Welcome to

Applied Engineering Analysis Class

Spring 2020

Instructor:

Tai-Ran Hsu
Professor
Department of Mechanical Engineering
San Jose State University
San Jose, California, USA

Available @ links:
www.engr.sjsu.edu/mae/faculty/hsu/index,htm

(File: Sylibbi S2020)

San Jose State University
Department of Mechanical Engineering
ME 130 Applied Engineering Analysis-1

Semester:	Spring 2020
Course Number:	(available in your CAVAS *Site)*
***Prerequisites**:*	***Math 133A with grad C- or better***
Co-requisites:	**ME 101 and ME 113**
Class Hours:	TR 09:00 – 10:15 AM
Class Room:	E192 Engineering Building
Instructor:	Dr. Tai-Ran Hsu, E117B, Tel: 924-3905, **E-mail: tai-ran.hsu@sjsu.edu**
Office Hours:	Thursdays 1:00 – 3:00 PM, or by appointment

** Students are **expected** to have learned the math subjects listed in the Table in the next slide.
You are strongly encouraged to become familiar with those underlined topics.

**Prerequisite Math Courses for the Course on Applied Engineering Analysis

SJSU Course No. and Title	Principal Course Syllabi
Math 19 Pre-Calculus	Functions and graphics; Polynomial and rational functions; Exponential, logarithm and trigonometric functions; Analytic trigonometry; Applications of trigonometric functions; Polar coordinates and vectors; Analytic geometry; Systems of equations and inequalities
Math 30 Calculus I	Functions and continuity; Derivatives of polynomials, exponential, trigonometric, logarithm and hyperbolic functions; Maximum and minimum values; The mean value theorem; L'Hopital's rule; Newton's method-an introduction to anti differentiation
Math 31 Calculus II	Areas and distances; The definite integral; Areas between curves; Volumes; Volumes by washers and cylindrical shells; Work; Integration by parts; Arc length; Area of a surface of revolution; Sequences and Series; Power series; Complex numbers
Math 32 Calculus III	Curve defined by parametric equations; Areas and lengths in polar coordinates; 3-D coordinate systems; Vector algebra; Equations of lines and planes; Cylinders and quadric surfaces; Cylindrical and spherical coordinates; Vector functions and space curves; Derivatives and integrals of vector functions; Arc length; Motion in space; Functions of several variables; Partial derivatives. The chain rule; Lagrange multipliers; Double integrals over general regions; Applications of double integrals; surface area; Triple integrals in cylindrical and spherical coordinates
Math 133A Differential Equations	Solution of first order differential equations with application to falling body, terminal velocity; Solution to linear second order differential equations - homogeneous and non-homogeneous equations with applications to vibration of mass-spring systems; Laplace transforms; Series solutions of differential equations-Taylor series method, power series, analytic functions

Mathematics indeed will be the principal TOOL that we will be using in this course.

But **NOT** this types of math that only confuses you with no practical value!!

We will use the math that you have already learned in your 4 previous math courses in your Lower Division Studies for this course

to enhance your learning of the following major sub-disciplines of mechanical engineering in: **fluid mechanics** (ME 111), **heat transfer** (ME 114), **rigid body dynamics** (ME 101), and **machine design** (CE 112, ME 147, 154, ME 157, 160, 165) **with analytic models for the engineering processes and systems for these sub-disciplines.**

Problems in these sub-disciplines will be the problems that you will be dealing with after you "walk-out" from this university and join the workforce to be a valuable and versatile MECHANICAL ENGINEEERS!!

Course Description

To pick up the right math to solve your problems is NOT enough, you will also need to develop the knowledge and skill to get the: Realistic interpretations of analytical and approximate solutions for steady and non-steady state mechanical engineering problems.

In addition to the course syllabi that you learned from your Lower Division math courses (as Slide 3 shows), you will also need to learn the linear algebra and statistics and their applications in quality assurance in mass productions - to make you a more contemporary mechanical engineer.

SO, THIS IS AN ENGINEERING COURSE –
NOT ANOTHER MATH COURSE

A side note: I Am aware of one criticism by my class in the 2017 SOTE report. It said:

"The instructor *spent too much time in presenting "**principles.**" It will be better for him to offer more "**examples**" in the class*."

While I share this feeling by the student(s) who offered this criticism, and I actually have many "examples in engineering case studies") to offer, unfortunately we just did not have the time for me to do just that. My reason for spending more time on principles over examples is solely because I want to educate you to be **ENGINEERS** but not TECHNICIANS.

The difference between ENGINEERS and TECHNICIANS is:

"ENGINEERS create (e.g. design new products) and solve problems, TECHNICIANS work according to rules and by instructions of ENGINEERS".

It is therefore more important for ENGINEERS to develop strong "Analytical minds" with "principles" and adequate knowledge base on "cases". Example on math actually is less important in this day of digital era.

Because my job is to educate you to be good ENGINEERS, but NOT TECHNICIANS. I want to educate you what I believe to be more important to you in this class. That is to emphasize "principles" over "math drilling."

