SYLLABUS
MENG 3243-201: Computer Aided Engineering
(Required Course)
Spring 2023

Instructor: Dr. Salim Azzouz

Office No.: MY 219G, Tel.: (940) 397-4301, Email: salim.azzouz@msutexas.edu

Office Hours: Schedule posted on D2L. Other days and times by appointment.

Course Schedule: MW 9:00 - 9:50 AM.   Lab: F 9:00 - 10:50 AM.

CATALOG DESCRIPTION
An introduction to the MATLAB software and its programming tools. Introduction to Finite Elements through SolidWorks simulation. Topics include static loads, frequency response, buckling of beams, and impacts. Study of LabVIEW software. Topics include arrays, while and for loops, case structures, shift register, and sequence locals. Companion lab.

COURSE PREREQUISITES
MENG 1202 Solid Modeling, MENG 2223 Mechanics of Solids, MENG 3104 Fluid Mechanics.

OTHER PREREQUISITES
Basic computer skills, MS Excel, hand calculator.

TEXTBOOK
Engineering Analysis with SolidWorks Simulation 2022, Paul M. Kurowski, SDC Publications.

OPTIONAL TEXTBOOK
MATLAB Programming with applications for engineers. Stephan J. Chapman, 6th Edition, Cengage Learning.

REFERENCES
Additional material will be put in D2L.

TOPICS COVERED

Topics	Topics
Introduction to Computer Aided Engineering	MATLAB Symbolic Language
MATLAB Basic Commands and Editor	Review of SolidWorks and CAD software
MATLAB Annotation and Plot Editing	Finite Elements Analysis and Meshing
MATLAB Mathematical Functions	Introduction to SolidWorks Simulation
MATLAB Matrix Manipulation	Introduction to ANSYS
MATLAB Numerical Solving Subroutines	Introduction to LabVIEW
MATLAB Fast Fourier Transform	

COURSE LEARNING OBJECTIVES AND RELATIONSHIP TO STUDENT OUTCOMES

Outcome-Related Course Learning	1	2	3	4	5	6	7
Make use of MATLAB basic commands and editor tools	X	X					X
Master MATLAB Annotation tools and plot editing functions	X	X					X
Master matrix manipulation with MATLAB software	X	X					X
Master MATLAB differential equations solving tools – numerical analysis	X	X					X
Make use of MATLAB Fast Fourier Transform in vibration analysis	X	X					X
Master MATLAB symbolic language	X	X					X
Apply SolidWorks for Solid Modeling	X	X					X
Understand the concept of Finite Element Analysis and stress-strain computation	X	X					X
Investigate Von Mises stress distribution using SolidWorks Simulation Software	X	X		X			X
Determine frequency response and buckling load	X	X					X
Master the basic loop functions using LabVIEW software	X	X					X
Performing lab experiments using programming software			X			X	
Write formal and informal engineering reports			X			X	
Work as a part of a team			X		X		

1: an ability to identify, formulate, and solve complex engineering problems by applying the principles of engineering, science, and mathematics

2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental, and economic factors

3: an ability to communicate effectively with a range of audiences

4: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

5: 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

6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions

7: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

CONTRIBUTION OF COURSE TO PROFESSIONAL COMPONENT
This course contributes to the engineering science component of the mechanical engineering program.

COURSE ORGANIZATION AND STUDENT PERFORMANCES ASSESSMENT

- **Lecture Format**

    The Computer Aided Engineering (CAE) class consists of a two 50-minutes sessions per week and two lab hours. The two hours class will be spent mostly explaining and discussing concepts, and solving relevant programming and numerical computer based problems. The other two class hours will be dedicated to a computer based lab, result analysis, and lab reports. Lectures will not be used to communicate the entire textbook course content and thus, students will have to study a set of course paragraphs specified by the instructor on their own to further their understanding. Student participation in class discussions is highly recommended and rewarded in the attitude grade.

    The course instructor expects the students to behave professionally and ethically throughout the duration of the course. After class starts, the use of cellphones, laptops, or any other electronic devices is strictly prohibited. The students are required to use the provided computer. Any student caught browsing a website that is not related to the course, send emails or messages during class, misbehaving in class, using foul language, making unethical written or verbal derogatory remarks about their classmates or the instructor, conducting private conversations during class, working on anything that is not directly related to the current course, playing, watching games or movies, drinking, eating or sleeping in class, leaving the class without the express permission of the instructor will result in heavy penalties for the student attitude grade. If the above infractions are continuously repeated by the student, the instructor will drop the student from class and labs for the rest of the semester. Not attending or arriving late to scheduled lectures, labs may cost the student the full attitude grade. Student participation in class discussions is highly recommended and rewarded.

