eg. the projectile or oblique impact or modal temperature distribution, flow in the pipe, etc.),
3. Write the equations neatly (use the equation editor in MS Word and do not write by hand),
4. Indicate the inputs and outputs and what exactly the function does. Copy your function from MATLAB editor and paste it into the MS Word,
5. Attach all the output results, including the output data and figures that you get after running the function. Place the screen shots of MATLAB when you run your program.

Grading policy:

5%	Appearance (Assembly and Organization)
20%	Defining the problem (equations, figures, flowcharts, etc.)
15%	Explaining how your function works (inputs and outputs and every section of the function)
40%	Function is written professionally (function line, descriptions, clc, help line at the beginning, input commands, fprintf, fool-proofing, logical statements, correct loops, avoiding repetitions, etc.)
20%	Results: How you call the function, Output values you get, figures and anything you want your function to do.
100%	Total

As will discuss in class, Plagiarism cannot be tolerated and the penalty is that the student not only gets zero for the case study, but also he/she will fail the course. You can review this document related to Plagiarism.

Check D2L and find the following documents on your case studies:

1- Components of a flowchart
2- How to draw a flow chart using www.draw.io
3- How to type equations in Microsoft Word
4- Case study draft samples
5- MATLAB final case study samples

ACADEMIC HONESTY:

The high quality of education at Kennesaw State University is reflected in the credits and degrees its students earn. **All assignments must be your own work and original for this course**. The protection of these high standards is crucial since the validity and equity of the University's grades and degrees depend upon it. Any student found to have violated any KSU academic honesty regulation after a hearing before a university hearing panel or before the Vice President for Student Success and Enrollment Services (or his/her designee) shall be suspended for at least one semester, unless the student persuades the deciding body that the circumstances of his or her behavior substantially mitigate the gravity of the violation. These regulations are designed to assist students in (1) developing appropriate attitudes about, and (2) understanding and following the university's standards relating to academic honesty. The regulations protect students by helping them avoid committing infractions that may compromise the completion of their KSU degrees or damage their reputations.

Student Conduct Pledge/Statement: As a member of the Kennesaw State University community of scholars, I understand that my actions are not only a reflection on myself, but also a reflection on the University and the larger body of scholars of which it is a part. Acting unethically, no matter how minor the offense, will be detrimental to my academic progress and self-image. It will also adversely affect all students, faculty, staff, the reputation of this University, and the value of the degrees it awards. Whether on campus or online, I understand that it is not only my personal responsibility, but also a duty to the entire KSU community that I act in a manner consistent with the highest level of academic integrity. Therefore, I promise that as a member of the Kennesaw State University community, I will not participate in any form of academic misconduct.

Types of Academic Misconduct:

1) **Cheating:** Receiving, attempting to receive, knowingly giving or attempting to give unauthorized assistance in the preparation of any work required to be submitted for credit (including examinations, laboratory reports, essays, themes, term papers, etc.) is considered cheating, as is engaging in any behavior that a professor prohibits as academic misconduct in the syllabus or class discussion. Unless specifically authorized, using and/or having access to electronic devices during an examination, quiz, test or other assessment is automatically considered cheating, regardless of the student's reason for using/accessing the device;

2) **Plagiarism:** Including direct quotations from other sources into work required to be submitted for credit without indicating them as such by quotation marks, block quotes or other appropriate formatting. Incorporating the work of someone (e.g. ideas, theories, data, figures, graphs, programs, electronic based information, illustrations, etc.) into a paper or project without due acknowledgement;

3) **Self-Plagiarism:** Submitting any work for credit which was not authored specifically and originally for the assignment in question without the prior permission of the professor receiving that assignment. Most commonly, this means submitting the same, or substantially the same, paper or other assignment for credit in more than one class;

4) Misrepresentation and/or Falsification: Knowingly providing false information in completing University forms or applications (including admissions forms, scholarship applications, time sheets, false or counterfeit transcripts, etc.) or in any work submitted for credit. This includes providing fabricated/altered documents to substantiate an excused absence (such as to meet attendance requirements or have the chance to make-up a missed exam). Signing in for another student or having another individual sign in on a student's behalf on an attendance sheet also constitutes a violation of this code section.

