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# TENNESSEE TECHNOLOGICAL UNIVERSITY

## MECHANICAL ENGINEERING

### ME3001-002 MECHANICAL ENGINEERING ANALYSIS

FALL 2021, 3 CREDIT HOURS

Lecture Section 002 (T. Hill): 9:30 AM-10:45 AM Tuesday, Thursday

Final Exam: 10:30 AM - 12:30 AM Monday, December 13

#### INSTRUCTOR INFORMATION

Instructor Name: **Tristan W. Hill**

Office: **BROWN 305**

Telephone Number: **931-372-3732**

Email: [thill@tntech.edu](mailto:thill@tntech.edu)

#### OFFICE HOURS

Tuesday, Thursday 12:00PM-2:00PM (or by appointment)

I will be available during the times above to answer questions about the course material and discuss individual student grades. We can meet in-person in my office or remotely using Teams or Zoom.

#### Synchronous In-Class

This course will be delivered in a synchronous in-person format, and all meetings will be held in the classroom. Materials will be made available to students for makeup purposes only after the proper documentation has been processed by the Office of Student Affairs. Medical and other excuses for absences should be directed to this office. The course policy is subject to change and will remain in accordance with the current COVID-19 guidelines at Tennessee Technological University

#### COURSE INFORMATION

##### PREREQUISITES

ENGR 1120, MATH 2010 and MATH 2120

##### TEXTS AND REFERENCES

**Reference Text:** Zill and Cullen, *Differential Equations with Boundary-Value Problems*, 7th Edition

**Reference Text:** *Scientific Computing with MATLAB and Octave*, Fourth Edition by Quarteroni, Saleri, Gervasio

**Course Website:** [ilearn](#)

##### COURSE DESCRIPTION

The goal of this course is to develop and implement analytical and numerical techniques for typical mechanical engineering problems and applications in various topics using the MATLAB programming language.

## COURSE OBJECTIVES/STUDENT LEARNING OUTCOMES

Practical methods for solving engineering applications in the areas of dynamics, mechanics, heat transfer, and fluids will be investigated with modern numerical computing tools such as the MATLAB programming language. Students will learn the following analytical and numerical methods for computation and engineering problem solving.

- Calculate Solutions to Non-Linear Equations with Analytical and Numerical Methods
- Construct Systems of Linear Equations and solve with Analytical and Numerical Methods
- Identify the Eigenvalue Problem and Demonstrate the Properties of Eigenvalues and Eigenvectors
- Construct Approximate Models of Numerical Data through Curve-Fitting and Numerical Integration Techniques
- Calculate Solutions to Ordinary Differential Equations with Analytical and Numerical Methods
- Calculate Solutions to Partial Differential Equations with Analytical and Numerical Methods
- Produce Organized Graphs and Charts to Represent Problem Solutions and Response Equations
- Analyze Results of Various Techniques and Compare Solutions for Validation Purposes
- Apply Modern Computing Tools such as MATLAB and Solidworks to Analysis in Engineering Problems
- Produce Solid Models and Dimensionally Accurate Part Drawings with a CAD package such as Solidworks

## GRADING AND EVALUATION PROCEDURES

A total point system will be used. Throughout the semester you have opportunity to earn points towards your final grade. There are 1000 total points available across your different assignments. The breakdown is shown below.

Field	Available Points
Weekly Quizzes	150
Homework	150
Solid Professor Solidworks Modules	150
Solidworks Validation Problems	100
Midterm Exam I	150
Midterm Exam II	150
Final Exam	150

Letter Grade	Grade Range
A	900 and above
B	800 to 899
C	700 to 799
D	600-699
F	599 and below

## COURSE POLICIES

### ONLINE GRADEBOOK

You will be able to see your assignment grades as soon as they are available on the course website, ilearn. Please check the gradebook periodically. If you believe your grade is incorrect or missing please send me an email describing the issue. If needed your grade will be changed. Please request no later than 2 weeks after the grade has been posted. After 2 weeks the grade will be considered final. This is particularly important towards the end of the semester as it can affect final grades.

## QUIZZES

Quizzes will be held weekly and may include example problems, derivations, software and/or hardware exercises, and more. There are 150 available points for participating in the quizzes and most weeks there will be one quiz that is due at the end of the day on Friday.

