

**San Jose State University**  
**Department of Mechanical Engineering**

**Course:** ME 130 Applied Engineering Analysis-1  
**Semester:** Fall 2015  
**Class Number:** 40290  
**Prerequisites:** Math 133A, Grade C- or better in ME 101 and ME 113  
**Class Hours:** TTh 09:00 – 10:15 AM  
**Class Room:** E341, Engineering Building  
**Instructor:** Dr. Tai-Ran Hsu, E310H, Tel: 924-3905, E-mail: [tai-ran.hsu@sjsu.edu](mailto:tai-ran.hsu@sjsu.edu)  
**Office Hours:** Thursdays 01:30 – 4:00 PM, or by appointment.

**Course Description**

Analytic models for engineering processes and systems in fluid mechanics, heat transfer, solid mechanics, and machine design. Practical interpretations of analytic and approximate solutions for steady and non-steady state problems. Introduction to linear algebra and statistics and their applications in engineering analyses.

**Textbook:** Bonded printed lecture notes on “Applied Engineering Analysis,” by Tai-Ran Hsu, San Jose State University, Fall 2014.  
(Sold at the Spartan Book Store)

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

**Grading Scheme:**

Aptitude test	5% bonus (optional) (Tuesday, August 25, 2015)
Homework:	20% (best of 6 assigned sets)
Quiz 1:	20% (Tuesday, September 29, 2015) Room 341
Quiz 2:	20% (Tuesday, November 3, 2015) Room 341
Final examination	40% (Thursday, December 10, 2015, 07:15-09:30 AM) in Room 341

- Letter grades will be assigned for the course. Grading will be based on **class performance** with student’s **overall marks**, with Grade C+ or B- to be the median of the overall mark distribution of the class. See the attached example for a typical letter grading scheme.
- Students are encouraged to use pocket electronic calculators and handbooks for solutions to problems in quizzes and the final examination. But they must show the proper procedures used in solutions, and specify the sources of the information as well as the use of a calculator.
- This is an engineering course. As such, students are expected to be ***precise*** in answers to problems in quizzes and examinations. Some partial marks will be given to quizzes and final examination with incorrect answers only if correct method is used in solution procedure.

**NOTE:** (1) There will be **NO** make-up quiz or final examination, except for students with serious medical reasons such as immobility, high fever, etc.. A medical doctor’s certificate is required to support such request. Requests for rescheduling quizzes or final examination with supporting documents must be submitted to the instructor **48 hours prior or one day after the originally scheduled quizzes or final examination.**

- (2) Calculators and written materials are allowed in quizzes and examination but **NOT** notebook (lap-top) computers or any wireless devices. Students are not allowed to share these devices and written materials with others in quizzes and final examination.
- (3) *Late submission of homework past due time and dates WILL NOT be accepted.*
- (4) Students are encouraged to ask questions at all times in the classroom and during the posted office hours. Special arrangements can also be made for consultation with the instructor at mutually convenient times.

## 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.*<sup>1</sup> Thus plagiarism includes, but is not limited to<sup>2</sup>:

- 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 learn how to interpret mathematical solutions into engineering terms and senses.

## 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 of solids and find ways to solve these equations.
5. To be proficient in finding solutions of integrals and related information from “tools” such as mathematical handbooks, spreadsheets and computer software such as Mathcad and Matlab.

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<sup>1</sup> Definition adapted from “Defining and Avoiding Plagiarism: The WPA Statement on Best Practices,” <http://www.ilstu.edu/~ddhesse/wpa/positions/WPAplagiarism.pdf>; and “What is Plagiarism?,” <http://www.stanford.edu/dept/vpsa/judicialaffairs/students/plagiarism.sources.htm>.

<sup>2</sup> Adapted from, “Avoiding Plagiarism,” [http://owl.english.purdue.edu/handouts/research/r\\_plagiar.html](http://owl.english.purdue.edu/handouts/research/r_plagiar.html).

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.

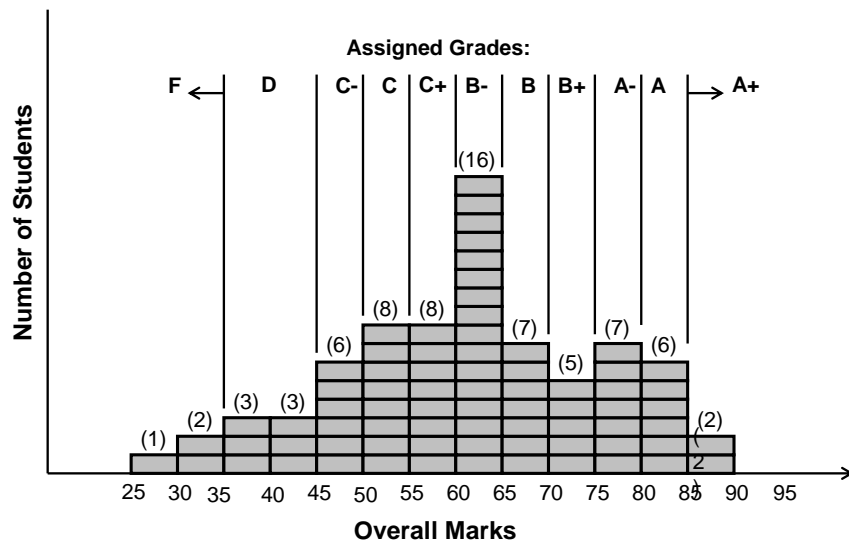
### Instruction Schedule

- 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 3: Chapter 3: Introduction to ordinary and partial differential equations. Derivation and solutions of first order ordinary differential equations.
- 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.

### Typical Grade Assignment on Class Performance

Mark Distribution of Class ME 130 Applied Engineering Analysis – Spring 2006



Total number of students: 74

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