MANE 3351: Manufacturing Engineering Analysis

Syllabus

Fall 2024

Subject to any new Texas legislative mandate changes.

Course Information

Meeting Times: MW 2:00 - 3:15 pm (lecture), MW 3:30 - 4:45 pm (laboratory)

Meeting Location: EMAGC 1.324 (lecture), EENGR 1.268 (laboratory)

Course Modality: Traditional Face-to-Face Courses (TR)

Instructor Information

Instructor Name: Dr. Douglas Timmer

UTRGV E-mail: douglas.timmer@utrgv.edu
Office Phone: (956) 358-3797
Office Location: EENGR 3.258
Office Hours: M-R 9:30 - 10:45 am or by appointment

Welcome and Teaching Philosophy

Welcome to MANE 3351 - Manufacturing Engineering Analysis. This course will focus on improving your program skills to solve common numerical analysis problems in engineering. The Python programming language will be used almost exclusively. Developing applications using Raspberry Pi's and Arduinos will also be included.

Course Description, Prerequisites & Course Modality

COURSE DESCRIPTION

> Topics include linear algebra, numerical methods and programming with engineering analysis software;

COURSE PREREQUISITE

> MATH 2414 (or MATH 2488) and CSCI 1380 (or CSCI 1387)

Mode of Learning

This course is scheduled to be taught as a traditional face-to-face mode. UTRGV policies and CDC recommendations will be followed.

Course Assignments & Learning Objectives

Course Assignments

Course assignments will fall into one of three categories: laboratories, homework and examnations. Further details will be provided in the course schedule and assessment section.

Learning Objectives

There are four student learning outcomes (SLOs) for MANE 3351. The table below lists the SLOs. Maps the SLOs to the Program Student Learning Outcomes and provides the assessment technique for each SLO.

Student Learning Outcome	Program Student Learning Outcomes	Major Course Requirement/Major Assignment/Examination
Construct computational solutions in Python and Octave to solve engineering problems	ABET SO 1, an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Laboratories
Compare algorithms for solving engineeering problems using numerical methods	ABET SO 1, an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Homework Assignments, Test 1 and Final Examination
Creating interactive visual solutions	ABET SO 1, an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	laboratories
Using Raspberry Pi and Arduino to explore Linux and Internet of Things	ABET SO 1, an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Laboratories

Assessment of Learning

Your performance in this course will be evaluated in the following manner:

Component	% of Overall Grade
Examinations (Test 1, Test 2, Final)	66% (equally weighted)
Laboratories	22%
Homework	12%

Examinations

There will be three examinations which are equally weighted. The final examination is not comprehensive. Students can prepare a single, *hand-written* 4 inch by 6 inch notecard for each exam. In addition, tables from your textbooks will be provided as needed. Otherwise the exams will be closed book.

Laboratories

There is only one method to learning programming and that is to program. For the majority of the class, there will be weekly laboratory assignments. Laboratory assignments will be completed on the Raspberry Pi and submitted using GitHub. More details will be provided about the laboratories once the class starts.

Homework

For the majority of the class, there will be weekly homework assignments. The homework assignments will focus on the analytical portion of the class and the ability to use pseudo-code.

Letter Grade Assignment

An overall course average will be calculated using the weighting scheme specified above. Your course average will be a value between 0 and 100. Your final letter grade will be assigned using the following definition.

Course Average	Letter Grade
90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
<60	F

Late Work

Descriptions of each assignment, including due dates, will be provided throughout the course. All assignments should be submitted on their due date using the provided Blackboard drop box. The course policy for late work is a 10% penalty per day for work submitted after the deadline. After one week, no credit will be given for late work. No late work will be accepted after study days. There will be cetain assignments where late work will not be accepted. This fact will clearly be stated in the appropriate assignments.

Students who miss graded assignments will receive a grade of zero. If you are ill or have a serious problem that prevents you from submitting an assignment on the day it is due, please contact me prior to the due date and we will arrange an alternative date.

