Instructor: Dr. Davood Abdollahian
Class hours: T Th 1:30 – 2:45 PM
Class room: HGH (Hugh Gillis Hall) 120
Course Code: 30147
Office hours: T Th 3:00 – 4:15 PM, or by appointment
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Course Description
Development of analytical models for engineering processes and systems in fluid mechanics, heat transfer, solid mechanics and mechanical vibrations. Practical interpretations of analytical and approximate solutions for steady state and non-steady state problems. Introduction to linear algebra, statistics, and their application in engineering analyses. 3 units.

Prerequisites: Math 133A, Grade C- or better in ME101 and ME113

Required Text: Bonded printed lecture notes on “Applied Engineering Analysis,” by Tai-Ran Hsu, San Jose State University, July 2013. (Sold at the Spartan Book Store)

Reference: CRC Standard Mathematical Tables, CRC Press, Inc. or other mathematical handbook, and those listed in the bonded printed notes.

Grading: Homework 20%, two midterm exams 20% each, final exam 40%.

Homework: Homework problems will be assigned at least one week before the due date. No late homeworks.

- Letter grades will be assigned for the course. Grading will be based on overall class performance, with Grade C+ or B- to be the median of the overall mark distribution of the class.
- Students are encouraged to use pocket electronic calculators and handbooks for solution of problems in quizzes and final examination. However, they must show the proper procedures used in solutions, and specify the sources of the information. Use of lap-top computers is not allowed during exams. Also, students are not allowed to share calculators and written materials with others during the examinations.
- This is an engineering course. As such, students are expected to be precise in answers to problems in quizzes and examinations. Partial credits will be given to quizzes and examinations with incorrect answers only if correct method is used in solution procedure.
- There will be no make-up for quizzes or final examination except for students with serious medical reasons. A medical doctor’s certificate is required to support such request.
- Homework assignments submitted past the due date will not be accepted.
• Students are encouraged to ask questions in the classroom and during the office hours. Special arrangements can also be made for consultation with the instructor.

Academic Integrity

Students in this course are expected to maintain high ethical standards in all matters pertaining to the course, including, but not limited to, examinations, homework, course assignments, presentations, writing, laboratory work, team work, treatment of class members, and behavior in class. Cheating and plagiarism are violations of the SJSU Policy on Academic Dishonesty (S98-1) and will not be tolerated in the class.

Students are expected to have read the Policy, which is available at:

http://www2.sjsu.edu/senate/S04-12.pdf

Plagiarism is defined as, *the use of another person’s original (not common-knowledge) work without acknowledging its source.* Thus plagiarism includes, but is not limited to:

- copying in whole or in part, a picture, diagram, graph, figure, etc. and using it in your work without citing its source
- using exact words or unique phrases from somewhere without acknowledgement
- putting your name on a report, homework, or other assignment that was done by someone else

Students are expected to familiarize themselves with how to avoid plagiarism. Several helpful resources can be found at: http://www.stanford.edu/dept/vpsa/judicialaffairs/students/plagiarism.sources.htm

Course Goals

1. To learn the relationships between engineering and mathematics.
2. To learn how to derive mathematical (analytical) models for the solution of engineering problems.
3. To learn how to formulate mathematical models, e.g. calculus and differential equations for mechanical engineering problems involving various sub-disciplines.
4. To develop analytical models and solutions for engineering processes utilizing differential equations, Laplace transform, and Fourier Series.
5. To learn how to interpret mathematical solutions into engineering terms.

Student Learning Objectives

1. To fully understand the physical (engineering) interpretations of fundamentals of mathematical terms such as variables, functions, differentiation and derivatives, integration, differential equations, etc.
2. To acquire experience and skill in basic methodologies in differentiation, integration and solving ordinary and partial linear differential equations.
3. To be able to relate special tools such as Laplace transform and Fourier series for modeling engineering phenomena and facilitate the mathematical solutions
4. To be able to establish mathematical models, such as differential equations and appropriate boundary and initial conditions for fundamental mechanical engineering problems in fluid mechanics, vibration and heat conduction in solids and to find ways to solve these equations.

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5. To be proficient in differentiation and finding solutions of integrals from “tools” such as mathematical handbooks, spreadsheets and computer software such as Mathcad and Matlab.
6. To learn the basic principles of linear algebra and its application in engineering analysis.
7. To understand the basic principles of statistics and its application in quality controls in manufacturing processes.

Course Schedule

Week 1: Chapter 1: The basic principles of engineering analysis and its applications.

Week 2: Chapter 2: The principles of calculus, derivatives, orders of derivatives and mathematical modeling.


Week 4: Chapter 3: Application of first order ordinary differential equations in fluid mechanics, heat conduction in solids and kinematics of rigid body.

Week 5: Chapter 4: Solution of homogeneous, second-order linear differential equations with constant coefficients.

Week 6, 7: Chapter 4: Application of ordinary differential equations in mechanical vibration.

Week 7, 8: Chapter 5: Laplace transform and its physical meaning. Application of Laplace transform in solving differential equations relevant to engineering applications.

Week 9: Chapter 6: Fourier series and its engineering applications.

Week 10: Chapter 7: Introduction to partial differential equations.

Week 11, 12: Chapter 8: Linear algebra and its application in engineering analysis.

Week 13-15: Chapter 10: Introduction to statistics and applications to manufacturing process and quality control.

NOTE: The above schedule may be modified as needed.