

SYLLABUS

COURSE INFORMATION

Course Number:	MATH 308
Course Title:	Differential Equations
Sections:	501
Time:	TR 11:10 – 12:25
Location:	BLOC 117
Credit Hours:	3

INSTRUCTOR DETAILS

Instructor:	Dr. Irina Holmes Fay
Office:	Blocker 641G
Phone:	Math Department: 979-845-3261 <i>(There is no phone in my office; email is the best method of correspondence.)</i>
E-Mail:	irinaholmes@tamu.edu
Office Hours:	(Virtual) TR 1-2pm, or by appointment

COURSE WEBPAGE

<https://www.math.tamu.edu/~irinaholmes/M308S22/M308S22Home.html>

Check regularly for important information, as well as for lecture notes, and other helpful links on Canvas: <http://canvas.tamu.edu>. Also, see <http://www.math.tamu.edu/courses/math308/> for the math department course page.

COURSE DESCRIPTION

Math 308: This is a course in differential equations. Topics include linear ordinary differential equations and systems of linear differential equations, second order linear equations, solutions using Laplace transforms, solutions by power series, and elements of nonlinear systems.

COURSE PREREQUISITES

Prerequisites: MATH 221, MATH 251, or MATH 253 or concurrent enrollment; knowledge of computer algebra system.

COURSE OBJECTIVES

We will cover much of chapters 1-3, 5, 6-7 and some of chapter 9 from the textbook. This course is to provide students with quantitative and problem-solving skills of differential equations. At the conclusion of this course, students should be able to:

- Solve basic first order ODEs
- Solve higher order linear ODE and systems of linear ODEs
- Be able to construct simple ODE models (linear and non-linear)
- Be able to conduct qualitative analysis of ODE models.

COURSE LEARNING OUTCOMES

Upon successful completion of this course, students will be able to: use differential equations to model mechanical and electrical systems; visualize solutions to first order differential equations and 2×2 systems of first order linear differential equations using direction fields and phase planes; solve basic first order differential equations and initial-value problems; understand the conditions required for a first order differential equation to have a unique solution; find the equilibrium points of an autonomous differential equation and determine their stability; solve homogeneous second order linear differential equations and initial value problems with constant coefficients; use the methods of undetermined coefficients and variation of parameters to find solutions to nonhomogeneous second order linear differential equations and initial value problems with constant coefficients; use Laplace transforms to solve basic initial value problems; determine the mathematical and practical effect of step functions and impulse functions on second order linear initial value problems with constant coefficients; use power series to solve second order linear differential equations; write a higher order differential equation as a system of first order equations; solve homogenous systems of first order linear differential equations; conduct qualitative analysis of 2×2 systems of linear first order differential equations with constant coefficients; understand methods of numerically approximating solutions to first order initial value problems.

TEXTBOOK AND/OR RESOURCE MATERIALS

TEXTBOOK: Elementary Differential Equations and Boundary Value Problems (11th edition), by William E. Boyce, Richard C. DiPrima and Douglas B. Meade. Earlier editions may be used for the purpose of studying the materials, but suggested homework problems (no credit) are from the 11th edition.

EDFINITY ACCESS: Homework assignments will be completed inside the online homework platform, Edfinity. You will need to purchase access to course for a nominal fee of \$27 per semester. Edfinity will be integrated with Canvas this semester so you will get all the necessary information through Canvas.

CALCULATOR POLICY: Calculators are not allowed on evaluations. Using them for those purposes is considered academic dishonesty and will be reported to the Aggie Honor Council. However, calculators may be used on homework or take-home assignments.

TEXAS A&M STUDENT ID: You must have a picture ID for exams.

TECHNOLOGY & SOFTWARE: This class is offered face-to-face. However, the office hours are virtual. Also, some or all the written assignments need to be uploaded on Canvas. For those reasons, the following technical requirements are needed:

- Appropriate hardware (laptop or desktop computer, high-speed internet connection)
- Appropriate software (PDF reader, Zoom on phone and computer, a scanning app such as the one provided inside Google Drive, the latest update on an internet browser-Chrome or Firefox).

GRADING POLICY/EXAMS

The course grading will be based on the tables below. At the end of the semester, you will receive the grade you *earned*, according to the scale given.

