

San Jose State University
Department of Mechanical Engineering
ME 130, Applied Engineering Analysis, Fall 2022, Section 03

Instructor:	Younes Shabany
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Office Hours:	Fridays 4:00 – 5:45 PM
Class Days/Time:	Wednesdays and Fridays 6:00 – 7:15 PM
Classroom:	Clark 222
Prerequisites:	Math 133A, ME101 with a C- or better
Corequisite:	ME113

Canvas and Course Messaging

Copies of the course materials such as the syllabus, course notes, assignments, homework solutions, etc. will be posted on the Canvas site for the class. I will be using this system for any communication with the class. This system will also allow you to have discussions or chat with others in the class. This feature may be especially helpful if you need assistance on a homework problem.

To log in, go to the Canvas URL <http://sjsu.instructure.com>. Log in with your 9-digit SJSU ID and password you use for your SJSUOne account. For questions on the use of Canvas, please check out http://www.sjsu.edu/at/ec/canvas/student_resources/index.html

You are responsible for regularly checking with the messaging system through Canvas. You can set up your Canvas account to forward all email sent to your Canvas account to any other email address you wish.

Course Description

Developing analytic models for physical systems in mechanical engineering. Methods to solve differential equations arising from those models. Practical interpretations of those analytical solutions. Introduction to linear algebra and statistics. Numerical solution of differential equations.

Course Goals

- The goal of this course is to educate students on advanced techniques which are used to solve mathematical equations that describe engineering problems.

Student Learning Objectives

- To learn different analytical and numerical techniques used to solve ordinary and differential equations that arise in modeling engineering problems.
- To be able to create mathematical models for engineering problems using differential equations and appropriate boundary conditions.

Required Texts/Readings

Mandatory Textbook

“Advanced Engineering Mathematics”, Dennis G. Zill, 6th Edition, Jones and Bartlett Publishers, 2018. A discounted version of this textbook is available through the SJSU bookstore.

Classroom Protocol

- Class attendance and arriving on time are encouraged.
- Participation in class discussions is encouraged and rewarded.
- Cell phone use in class is prohibited unless it is required for class activities.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester’s [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](http://www.sjsu.edu/provost/services/academic_calendars/) at http://www.sjsu.edu/provost/services/academic_calendars/. The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

Assignments

[Academic Policy S12-3](http://www.sjsu.edu/senate/docs/S12-3.pdf) at <http://www.sjsu.edu/senate/docs/S12-3.pdf> has defined expected student workload as follows:

“Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/ studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.”

Homework assignments will challenge students' problem solving skills and may require using computer tools such as Excel or MATLAB.

- Homework shall be professional, neat and easy to follow.

Grading Policy

		A	93.0 – 100	A-	90.0 – 92.9
B+	87.0 – 89.9	B	84.0 – 86.9	B-	80 – 83.9
C+	77.0 – 79.9	C	74.0 – 76.9	C-	70.0 – 73.9
		D	60.0 – 69.9		

Homework:	20%
Projects:	15%
Midterm 1 (Friday, September 30, Class Time):	15%
Midterm 2 (Friday, November 4, Class Time):	20%
Final Exam (Friday, December 9, 5:15 – 7:30 PM):	30%

- The dates for midterm and final exams are final and will not change.
- All students shall plan to take the midterm and final tests on these dates.
- If you can not take either a midterm or the final test on these dates, only due to circumstances beyond your control, please let me know two weeks in advance to make alternate arrangements.

University Policies

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University's Academic Integrity policy S07-2](http://www.sjsu.edu/education/Palgiarism.pdf), located at <http://www.sjsu.edu/education/Palgiarism.pdf> requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the [Disability Resource Center](http://www.drc.sjsu.edu/) (DRC) at <http://www.drc.sjsu.edu/> to establish a record of their disability.

Tentative Topics and Schedule

Week	Date	Topic	Textbook Reading
1	August 19	Introduction to MATLAB	-
2	August 24 August 26	Textbook Reading: Engineering Computations; An Introduction Using MATLAB and EXCEL Mandatory Online Course: MATLAB Onramp	
3	August 31 September 2	Review of Calculus (See Review of Fundamentals of Calculus) Algebra of Real and Complex Numbers	-
4	September 7 September 9	Mathematical Modeling of Engineering Problems Differential Equations as Mathematical Models Definitions and Terminology Initial-Value Problems Modeling with Systems of Differential Equations	1.3 1.1 1.2 2.9
5	September 14 September 16	First Order Ordinary Differential Equations Separable Equations Linear Equations	2.2 2.3
6	September 21 September 23	Exact Equations Solution by Substitution	2.4 2.5
7	September 28 September 30	Review Midterm 1	
8	October 5 October 7	Second Order Ordinary Differential Equations Initial-Value, Boundary-Value, Homogeneous and Nonhomogeneous Equations Reduction of Order Homogeneous Linear Equations with Constant Coefficients	3.1 3.2 3.3
9	 October 12 October 14	Method of Undetermined Coefficients Method of Variation of Parameters Cauchy-Euler Equation Linear Models; Initial-Value Problems Linear Models; Boundary-Value Problems	3.4 3.5 3.6 3.8 3.9
10	October 19 October 21	Laplace Transform Definition of Laplace Transform The Inverse Transfer and the Transform of Derivative	4.1 4.2
11	October 26 October 28	Translation Theorems Derivative of Transform, Transform of Integrals and Periodic Functions The Dirac Delta Function	4.3 4.4 4.5
12	November 2 November 4	Review Midterm 2	

13	November 9	Numerical Solution of Ordinary Differential Equations Euler Methods and Error Analysis Runge-Kutta Methods Higher-Order Equations and Systems Second-Order Boundary-Value Problems	6.1 6.2 6.4 6.5
	November 11	Veteran's Day, Campus Closed	
14	November 16 November 18	Vectors, Vector Algebra, Vector Calculus	7.1 – 7.4 9.1 – 9.5 9.7
15	November 23 November 25	Thanksgiving Holiday	
16	November 30 December 2	Matrices and Matrix Algebra	8.1, 8.4 – 8.6, 8.8
17	December 9	Final Exam	