Required Readings, Technology Needs, and Resource Materials

The following resources are required for completion of Manufacturing Engineering Analysis.

Required Textbook

The following textbook is required for this course. It is an open source (free) textbook that can be downloaded or purchased for a small fee. Note that using an electronic version (pdf) is acceptable.

> Brin, Leon. *Tea Time Numerical Analysis: Experiences in Mathematics, 3rd edition*. Southern Connecticut State University.

The following textbook is recommended for this course. It, too, is an open-source textbook.

Recommended Textbook

The following (free) book is an excellent resource on learning Python.

> VanderPlas, Jake. *A Whirlwind Tour of Python.* O'Reilly Media Inc.

Technology

Students will be issued Raspberry Pi 4 single board computers and Arduino Unos along with bread boards and other electronic components to complete the first three laboratory assignments. The remaining laboratory assignments can be completed using personal computers or Raspberry Pis. Students are encouraged to install Anaconda Python on personal computers and bring their computers to both lectures and laboratory sessions.

Tentative Calendar of Activities (Required on all syllabi.)

Calendar of Tentative Lecture Activities

Class Meeting - Date	Topic
1 - Aug. 26	Course Introduction, Syllabus, Goals, Programming Languages, Classroom Organization

2 - Aug. 28	Introduction to Python Programming
3 -Sept. 2	Labor Day Holiday (noclass)
4 - Sept.4	Numerical Methods, Error Analysis, and Computer Representation of Numbers
5 - Sept. 9	Markdown
6 - Sept. 11	Taylor Series
7 - Sept. 16	Anaconda Python, GitHub Desktop, Jupyter Notebook
8 - Sept. 18	Roots of Equations, Bisection Method
9 - Sept. 23	Bisection Method Error Analysis, False Position
10 - Sept. 25	Test 1 (lectures 1-6)
11 - Sept. 30	Newton's Method
12 - Oct. 2	Secant Method
13 - Oct. 7	Introduction to Numerical Integration, Trapezoid Rule
14 - Oct. 9	Trapezoid Rule
15 - Oct. 14	Simpson's Rule
16 - Oct. 16	Romberg Integration
17 - Oct. 21	ABET Visit - no class
18 - Oct. 23	Gaussian Integration
19 - Oct. 28	Numerical Differentiation
20 -Oct. 30	Vectors
21 - Nov. 4	Matrix Multiplication, Three-Dimensional Transformations
22 - Nov. 6	Determinants, Matrix Inversion
23 - Nov. 11	Test 2 (lecture 8 - 19)
24 - Nov. 13	Inverting Matrices by Hand
25 - Nov. 18	Gaussian Elimination
26 - Nov. 20	Partial Pivoting
27 - Nov. 25	Octave/Matlab

Class Meeting - Date	Topic
28 - Nov. 27	Generative AI
29 - Dec. 2	Programming with Chat GPT
30 - Dec. 4	Review
Dec. 9	Final Exam (lectures 20 - 30) 1:15 - 3:00 pm

The lecture schedule is subject to change.

Calendar of Tentative Laboratory Activities

Class Meeting - Date	Topic
1 - Aug. 26	Course Introduction, Syllabus, Goals, Programming Languages, Classroom Organization
2 - Aug. 28	Distribute Raspberry Pis
3 -Sept. 2	Labor Day Holiday (no class)
4 - Sept. 4	Python Programming (Jupyter Notebook, Thonny)
5 - Sept. 9	Lecture: Raspberry Pi Hardware Interfacing, Lab 1: Raspberry Pi
6 - Sept. 11	Lab 1: Raspberry Pi
7 - Sept.16	Lecture: Arduinos, Lab 2: Arduino
8 - Sept. 18	Lab2: Arduino
9 - Sept. 23	Lecture: Solar Panel Tracking, Lab 3:Solar Panel Tracking Lab
10 - Sept. 25	Lab 3: Solar Cell Lab Lab
11 - Sept. 30	Lab 4: GitHub Classroom
12 - Oct. 2	Lab 5: Git/Clone/Update
13 - Oct. 7	Lab 6: Jupyter Notebook/Markdown
14 - Oct. 9	Lab 7: New Jupyter Notebook
15 - Oct. 14	Lab 8: Python user-defined functions
16 - Oct. 16	Lab 9: Logical Statements/Matplotlib
17 - Oct. 21	Lab 10: Boole's Rule, function/arrays
18 - Oct. 23	Lab 11: Numpy/SciPy statistical table