GRADE BREAKDOWN

Activity	Date	Percentage
Quizzes	~ Weekly	25%
Python Labs	~ end of semester~	5%
Exam I	2/24/22	Total of 40%
Exam II	4/7/22	
Comprehensive Final	5/5/22	30%
TOTAL		100%

Range	Grade
$90 \leq \text{Average} \leq 100$	A
$80 \leq \text{Average} < 90$	B
$70 \leq \text{Average} < 80$	C
$60 \leq \text{Average} < 70$	D
Average < 60	F

APPEAL POLICY

Students have one week upon the return of assignments and exams to notify the instructor of any inaccuracies in their graded work. After 1 week, the grade will stand. Students have 1 week from the day grades are posted in the Canvas gradebook to bring any inaccuracies to the instructor's attention. Students should bring all grade disputes to the instructor in a one-on-one Zoom meeting. Due to FERPA privacy issues, grade disputes will not be discussed over email or in the classroom.

HOMEWORK

Homework assignments will not be graded, but the quizzes and exam problems will be heavily inspired from the homework problems. It is important to keep up with the weekly homework, as material piles up quickly in this course.

QUIZZES

Quizzes will be due in Canvas every Sunday night.

COMPUTER ASSIGNMENTS

There will be 2-3 computer assignments throughout the semester, mostly using Python. Details of each assignment are given in Canvas. Assignments may be turned in as paper copy or scanned and uploaded in Canvas.

EXAMS

There will be two proctored exams administered during published class times. Material on the exams will be similar to the examples presented in class, and problems from the assigned homework. Please have your ID available at each exam. The lower of your two midterm scores will count as 15% of your total grade, and the higher of the two will count as 25%. The tentative exam schedule is as follows:

Exam I: Thursday, February 24 (Chapters 1, 2, and parts of Chapter 3)

Exam II: Thursday, April 7 (Rest of Chapter 3, and Chapters 5, 6)

FINAL EXAM

The final exam will be comprehensive, and the material on the final exam will be similar to the examples presented in class, problems from the assigned homework, and problems from previous exams. You will need to bring your ID to your final exam. The day and time of the final exam is determined by the university registrar, and may be found at

<http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Examination-Schedules>

Section 501: Thursday, May 5, 2022, 3-5pm

ATTENDANCE AND MAKE-UP POLICIES

Attendance is essential to complete this course successfully. Moreover, any possible curve at the end of the semester would only be offered to those who regularly attend class. Clearly, this would have an impact on the borderline grades.

- **Excused Absences:** University student rules concerning excused and unexcused absences, as well as makeups, can be found at <http://student-rules.tamu.edu/rule07>. In particular, make-up exams and quizzes or late homework will NOT be allowed unless a University approved reason is given to me in writing. Notification before the absence is required when possible. Otherwise (e.g. accident, or emergency), you must notify me within two business days of the missed exam, quiz, or assignment to arrange a makeup.
- **Working with friends:** In this course, students can discuss homework assignments and their solutions with each other. However, it is NOT permissible to copy homework solutions from another student. It is NOT permissible to discuss any aspect of any test or examination until ALL students have completed the exam. The penalties for violating this policy will range from an F on an assignment or test, to failing in the course.
- **Makeup exams:** will only be allowed due to excused absences and the makeup must be taken as soon as possible after the missed exam. You will need to schedule to make up your exam within 2 business days of the originally scheduled time to allow for grades to be returned in a timely manner. If you know ahead of time you will be absent during an exam, you must notify me (reihani@tamu.edu) in advance.

ZOOM ETIQUETTE

- **Office Hour Attendees:** When joining office hours via ZOOM, please join with your audio off. Everyone attending office hours will be joining one room, so if you would like to ask a question during office hours, please "raise your hand" and wait to be called on. If you need to speak to me privately, and have not made an individual appointment with me, please let me know through a private CHAT message and I will move you to a breakout room where we can talk one-on-one.

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LEARNING RESOURCES***Week-in-Review (WIR)***

There will be two independent Week-in-Review sessions every week during this semester; one is sponsored by Math Department and one by MLC (Math Learning Center), starting the second week of classes. Each review is open to all Math 308 students to review the topics of the previous week and to provide additional examples. The schedule and problem sets that will be worked during these sessions can all be found at [https://mlc.tamu.edu/Online-Help-Services/Week-in-Review-\(A\)](https://mlc.tamu.edu/Online-Help-Services/Week-in-Review-(A))

Help Sessions

Help sessions are an opportunity for you to ask questions and get help with your homework.