MARKING SCHEME:

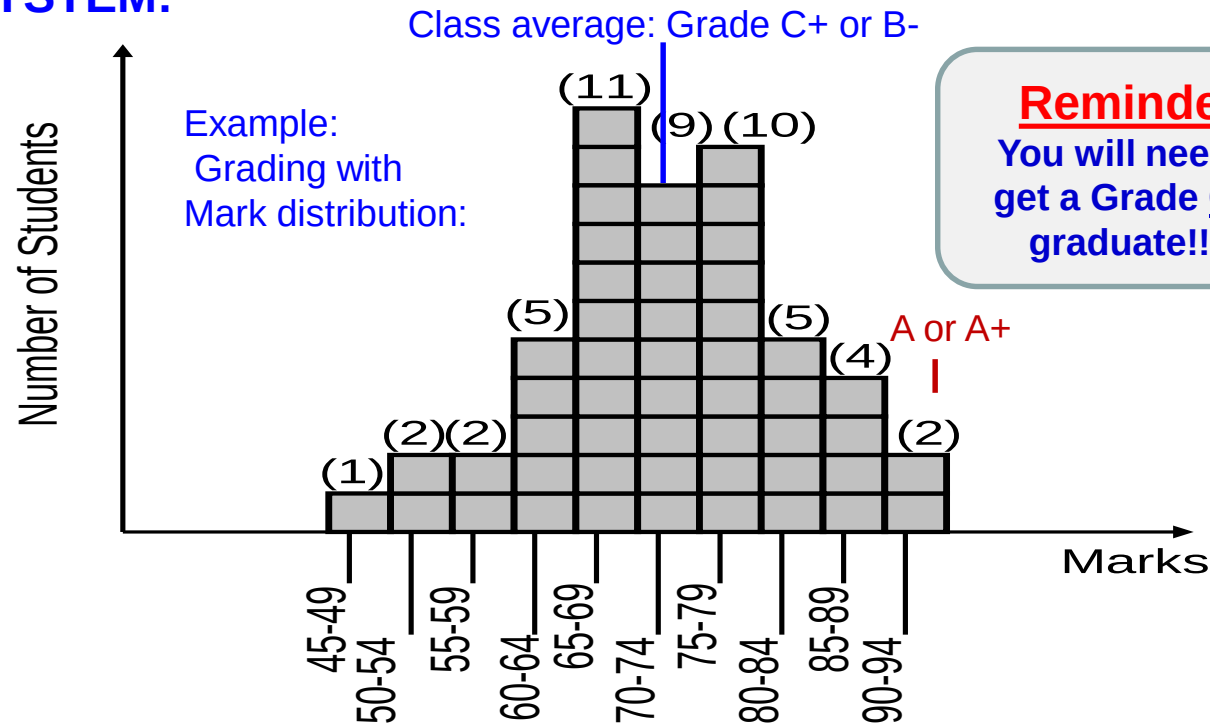
Home works: 20% (accounts for the BEST 5 of the 6 assigned sets*

Mid-Term Exam: 35%Thursday, April 9, 2020 (to be finalized on April 16, 2020)

Final Exam: 45%, at 07:15-9:30, Tuesday, May 19, 2020 in Room: TBA.

Bonus quiz: 5% (by team of 2 volunteer students, Topics to be announced later)

GRADING SYSTEM:



Reminder:
You will need to get a Grade C to graduate!!!!!

Important NOTES to the Class:

(1) There will be NO make-up mid-term and final exams except for students with serious medical reasons. A medical doctor's certificate is required to support such request. Request for make-up exams under this circumstance must be sent to the instructo for approval within three (3) days after the event.
Reason for this stipulation is to be fair to the rest students in the class.

(2) All exams are of OPEN-BOOK format. As such students are allowed to bring textbook and reference books, as well as using the pocket calculator only. No notebook (or laptop) computers and any other wireless phone or devices are allowed in the exams.

(3) Late submission of homework past the due dates (and time) will NOT be accepted. Student are encouraged to use on-line solution methods in their homeworks. However, they must indicate the precise website address from which they obtained these solution methods. The Grader will NOT give credits for homework without such indications.

(4) Materials covered in the mid-term and final exams will include those in: (a) textbook, (b) slides shown in the classes, (c) those shown on the white boards in the classes by the instructor, and (d) Instructor's verbal presentations at the classes.

Academic Integrity –

With ABSOLUTE ZERO TOLERANCE

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

http://www.sjsu.edu/senate/S)4-12.pdf

Planned Instruction Schedule (subject to modifications as needed)

Weeks 1,2: On Math and Physics

Weeks 3,4,5:

Chapters 3-6: Lectures will not cover all sections in the textbook. Rather, the Instructor will only highlight the self-study topics in the sections of he textbook assigned to the students **NOTE:** ALL topics in the textbook will be covered in the scheduled Mid-term examination.

Weeks 6,7 on Chapter 7: Application of 1st order differential equations with applications in: fluid mechanics & heat transfer in solids and fluids.

Week 8 on Chapter 8: Application of 2nd order differential equations in Mechanical vibration analysis

Week 9 & 10 on Highlights of Chapter 9 with focus on Partial differential equations for vibration of flexible cables structures

Week 11 & 12 on Chapter 10 on highlights of numerical analysis

Week 13 & 14: On introduction of Finite element analysis

Week 15: chapter 12: Introduction to statistics and introduction to Statistic Process Controls

It is my passion to educate you to be professional engineers the best I can,

but it is your responsibility to try hard to learn from me!!!

If you:

(1) Attend all classes, and listen attentively to what I say in the classes,
(2) Do not hesitate to ask questions in the class, or after the classes. Never pretend that you understand what is being said in the classes,
(3) Do ALL your Chapter-end homework PROBLEMS in the textbook if possible,
(4) Make sure to let me know your problems in learning whenever they occur,
(5) Make use of my posted office hours for questions and your learning problems,
(6) Form a study group with 2 or 3 favored and motivated fellow students in your class to work on "exchange your class notes, "doing home work together, "review the returned quizzes and mid-term exam papers", and
(7) Take a proactive attitude of ENJOYING what you are learning from me in this course.

YOU WILL BE SUCCESSFUL IF YOU DO ALL THE ABOVE!!!!!