SYLLABUS
MENG 4123-101: MATHEMATICAL METHODS FOR ENGINEERS
(Required Course - Fall 2025)

COURSE INSTRUCTOR
Prof. Sheldon Wang, Ph.D., P.E., Fellow ASME (sheldon.wang@msutexas.edu)

LAB INSTRUCTOR
N/A

TEACHER ASSISTANT

COURSE & LAB SCHEDULE

Days	*Time*	*Location*
Monday	10:00 am – 10:50 am	MY 136
Tuesday		
Wednesday	10:00 am – 10:50 am	MY 136
Thursday		
Friday	10:00 am – 10:50 am	MY 136

**Lab sessions are indicated with an asterisk.*

OFFICE HOURS

Days	*Time*	*Location*
Tuesday	9:30 am – noon	MY 138
Thursday	9:30 am – 11: 00 am	MY 138
Thursday	1:00 pm – 3:00 pm	MY 138

MSU CATALOG DESCRIPTION
The use of Fourier series, linear algebra, transforms, and other advanced mathematical methods for the solution of a variety of engineering problems.

COURSE PRE-REQUISITES
MATH 3433 – Differential Equations

REQUIRED TEXTBOOK
Essential Mathematical Tools for Engineers by Sheldon Wang, 2nd edition, Sential Publishing (required)
Advanced Engineering Mathematics by Erwin Kreyszig, 10th edition, Wiley (recommended)

SUPPLEMENTAL MATERIAL

LIST OF TOPICS COVERED

• Cartesian, cylindrical, spherical coordinates	• Series, Fourier and Laplace transform
• Linear algebra: matrices, vectors, determinants	• Differential equations
• Complex variable: concepts, contour integrals	• Partial differential equations
• Linear Systems: matrix eigenvalue problems	• Dynamic systems and applications

Additional material may be covered as time permits.

SPECIFIC GOALS OF INSTRUCTION

Table 1: A detailed list of course objectives matched with the ABET outcomes (1-7).

	ABET OUTCOMES*						
COURSE OBJECTIVES	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Students will acquire knowledge of the rules and methods of linear algebra. (assignments, exams)	**X**						
Students will formulate and solve fundamental problems of linear algebra. (assignments, exams)	**X**						
Students will classify and solve differential equations and partial differential equations. (assignments, exams)	**X**						
Students will apply real and complex analysis methods, such as the Fourier and Laplace transforms, to relevant engineering problems. (assignments, exams)	**X**						
Students will analyze mechanical vibrations in mechanical systems. (assignments, exams)	**X**					**X**	
Students will design vibration absorbers for physical systems. (assignments, exams)	**X**		**X**			**X**	
Students will be able to model, formulate, and solve dynamical systems. (assignments, exams)	**X**		**X**			**X**	
Students will be able to characterize and utilize features in Matlab to tackle basic control problems. (assignments, exams)	**X**		**X**			**X**	

***Table 2:** Detailed descriptions of the ABET outcomes (1-7) listed in Table 1.

	ABET Student Outcome Description
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2	an ability to apply engineering design to produce solutions that meets 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 judgment 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 ASSESSMENT

Lecture Format

This course consists of a three 50-minutes sessions per week. The one hour class will be spent mostly explaining and discussing concepts, and solving relevant case problems. Lectures will not be used to communicate the entire textbook course content and thus, you will have to study a set of course paragraphs specified by the instructor on your own to further your understanding. Student participation in class discussions is highly encouraged and rewarded.

Exam
There will be two regular midterm exams plus one comprehensive final exam at the end of the semester. Each exam is based on the course materials developed between two consecutive exams. You are expected to take the exam on the scheduled date and time it is given. However, if for some acceptable reason you are not able to do so, then you must inform the instructor in advance in writing. The instructor will then decide whether you will be allowed to take a make-up exam, depending on the validity of your excuse.

Homework
Homework will be assigned from a set of chosen chapters. It will be turned in each week, unless specified by the instructor. Homework must be turned in on the due date, at the beginning of class. Each student is responsible for submitting his own individual personal homework copy written in his own words. No dual or group homework copy is accepted unless specified by the instructor.

Course Grade
The final grade for the course will be based on the scores earned in the two mandatory exams, the comprehensive final exam, the average score earned in the quizzes, and the average score earned in the homework. Each one of the two exams contributes 15%, the comprehensive final exam contributes 30%, homework contributes 30%, and participation, neatness, attitude, and class attendance contributes 10%, for a total of 100%. Please refer to Student Resources https://msutexas.edu/academics/scienceandmath/student_resources.php for Academic Appeals and other supports.

General Guidelines
Plan on spending at least six hours outside of class to study the material and to work on homework assignments. Do not wait until the last day to start working on your assignment, 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, Matlab, 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 lack of neatness. You are strongly encouraged to study in group. You must choose different partner for the lab experiments.

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.

Academic Integrity Policy
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.

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.

Conflict Resolution

a. 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.
b. The student should notify the faculty via email again if the issue still did not get resolved after the first encounter or communication.
c. 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.
d. The student should notify the Chair via email if the issue still did not get resolved.
e. 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.

COVID-19 Safety and Prevention Strategies https://msutexas.edu/coronavirus/index.php

Campus Carry
Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. The new Constitutional Carry law does not change this process. Concealed carry still requires a License to Carry permit, and openly carrying handguns is not allowed on college campuses. For more information, visit Campus Carry.

Active Shooter
The safety and security of our campus is the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor. Please review the information provided by MSU Police Department regarding the options and strategies we can all use to stay safe during difficult situations. For more information, visit Safety / Emergency Procedures. Students are encouraged to watch the video entitled "*Run. Hide. Fight.*" which may be electronically accessed via the University police department's webpage: *"Run. Hide. Fight."*

Prepared by Dr. Sheldon Wang, July 2025.