- **Exams**

    There will be two regular exams plus a final one at the end of the semester. Each exam will have a set of textbook theoretical questions designed to test the students' ability to acquire a self-reading knowledge of the taught materials. The exam has also a set of practical questions designed to test the students' ability to program code, think logically, analyze, and solve engineering problems. Each exam is based on the course materials given before the first exam or between two consecutive exams. All exams will be in-class exams. Solutions for the exam should be written on the front side of the engineering paper or the blank sheets, not the backside, and should be uploaded to a D2L Dropbox. Exam solutions should be organized with the appropriate questions numbering, and neatly written. During the exam, each student is allowed to use a one single page formula sheet, the textbook, the instructor notes, and a copy of their homework solutions. Any other document is strictly prohibited.

    You are expected to take the exam on the scheduled date and time it is given. If for any exceptional or unforeseen reason, a student misses an exam, he will be asked to provide a valid and convincing proof on why he missed it. If the instructor accepts the proof and depending on his availability, the instructor will write a make-up exam that will be administered on an agreed date with the student. The make-up exam testing materials could be very different from the regular given exam. During the exam, it is strictly forbidden to use cell phones or any other electronic devices with the exception of the provided computer. All cell phones and other electronic devices will be collected at the beginning of the exam and restituted at the end of it.

- **Homework**

  Homework will be posted on D2L from a set of chosen chapters by the instructor. The students are required to upload the homework to a D2L Dropbox in a single PDF file format; no other formats will be accepted. Solutions of the homework should be uploaded with the appropriate homework questions sheet as a cover page, organized with the proper questions numbering, neatly and legibly written. Homework have to be turned-in on the due date specified on the homework questions sheet. Late homework will be accepted until the end of the semester and graded with a maximum grade of 50%. Each student is responsible for submitting his own individual personal homework written in his own words. No dual or group homework copy is accepted unless specified by the instructor.

- **Lab Reports**

  The students are required to upload the lab report to a D2L Dropbox in PDF format. The lab report should be written using the posted lab template. Lab reports should be organized with the appropriate questions numbering, neatly and legibly written. Lab reports have to be turned-in on the due date specified on the lab questions sheet. Late lab reports will be accepted until the end of the semester and graded with a maximum grade of 50%. Each group of students is responsible for submitting a group lab report, written by all members of the group. A student cannot add his name to a student lab report if absent during the lab. Lab reports are graded according to the content listed in the below table. Students are encouraged to finish their lab report and submit it during the lab session if possible.

Graded Items																					
Submitted/Behavior	10	9.5	9	8.5	8	7.5	7	6.5	6	5.5	5	4.5	4	3.5	3	2.5	2	1.5	1	0.5	0
Motivation	10	9.5	9	8.5	8	7.5	7	6.5	6	5.5	5	4.5	4	3.5	3	2.5	2	1.5	1	0.5	0
Lab Theory	15	14.5	14	13.5	13	12.5	12	11.5	11	10.5	10	9	8	7	6	5	4	3	2	1	0
Programming	15	14.5	14	13.5	13	12.5	12	11.5	11	10.5	10	9	8	7	6	5	4	3	2	1	0
Results and Discussion	30	28	26	24	22	20	18	16	14	12	10	9	8	7	6	5	4	3	2	1	0
Conclusion	10	9.5	9	8.5	8	7.5	7	6.5	6	5.5	5	4.5	4	3.5	3	2.5	2	1.5	1	0.5	0
Ref./Org./Neatness	10	9.5	9	8.5	8	7.5	7	6.5	6	5.5	5	4.5	4	3.5	3	2.5	2	1.5	1	0.5	0

- **Course Grade**

  It is brought to the attention of the students that each one of them will be graded individually. The final grade for the course will be based on the scores earned in the three mandatory exams, the average score earned in the homework, the average score earned in lab reports, and the general attitude grade. The first exam contributes 10%, the second exam contributes 25%, the third exam contributes 35%, homework average contribute 10%, lab reports average contributes 10%, and class participation, returned copies neatness, student behavior, attitude, and class attendance contribute 10%, for a total of 100%. The overall average score (X) for the course is determined as follows:

  X = 0.10 x (exam1 score) + 0.25 x (exam 2 score) + 0.35 x (final exam score) + 0.10 x (homework average score) + 0.10 x (lab report average score) + 0.10 x (participation, neatness, behavior, attitude, attendance scores, and ethics).