19 - Oct. 28	Lab 12: Root Finding
20 -Oct. 30	Lab 12: Root Finding
21 - Nov. 4	Lab 13: Numerical Integration
22 - Nov. 6	Lab 13: Numerical Integration
23 - Nov. 11	Lab 14: Gauss-Jordan Elimination
24 - Nov. 13	Lab 14: Gauss-Jordan Elimination
25 - Nov. 18	Lab 15: Numpy Matrix
26 - Nov. 20	Lab 15: Numpy Matrix
27 - Nov. 25	Lab 16: Octave
28 - Nov. 27	Lab 16: Octave
29 - Dec. 2	Lab 17: Programming with Chat GPT
30 - Dec. 4	Return Raspberry Pis and Arduinos

The laboratory schedule is subject to change.

Important University Dates

A subset of the Fall 2024 Academic calendar containing important dates is provided below. The entire academic calendar is available at https://www.utrgv.edu/_files/documents/admissions/utrgv-academic-calendar.pdf and the final exam schedule is available at https://www.utrgv.edu/ucentral/_files/fall-2024-final-exam-schedule_12-20-23.pdf.

Date	Event
August 26	First day of classes
September 2	Labor Day Holiday; no classes
September 2	Last day to add a class or register
September 11	Census Day
November 7	Last day to drop a class or withdraw
November 28 - 30	Thanksgiving Holiday; no classes
December 5	Study Day - No classes
December 6 - 12	Final Exams
December 9	Final Exam for MANE 3351 at 1:15 - 3:00 PM
December 16	Grades due at 3 pm

Course Policies and Procedures

We value a positive and supportive learning environment, and for us to thrive together, we must recognize that our responsibilities, actions, and contributions can impact and transform our learning. The course policies listed below are created to ensure your success by fulfilling course expectations while remaining flexible to account for unexpected events.

ATTENDANCE

Students are expected to attend all scheduled classes. UTRGV's attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics, accommodation by Student Accessibility Services (SAS), observance of religious holy days, or military service.

When setting your attendance policy, please consider extenuating circumstances. Accommodations related to long-term complications from medical conditions should go through SAS. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

Recorded Lectures

Recordings of all lecture and laboratory session will be posted in Blackboard. Please review the university policy on classroom recordings.

The use of classroom recordings is governed by the Federal Educational Rights and Privacy Act (FERPA), UTRGV's acceptable-use policy, and UTRGV HOP Policy STU 02-100 Student Conduct and Discipline. A recording of class sessions will be kept and stored by UTRGV, in accordance with FERPA and UTRGV policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. **You may not share recordings outside of this course.** As referenced in [UTRGV HOP Policy STU 02-100 Student Conduct and Discipline](), doing so may result in disciplinary action.

COURSE DROPS

According to UTRGV policy, students may drop any class without penalty earning a grade of DR (drop) until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the "3-peat rule" and the "6-drop" rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.

Use of Artificial Intelligence (AI) Technologies

Generative AI technologies are growing and evolving rapidly. We will have an opportunity to explore the benefits, challenges, and ethical decisions engineers encounter in the use of AI in this course. Generative AI will be incorporated into this course in a limited and specified manner.

