MATH 451: Applied Mathematics I

Mathematical Modeling
Fall 2026 Syllabus

University of Tennessee at Martin

Basic Information

Course: MATH 451, Section 001
Meeting Time: MWF 1:00–1:50 PM
Location: Latimer-Smith 304
Credit Hours: 3
Prerequisites: MATH 310 and MATH 320

Textbook

A First Course in Mathematical Modeling, Fifth Edition, Giordano, Fox, and Horton, Cengage Learning, 2021. ISBN: 978-1-285-05090-4.

A calculator is strongly encouraged. The department recommends a TI-84 series calculator. Calculators that perform symbolic computations (e.g., TI-89, TI-92) are NOT permitted on exams.

Faculty Contact Information

Instructor: Dr. Shalmali Bandyopadhyay
Email: sbandyo5@utm.edu
Office: Latimer-Smith 360

Office Hours:

- Monday: 9:00–10:00 AM & 11:00 AM–12:00 PM
- Wednesday: 8:00–10:00 AM, 11:00 AM–1:00 PM, & 3:00–4:00 PM
- Friday: 9:00–10:00 AM & 11:00 AM–1:00 PM
- *Other times by appointment via email.*

Course Description

Practical applications of mathematics including optimization, interpolation and best fit, simulation and dimensional analysis. Mathematical model building including problem identification, model construction or selection, fine tuning and validation.

Teaching Objectives

The student will:

1. Create and select appropriate models including problem identification, data collection, and model validation.
2. Implement and maintain models using experimentation, simulation, data fitting, exposing assumptions and estimating stability.
3. Develop and use models involving linear algebra, differential equations and calculus.

Student Learning Outcomes

Upon completion of the mathematics major, the graduate will be able to:

i. Apply mathematical concepts and principles to perform numerical and symbolic computations.

ii. Use technology appropriately to investigate and solve mathematical and statistical problems.

iii. Write clear and precise proofs.

iv. Communicate effectively in both written and oral forms.

v. Demonstrate the ability to read and learn mathematics and/or statistics independently.

Grading

Grading Scale

Grade	Percentage
A	90–100%
B	80–89%
C	70–79%
D	60–69%
F	Below 60%

Grade Weights

Component	Weight
Homework (13 assignments)	30%
Exams (3)	30%
Projects (3)	20%
Final Exam	20%

Homework

There are 13 homework assignments throughout the semester, due in class on the dates listed below. All assigned problems must be completed. Two problems will be randomly selected from each assignment for grading. Homework solutions will be shared the next class meeting after the due date. Late homework will not be accepted.

HW	Sections	Due Date
1	S 2.1	In class, Wed Sep 2
2	S 2.2	In class, Fri Sep 4
3	S 2.3–2.5	In class, Wed Sep 9
4	Ch 14	In class, Mon Sep 14
5	S 1.2	In class, Wed Sep 30
6	S 1.3	In class, Mon Oct 5
7	S 7.1–7.3	In class, Fri Oct 9
8	S 7.4–7.5	In class, Fri Oct 16
9	S 9.1	In class, Wed Nov 4
10	S 9.2–9.3	In class, Mon Nov 9
11	S 10.1–10.2	In class, Fri Nov 13
12	S 10.3–10.4	In class, Wed Nov 18
13	S 10.5–10.6	In class, Mon Nov 23

Exams

There are three in-class exams during the semester, each worth 50 points and administered during the regular 50-minute class period. Exam problems are drawn directly from homework assignments without any changes. Students are permitted to bring one small notecard (index card size) with formulas written on it to each exam. No electronic devices are permitted during exams.

Exam	Date	Topics
Exam 1	Wed Sep 16	Ch 1, 2, 14
Exam 2	Mon Oct 19	Difference Equations, Linear Programming
Exam 3	Fri Nov 20	Decision Theory, Game Theory

Projects

There are three group projects, each worth 24 points. Projects are completed primarily during designated in-class project days. Each project includes a guided worksheet that serves as the final report, submitted once per group. Project descriptions, worksheets, and rubrics are available on Canvas at the beginning of the semester.

Active participation by every group member is required. Even though projects are graded as group work, relying on group members entirely without appropriate division of labor will result in a grade of zero on the project regardless of the group score.

Project	Title	In-Class Days	Report Due
Project 1	Toilet Paper Roll Modeling	Sep 18–23	Fri Sep 25
Project 2	Poster Board Optimization	Oct 21–28	Fri Oct 30
Project 3	Prisoner's Dilemma Experiment	Nov 23–Dec 4	Fri Dec 4

Final Exam

The final exam is cumulative, covering material from all 13 homework assignments. It is a 2-hour exam. Problems are drawn from homework assignments. Students are permitted to bring one small notecard with formulas.

Date	Time	Location
Monday, December 7	12:45–2:45 PM	LS 304

Course Policies

Attendance. Class will begin promptly at 1:00 PM and you are expected to be in your seat and ready to take notes at that time. Attendance will be checked on a regular basis and you are expected to attend every class period. Excessive absences or tardiness will reflect poorly on your final class grade.

Cell Phone / Electronic Device Policy. No cell phones, smart watches, or other electronic devices are permitted in class. The only electronic device allowed is an approved calculator. If any device disrupts class, the student responsible may be asked to leave for the remainder of the class period. Please check with the professor before using any type of recording device.

AI Policy. Use of AI tools is not permitted in this course on any assignment. All work in this course must be produced by the student. Use of AI tools will be considered a violation of academic integrity and will be dealt with accordingly.

Makeup Policy. Students who miss exams or project days due to excused absences must contact the professor prior to the absence and arrange for an alternative. It is the student's responsibility to schedule makeups with the professor before the next assessment.

Course Communications. In the rare case where class may be canceled or another notification needs to be sent, I will contact you via Canvas announcement. Please check Canvas regularly. The easiest way to contact me is a Canvas message. All emails will come from sbandyo5@utm.edu. Expect a reply by the end of the next school day.

University Policies

Academic Integrity. The University of Tennessee at Martin has chosen as its primary objective quality undergraduate education. Commitment to this objective must include an obligation by all members of the University community to promote and protect the highest standards of integrity in study, research, instruction, and evaluation. Dishonesty or unethical behavior does not belong at an institution dedicated to the promotion of knowledge and learning. For more information: https://www.utm.edu/offices-and-services/student-conduct/academic-integrity.php

Standard of Conduct. When persons enroll in The University of Tennessee at Martin, they retain the rights and duties of a citizen. Additionally, they must assume the duties and observe the regulations imposed by the University community. For more information: https://www.utm.edu/offices-and-services/student-conduct/

Accessibility Resource Center. The University of Tennessee provides reasonable accommodations to ensure equal access to educational content and university programs for students with disabilities. Students who are approved for accommodations are responsible for requesting accommodation letters be sent to faculty each semester. The Accessibility Resource Center is located at 430–448 Clement Hall. For more information: https://www.utm.edu/offices-and-services/accessibility-resource-center/

Course Assessment. At the University of Tennessee at Martin, it is our collective responsibility to improve the state of teaching and learning. During the semester, you may be requested to assess aspects of this course. You are encouraged to respond to these assessments as a means of continuing to improve the quality of the UTM learning experience.

The professor reserves the right to revise, alter, or amend this syllabus as necessary. Students will be notified in writing (email or Canvas announcement) of any such changes.