Instructor: Dr. Salim Azzouz

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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 2018/2019, 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
  This course 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 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.

- Exams
  There will be two regular exams plus a final one at the end of the semester. Each exam has two testing parts. A theoretical closed book part where the students will be quizzed on the course materials and homework submitted before the exam. This part is designed to test the students' ability to acquire a self-reading knowledge on the taught materials and their ability to solve the problem given on the homework. A hand written formula sheet summarizing the taught materials is allowed during the closed book part. A practical open book part is designed to test the students' ability to think, analyze, and solve a set of problems. Each exam is based on the course materials developed between two consecutive exams. During the open book part only your hand written notes, programming prints, the textbook, and the notes posted by the instructor on D2L are allowed. Any other document is considered illegal. **The notes and other materials posted on D2L are the strict property of the instructor and should not be given, copied, or communicated through electronic means to a third party.** You are expected to take the exam on the scheduled date and time it is given. No make-up exam will be given. **It is strictly forbidden to use cell phones or other electronic devices with the exception of the provided computer and a simple calculator during the exam**. Cell phones and other electronic devices will be collected at the beginning of the exam and restituted at the end of it.

- Homework & Quizzes
  Homework will be assigned from a set of chosen chapters by the instructor. Organized using a specific template, neat with appropriate content homework have to be turned in on the due date at the beginning of class. Homework count for a maximum of 50% of the homework/quizzes grade. After the deadline, homework will still be accepted till the end of the semester, and count for 10% of the homework/quizzes grade. Quizzes on the homework will be administrated during the week after the homework are turned in. The quizzes count for 50% of the total homework/quizzes grade. No make-up quiz will be given. The quizzes are designed to encourage the students to study the homework in-depth. 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
  Lab reports are based on the materials studied in class, or presented during lab sessions. Organized according the template, neat Lab reports must be turned in on the due date, at the beginning of class. Each group of students is responsible for submitting its own lab report in its own words. A student cannot add its name to a student lab group if absent. Labs are graded according to the content listed in the below table. Students are encouraged to finish their lab and submit it during the lab session if possible.

Arriving late to the lab will be penalized by -5 points on the lab grade. Quitting the lab session without the instructor authorization will be penalized by -10 points on the lab grade. For lab guidelines, and content, the students are referred to the labs instructor: Dr. Salim Azzouz.

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	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Programming	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
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
  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/quizzes, the average score earned in lab reports, and the attitude grade. The first exam contributes 10%, the second exam contributes 20%, the third exam contributes 35%, homework/quizzes average contribute 10%, lab reports average contributes 15%, and participation, neatness, 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 + 0.20 x exam 2 score + 0.35 x exam 3 score + 0.10 x (homework/quizzes average scores) + 0.15 x (lab report average scores) + 0.10 x (participation/neatness/attitude/attendance scores/ethics).

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

Value of X (in %)	Letter Grade
89.5-100	A
79.5-89.4	B
69.5-79.4	C
59.5-69.4	D
< 59.4	F

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 before coming to class.
- Utilize the office hours throughout the semester to seek explanations from the instructor.
- Use engineering paper for all homework assignments and exams. Use a systematic approach to solve problems. If a problem involves drawing a graph, use Excel, or any other graphic software tool 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. Time to time a lab partner will be randomly selected for you.

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@mwsu.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 www.mwsu.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
www.cur.org/resources/for_students and may sign up at:
members.cur.org/members_online/members/newmember.asp.

The CUR Undergraduate Resources Webpage contains:

- Research Opportunities
- Presentation Opportunities
- Undergraduate Research Journals
- CUR-Sponsored Student Events
- The Registry of Undergraduate Researchers
- 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 2020 is has not been established yet; however, it will be announced in the upcoming spring semester. Information and resources are available at www.mwsu.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://mwsu.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, quizzes, 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 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. Each student caught checking or typing on his cellphone or his computer during class will see his attitude grade decreased by 0.5% at each occurrence. Each student caught doing other work during this class will see his attitude grade decreased by 0.5% at each occurrence. A 0.5% decrease in the attitude grade is applied for each unjustified absence. Each student leaving the class for more than 5 minutes will be considered absent for that day of class!

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*: 01/20/2020