Students are discouraged from using Generative AI technologies such as Chat GPT or Microsoft Copilot for homework. The goal of homework is to gain confidence and proficiency in your engineering analysis and Generative AI technologies will not be available for in-class tests. Submission of printed Generative AI output for student homework will result in a grade of zero and be reported as academic dishonesty.

For most laboratory assignments, Generative AI may not be submitted. Each laboratory assignment will contain a clear statement whether Generative AI can or cannot be used. Submission of code generated using Generative AI when not allowed will result in a grade of zero and will be reported as academic dishonesty.

ACADEMIC INTEGRITY

Members of the UTRGV community uphold the [Vaquero Honor Code]()'s shared values of honesty, integrity and mutual respect in our interactions and relationships. In this regard, academic integrity is fundamental in our actions, as any act of dishonesty conflicts as much with academic achievement as with the values of honesty and integrity. The Writing Center is an excellent resource to assist in learning about and avoiding plagiarism in writing. Violations of academic integrity include, but are not limited to: cheating, [plagiarism (including self-plagiarism]()), and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts (Board of Regents Rules and Regulations, STU 02-100, and UTRGV Academic Integrity Guidelines). **All violations of Academic Integrity will be reported to Student Rights and Responsibilities through [Vaqueros Report It]().**

Student Support Resources

We are committed to your personal, academic, and professional success; please know you can reach out to me for questions and/or I can help you identify the resources you need. UTRGV offers student support resources designed to contribute to your well-being and academic excellence.

Students seeking academic help in their studies can use university resources in addition to an instructor's office hours. University Resources include the Advising Center, Career Center, Counseling Center, Learning Center, and Writing Center. These centers provide services such as tutoring, writing help, counseling services, critical thinking, study skills, degree planning, and connections student employment (through Handshake and HR Student Employment). In addition, services, such as the Food Pantry are also provided. Locations are listed below.

Center Name	Brownsville Campus	Edinburg Campus
Advising Center AcademicAdvising@utrgv.edu	BMAIN 1.400 (956) 665-7120	EITTB 1.000 (956) 665-7120
Career Center CareerCenter@utrgv.edu	BINAB 1.105 (956) 882-5627	ESTAC 2.101 (956) 665-2243
Counseling Center Counseling@utrgv.edu Mental Health Counseling and Related Services List	BSTUN 2.10 (956) 882-3897	EUCTR 109 (956) 665-2574
Food Pantry FoodPantry@utrgv.edu	BCAVL 101 & 102 (956) 882-7126	EUCTR 114 (956) 665-3663
University Library www.utrgv.edu/library circulation@utrgv.edu	BLIBR (956) 882-8211	ELIBR (956) 665-2585
Learning Center LearningCenter@utrgv.edu	BMSLC 2.118 (956) 882-8208	ELCTR 100 (956) 665-2585
Writing Center WC@utrgv.edu	BUBLB 3.206 (956) 882-7065	ESTAC 3.119 (956) 665-2538

Financial Need

Students who demonstrate financial need have a variety of options when it comes to paying for college costs, such as scholarships, grants, loans and work-study. Students should visit the Student Services Center (U Central) for additional information. U Central is located in BMAIN 1.100 (Brownsville) or ESSBL 1.145 (Edinburg) or can be reached by email (ucentral@utrgv.edu) or telephone: (956) 882-4026. In addition to financial aid, U Central can assist students with registration and admissions.

Blackboard Support

Blackboard Support

If you need assistance with course technology at any time, please contact the Center for Online Learning and Teaching Technology (COLTT).

Campus:	Brownsville	Edinburg
Location	Casa Bella (BCASA) 613	Marialice Shary Shivers (EMASS) 3.142
Phone	(956)-882-6792	(956)-665-5327
Toll Free	1-(866)-654-4555	
Support Tickets	Submit a Support Case via our Ask COLTT Portal	
Online Support	Chat with a Support Specialist online	
24/7 Support	Need Blackboard assistance after hours? You can call our main office numbers, (956)-882-6792 or (956)-665-5327, to speak with a support representative.	