5) **Unauthorized Access to University Materials:** Taking, attempting to take, stealing or in any unauthorized manner otherwise procuring, gaining access to, altering or destroying any material pertaining to the conduct of a class (including tests, examinations, grade change forms, grade rolls, roll books, laboratory equipment, University grade records in written or computerized form, etc.).

6) Malicious**/Intentional Misuse of Computer Facilities/Services:** Maliciously or intentionally misusing university-controlled computer facilities and services. This includes violations of state and

federal laws (e.g. copyright violations, unauthorized access to systems, alteration/damage/destruction, or attempted alteration/damage/destruction, use for profit, etc.) or a department's rules for computer usage (e.g. account violations, damage, or destruction of the system and/or its performance, unauthorized copying of electronic information, use of threatening or obscene language, etc.).
7) Malicious **Removal, Retention or Destruction of University Resource Materials**: Misplacing, taking, destroying any item or part of an item belonging to or in the protection of the University (or the attempt thereof) with the intention of bringing about an undue disadvantage in the academic pursuits of other Kennesaw State University students.

These examples of academic dishonesty shall not be construed to be comprehensive, and infractions will be dealt with on an individual basis according to university policies and procedures. It is the obligation of each student to assist in the enforcement of academic standards.

See: **The KSU Student Code of Conduct at** KSU Codes of Conduct-2015.pdf
Enforcement: This policy is strictly enforced. Please note, **I reserve the right to select any paper and/or assignment that are turned in for a grade for plagiarism review. Plagiarism review consists of running your paper/assignment through various search engines and databases at my disposal in order to check for "borrowed" or "bought" information. Students will be required to use TurnItIn.Com to have their papers reviewed for plagiarism.** If you are found in violation of academic dishonesty, then you will be subject to the enforcement policies and procedures, as outlined by the University and the Department.

Turnitin

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Terms and Conditions of Use posted on the Turnitin.com site.

WEB ACCESSBILITY:

Kennesaw State University follows the guidelines of the Universal Design for Learning standard of web accessibility. Faculty use Word, PDF, and HTML formats when communicating electronic information to students whenever possible and appropriate in light of the goals of the course. Faculty are trained to use Web Accessibility Evaluation tools, e.g., WAVE (www.wave.webaim.org), and make adjustments as possible and appropriate in light of the goals of the course. For free resources available to students on web accessibility, please visit the Web Accessibility Resources page at the Distance Learning Center: http://www.kennesaw.edu/dlc/facultyresources/index.php#

Kennesaw State University provides program **accessibility** and reasonable accommodations for persons defined as disabled under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) please contact the Office for Student Disability Services (SDS). Kennesaw Campus, 470-578-2666 or Marietta Campus, 678-915-7244. Please do not request accommodations directly from the professor or instructor without a letter of accommodation from the Office for Student Disability Services (SDS).

Also check Accessibility Statements for Technologies:
https://softchalkcloud.com/lesson/serve/jV10GKPfztZwQn/html

For additional information see:

http://digitalcommons.kennesaw.edu/accessibility.html
http://commencement.kennesaw.edu/guests/accessibility.php

KSU SEXUAL MISCONDUCT POLICY:
Kennesaw State University adheres to KSU's policy prohibiting sexual misconduct both in and out of the classroom. Questions about this policy should be directed to the KSU Equal Employment Opportunity (EEO) and Title IX officer by telephone at (470) 578-2614. You may also visit the University's EEO website http://www.kennesaw.edu/eeo/index.html for more information.