The final letter grade for the course is based on the value of X and is determined from the following grade levels:

Value Range of X (in %)	Letter Grade
90 ≤ X ≤ 100	A
80 ≤ X < 90	B
70 ≤ X < 80	C
60 ≤ X < 70	D
< 60	F

STUDENT RESOURCES
https://msutexas.edu/academics/scienceandmath/student_resources.php

GENERAL GUIDELINES
- Plan to spend at least 6 hours outside of class to study the material and to work on homework assignments, and lab experiments. Do not wait until the last day to start working on your report, or prepare for the exam.
- Read the course material and do the homework after the day class.
- Utilize the instructor office hours throughout the semester to seek explanations from the instructor.
- Use engineering or blank paper for all homework assignments and exams. Use a systematic approach to solve problems. If a problem involves drawing a graph, use MATLAB to draw the graph. In engineering, neatness is a must, not a luxury. Be advised that you will be penalized for a lack of neatness.
- You are strongly encouraged to study in-group and seek tutoring.

CONFLICT RESOLUTION
If a misunderstanding or a conflict arises between the student and the instructor. Please follow this conflict resolution procedure:

1) The student should contact the instructor face to face or via e-mail if there is an issue with the course or the instructor. The faculty and the student will discuss this face to face or via email. Hopefully a resolution is reached on the issue.

2) The student should notify the faculty via email again if the issue still did not get resolved after the first encounter or communication.

3) The student can then contact the Chair of the McCoy School of Engineering, Dr. Desai, face to face or via email, (raj.desai@msutexas.edu), and discuss this issue. Dr. Desai will discuss the issue at hand with the faculty member. Dr. Desai will discuss the result of this discussion with the student. Hopefully a resolution is reached on the issue after this.

4) The student should notify the Chair via email if the issue still did not get resolved.

5) The Chair will contact the Dean and try to resolve the conflict. In case the conflict deals with the student grade, she will forward the case to the Grade Appeals Committee if necessary.

MIDTERM PROGRESS REPORT
In order to help students keep track of their progress toward course objectives, the instructor for this class will provide a Midterm Progress Report through each student's WebWorld account. At-risk students

will be reported and will receive a midterm overall grade. Midterm grades will not be reported on the students' transcript; nor will they be calculated in the cumulative GPA. They simply give students an idea of where they stand at the midpoint of the semester. Students earning below a C at the midway point should have a meeting with the professor and seek out tutoring.

UNDERGRADUATE RESEARCH INFORMATION

Research and Creative Activity Opportunities at MSU Texas
Enhancing Undergraduate Research Endeavors and Creative Activities (EURECA) is a program that provides opportunities for undergraduates to engage in high-quality research and creative activities with faculty. EURECA provides incentives and funding through a system that supports faculty and students in a cooperative research process. For more information contact the Office of Undergraduate Research, (940) 397-6275 or by sending a message to eureca@msutexas.edu or better yet, stop by the UGR office located in the atrium of the Clark Student Center, room 161. Information and resources are available at https://msutexas.edu/eureca/

Council on Undergraduate Research (CUR)
To support undergraduate research and creative activities, Midwestern State University holds an enhanced institutional membership with the Council on Undergraduate Research (CUR). This institutional membership includes unlimited memberships for any interested faculty, staff, and students. Students may find information on benefits and resources at:
https://www.cur.org/engage/undergraduate/.

The CUR Undergraduate Resources Webpage contains:

Research Opportunities
Presentation Opportunities
Undergraduate Research Journals
CUR-Sponsored Student Events
and more!

UGROW
Like EURECA, the Undergraduate Research Opportunities and Summer Workshop, UGROW provides opportunities for students to conduct research with faculty. However, the research occurs in the summer. For five weeks, UGROW students experience the authenticity of scientific research in faculty's laboratories, in a highly interdisciplinary environment. Students work on projects of their choice and present their findings at the end of program and the MSU Undergraduate Research Forum. Faculty members publicize research projects in the spring. The application deadline for UGROW 2023 has not been established yet; however, it will be announced in the upcoming spring semester. Information and resources are available at https://msutexas.edu/ugrow/**.**

CAMPUS CARRY STATEMENT
Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at http://msutexas.edu/campus-carry/rules-policies.

GENERAL EDUCATION STATEMENT

Students in this course must demonstrate their competency in oral and written communication through written homework assignments, lab reports, and exams. They must also demonstrate their ability to use the English language.

ACADEMIC INTEGRITY POLICY AND ETHICS

Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of the student handbook: https://msutexas.edu/student-life/_assets/files/handbook.pdf. regarding student responsibilities & rights, and the intellectual property policy information about procedures and what constitutes acceptable on-campus behavior. Any form of plagiarism will not be accepted, and will be heavily reprimanded. For more information, please visit the MCOSME student resources website: https://msutexas.edu/academics/scienceandmath/student_resources.php.

DISABILITY SUPPORT SERVICES

Students registered with Disability Support Services should have a letter verifying their disability and the appropriate accommodations.

DISCLAIMER STATEMENT

Information contained in this syllabus, other than grading, late assignments, makeup work, and attendance policies, may be subject to change with advance notice, as deemed appropriate by the instructor.

Prepared by: Dr. Salim Azzouz, *Date*: 01/16/2023