University Policy Statements

We care about creating a safe and supportive learning environment for all students. The University policy statements below are intended to create transparency for your rights and responsibilities as students. We each contribute to ensuring a safe and positive environment through our actions and conduct, and students are encouraged to advocate for their needs.

STUDENT ACCESSIBILITY SERVICES

Student Accessibility Services staff can be contacted at either campus to learn about and explore accessibility services.

Campus:	Brownsville	Edinburg
Location:	Music and Learning Center (BMSLC, 1.107	University Center (EUCTR, 108)
Phone:	phone (956) 882-7374	phone (956) 665-7005
ability@utrgv.edu		

STUDENTS WITH DISABILITIES

Students with a documented disability (physical, psychological, learning, or other disability which affects

Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive reasonable academic accommodations should contact **Student Accessibility Services (SAS)** for additional information. In order for accommodation requests to be considered for approval, the student must apply using the mySASportal and is responsible for providing sufficient documentation of the disability to SAS. Students are required to participate in an interactive discussion, or an intake appointment, with SAS staff. Accommodations may be requested at any time but are not retroactive, meaning they are valid once approved by SAS. Please contact SAS early in the semester/module for guidance. Students who experience a broken bone, severe injury, or undergo surgery may also be eligible for temporary accommodations.

PREGNANCY, PREGNANCY-RELATED, AND PARENTING ACCOMODATIONS

Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting should submit the request using the form found at Pregnancy and Parenting | UTRGV.

SEXUAL MISCONDUCT AND MANDATORY REPORTING

In accordance with UT System regulations, your instructor is a "Responsible Employee" for reporting purposes under Title IX regulations and so must report to the Office of Institutional Equity & Diversity (OIED@utrgv.edu) any instance, occurring during a student's time in college, of sexual misconduct, which includes sexual assault, stalking, dating violence, domestic violence, and sexual harassment, about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found through the Office of Institutional Equity and Diversity, including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect that is free from sexual misconduct, discrimination, and all forms of violence. If students, faculty, or staff would like confidential assistance, or have questions, they can contact OVAVP (Office for Victim Advocacy & Violence Prevention) at (956) 665-8287, (956) 882-8282, or OVAVP@utrgv.edu.

DEAN OF STUDENTS

The Dean of Students office assists students when they experience a challenge with an administrative process, unexpected situation, such as an illness, accident, or family situation, and aids in resolving complaints. Additionally, the office facilitates student academic related requests for religious accommodations, support students formerly in foster care, helps to advocate on behalf of students and inform them about their rights and responsibilities, and serves as a resource and support for faculty and campus departments.

Vaqueros Report It allows students, staff, and faculty a way to report concern about the well-being of a student, seek assistance in resolving a complaint, or report allegations of behaviors contrary to community standards or campus policies. The Dean of Students can be reached by email (dos@utrgv.edu), phone (956-665-2260), (956-882-5141), or by visiting one of the following office locations: Cavalry (BCAVL) 204 or University Center (EUCTR 323).

MANDATORY COURSE EVALUATION PERIOD

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Students have the opportunity to complete an ONLINE evaluation of this course, accessed through your UTRGV account (http://my.utrgv.edu). Course evaluations are used by the instructor to better understand the student experience in the course, which can inform revisions of the course to ensure student success. Additionally, course evaluations are also used by the instructor for annual performance review and promotion applications, teaching award applications, among others. For these reasons, your feedback, reflections, and insights on your experience in the course are invaluable to ensure student success and a quality education for all. You will be contacted through email with further instructions. Students who complete their evaluations will have priority access to their grades.

Online evaluations will be available on or about:

Term	Dates
Fall Module 1 (7 weeks)	October 2-8, 2024
Fall Regular Term 2023	November 13 - December 4, 2024
Fall Module 2 (7 weeks)	November 27 - December 3, 2024