COPYRIGHT LAW:
Kennesaw State University adheres to USG's policy to respect the right of copyright. Holders and comply with copyright laws as set forth in the United States Copyright act. For more information, see the following link to USG's policy: http://www.usg.edu/copyright/

STUDENT RECORDS/FERPA:
Kennesaw State University adheres to the Family Educational Rights & Privacy Act of 1974 – FERPA. See the following link for more information:
http://www.usg.edu/information_technology_handbook/section9/tech/9.5_privacy_and_security

Privacy Policies:
Desire 2 Learn - https://www.d2l.com/legal/privacy/
Blackboard Collaborate - https://sas.elluminate.com/privacy.html

ELECTRONIC RECORDING AND SOCIAL MEDIA:
Electronic recording performed without the consent of the people being recorded chills the free exchange of ideas. Academic freedom, free inquiry, and freedom of expression should not be limited by the fear that one's brainstorming, polemic discourse, speculative inquiry, or any other kind of expressed curiosity made within the space of a university classroom will be made public without one's consent. This fear is unacceptable regardless of whether one is in an online, hybrid, or face-to-face classroom setting. Accordingly, no person shall make public any electronically recorded class discussion without the written permission of the instructor. This policy is not intended to discourage electronic recording in the classroom or the use of social media when such actions are performed with the written consent of the instructor, and others as appropriate. Note: Faculty accommodate all reasonable requests to electronically record a class discussion; these requests must be documented by the Disabled Student Support Services available at: http://www.kennesaw.edu/stu_dev/dsss/prospect.shtml

DISRUPTION OF CAMPUS LIFE STATEMENT:
It is the purpose of the institution to provide a campus environment, which encourages academic accomplishment, personal growth, and a spirit of understanding and cooperation. An important part of maintaining such an environment is the commitment to protect the health and safety of every member of the campus community. Belligerent, abusive, profane, threatening and/or inappropriate behavior on the part of students is a violation of the Kennesaw State University Student Conduct Regulations. Students who are found guilty of such misconduct may be subject to immediate dismissal from the institution. In addition, these violations of state law may also be subject to criminal action beyond the university disciplinary process.

COURSE ENROLLMENT POLICY:
Students are solely responsible for managing their enrollment status in a class; nonattendance does not constitute a withdrawal.

STUDENT SUPPORT RESOURCES
The following resources and policies are found under this link:
http://learnonline.kennesaw.edu/resources/index.php

DISABLED STUDENT SUPPORT SERVICES

In compliance with applicable disability law, qualified students with a disability may be entitled to reasonable accommodation. Any student with a documented disability (hidden or visible) needing academic adjustments, including classroom or test accommodations is requested to notify the instructor within the first two weeks of the course. **Verification from KSU Disabled Student Support Services is required. All discussions and documentation will remain confidential.**

Disabled Student Support Services
James V. Carmichael Student Center Addition – 2nd Floor, Suite 267
470.578.6443
http://www.kennesaw.edu/stu_dev/dsss/prospect.shtml
Please visit the following Student Disabilities Services website for more information.
//www.kennesaw.edu/stu_dev/sds

Student Rights and Responsibilities

Students of Kennesaw State University are entitled to an environment that is conducive to learning and individual growth. To this end, students enrolling at Kennesaw State University assume a responsibility to abide by the policies and regulations expressed in this section. By doing so, students may fulfill their responsibilities and enjoy the exercise of their own rights while also respecting the rights of others. All rights and responsibilities may be found in the University Catalog at //catalog.kennesaw.edu

Help Resources

Contacts to get Help

Student Help Desk studenthelpdesk@kennesaw.edu or call 470.578.3555
D2L FAQ's click here
D2L Student User's Guide click here
UITS Student Training Workshop Schedule click here

Additional Resources

Remote access to Library Resources: http://library.kennesaw.edu/
Student Support:
http://learnonline.kennesaw.edu/resources/student_support_resources.php
Tutoring and Academic Support:
http://learnonline.kennesaw.edu/resources/tutoring_academic_support.php
Advising: http://learnonline.kennesaw.edu/resources/advising.php
Bookstore: http://bookstore.kennesaw.edu/home.aspx