<https://mlc.tamu.edu/Online-Help-Services/MLC-Help-Sessions#M308>

UNIVERSITY POLICIES

ATTENDANCE POLICY

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

MAKEUP WORK POLICY

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor. Please refer to [Student Rule 7](#) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" ([Student Rule 7, Section 7.4.1](#)).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" ([Student Rule 7, Section 7.4.2](#)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](#).)

ACADEMIC INTEGRITY STATEMENT AND POLICY

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" ([Section 20.1.2.3, Student Rule 20](#)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

AMERICANS WITH DISABILITIES ACT (ADA) POLICY

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

TITLE IX AND STATEMENT ON LIMITS TO CONFIDENTIALITY

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX

Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University’s goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University’s [Title IX webpage](#).

STATEMENT ON MENTAL HEALTH AND WELLNESS

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student’s academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

COVID SYLLABUS STATEMENT FOR SPRING 2022

To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking – regardless of vaccination status – have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death.

TENTATIVE COURSE SCHEDULE

WEEK	TOPICS AND SECTIONS
1: Jan 18&20	<ul style="list-style-type: none"> Section 1.1: Some Basic Mathematical Models; Direction Fields Section 1.2: Solutions of Some Differential Equations Section 1.3: Classification of Differential Equations
2: Jan 25&27	<ul style="list-style-type: none"> Section 2.1: Linear Equations; Method of Integrating Factors Section 2.2: Separable Equations Section 2.3: Modeling with First Order Equations
3: Feb 1&3	<ul style="list-style-type: none"> Section 2.4: Differences Between Linear and Nonlinear Equations Section 2.5: Autonomous Equations and Population Dynamics Section 2.6: Exact Equations and Integrating Factors
4: Feb 8&10	<ul style="list-style-type: none"> Section 3.1: Homogeneous Equations with Constant Coefficients Section 3.2: Solutions of Linear Homogeneous Equations Section 3.3: Complex Roots of the Characteristic Equation
5: Feb 15&17	<ul style="list-style-type: none"> Section 3.4: Repeated Roots; Reduction of Order Section 3.5: Nonhomogeneous Equations; Method of Undetermined Coefficients Section 3.6: Variation of Parameters
6: Feb 22&24	<ul style="list-style-type: none"> Section 3.7: Mechanical and Electrical Vibrations Section 3.8: Forced Vibrations Exam 1 (Chapters 1-3)
7: Mar 1&3	<ul style="list-style-type: none"> Section 6.1: Definition of the Laplace Transform Section 6.2: Solution of Initial Value Problems [via Laplace Transforms] Section 6.3: Step Functions
8: Mar 8&10	<ul style="list-style-type: none"> Section 6.4: Differential Equations with Discontinuous Forcing Functions Section 6.5: Impulse Functions Section 6.6: The Convolution Integral
9: Mar 15&17	SPRING BREAK
10: Mar 22&24	<ul style="list-style-type: none"> Section 5.1: Review of Power Series Section 5.2: Series Solutions Near an Ordinary Point I Section 5.3: Series Solutions Near an Ordinary Point II Section 7.1: Introduction [to Systems of 1st Order Equations] Section 7.2: Review of Matrices
11: Mar 29&31	<ul style="list-style-type: none"> Section 7.3: Linear Algebraic Equations; Eigenvalues, Eigenvectors Section 7.4: Basic Theory of Systems of First Order Linear Equations
12: Apr 5&7	<ul style="list-style-type: none"> Section 7.5: Homogeneous Linear Equations with Constant Coefficients Section 7.6: Complex Eigenvalues Exam 2 (Chapters 3, 5, 6)
13: Apr 12&14	<ul style="list-style-type: none"> Section 7.7: Fundamental Matrices Section 7.8: Repeated Eigenvalues
14: Apr 19&21	<ul style="list-style-type: none"> Section 7.9: Nonhomogeneous Linear Systems Section 9.1: The Phase Plane: Linear Systems
15: Apr 26&28	Catch up & Review
May 5, 3-5PM (Section 501)	Final Exam