## HOMEWORK ASSIGNMENTS

There will be individual homework assignments given throughout the semester and there are 150 available points from these assignments. Homework will be submitted digitally in the specified format and a formal printed report may be required. The homework will be done in groups of two and each group will turn in a single homework assignment with all names attached, and each member will receive the same grade for the assignment. Any software or code that is used must be submitted digitally and documented properly.

## EXAMS

You will have 2 midterm exams and 1 final exam. You have the opportunity to earn up to 150 points on each midterm exam and 150 points on the final exam. The exam dates are shown on the course schedule, and the final exam schedule is posted on this syllabus. You are allowed to use a calculator and single two-sided handwritten note sheet on the exams but this is subject to change. Some exams may allow the use of personal computers.

## SOLIDPROFESSOR SOLIDWORKS MODULES

You will complete the Introduction to Solidworks module on Solid Professor, and you have the opportunity to earn up to 150 points for this exercise.

## SOLIDWORKS ANALYSIS VALIDATION PROBLEMS

You complete three Solidworks Validation Problems in which you will compare the results from the analysis techniques learned in lecture to the results from the Solidwork Analysis package. More details will be provided regarding these new exercises soon. You have the opportunity to earn up to 150 points for completing the analysis validation problems.

## ATTENDANCE POLICY AND CLASS PARTICIPATION

You are expected to attend lecture and you are responsible for all assignments and material covered and all issues discussed during class meetings whether you are present or not. Please ask questions and participate in class discussions. Do not worry about asking stupid questions, you are not here to look cool. Makeups will not be given unless exceptional circumstances are present and you have official documentation. Assignment due dates are posted on ilearn but they are subject to change.

*Materials will be made available to students for makeup purposes only after the proper documentation has been processed by the Office of Student Affairs. Medical and other excuses for absences should be directed to this office.*

## STUDENT ACADEMIC MISCONDUCT POLICY

Maintaining high standards of academic integrity in every class at Tennessee Tech is critical to the reputation of Tennessee Tech, its students, alumni, and the employers of Tennessee Tech graduates. The Student Academic Misconduct Policy describes the definitions of academic misconduct and policies and procedures for addressing Academic Misconduct at Tennessee Tech. For details, view the Tennessee Tech's Policy 217 – Student Academic Misconduct at [Policy Central](#). Students are encouraged to obtain limited help and/or ideas from one another. However, sharing files or code in any way is strictly forbidden. Similarly there is a zero tolerance policy for cheating on quizzes or exams. While completing the exams, students may only use the allowed materials detailed above. If a student is observed using a restricted device or material, or is found to have copied any part of the exam answers from another student, the student (or students) will be reported to the Student Affairs office for Academic Misconduct. Violation of this policy will result in an 'F' for the course.

## Disability Accommodation

Students with a disability requiring academic adjustments and accommodations must contact the Accessible Education Center (AEC). AEC is located in the Roaden University Center, Room 112; phone 372-6119. For more information see Tennessee Tech Policy 340 (Services for Students with Disabilities) at [www.tntech.edu/policies](http://www.tntech.edu/policies)

## COVID-19 University Protocols

1. Each student must take personal responsibility for knowing and following the university's COVID-19 protocols. Students are expected to follow all COVID-19 directives published by Tennessee Tech on its official COVID-19 webpage: [www.tntech.edu/covid19](http://www.tntech.edu/covid19).
2. As conditions related to the pandemic change, the university's COVID-19 protocols are also likely to change. Students are expected to monitor the university's official COVID-19 webpage to stay up to date on all university COVID-19 protocols.
3. If the university's COVID-19 protocols include the wearing of face coverings inside campus facilities, then face coverings must be worn covering the mouth and nose. Protocols will apply to all vaccinated and unvaccinated individuals.
4. Students who refuse to comply with university protocols will be reported to the Tennessee Tech Dean of Students.
5. Students should direct all requests for excused class absences related to COVID-19 to Tennessee Tech's Health Services by following the student link at the following website: [www.tntech.edu/covid19/report.php](http://www.tntech.edu/covid19/report.php). The Office of Student Affairs will provide notifications to faculty members of student absences and the expected length of the absence.
6. Students can get a COVID-19 vaccine on campus at Tech Health Services. Call ahead to schedule at (931) 372-3320. COVID-19 vaccines are given free of charge daily, as well as testing.
7. Per CDC guidelines, you are considered fully vaccinated:
  - 2 weeks after your second dose in a 2-dose series, such as the Pfizer or Moderna vaccines, OR
  - 2 weeks after a single-dose vaccine, such as Johnson & Johnson's Janssen vaccine