

MATH 3002: Differential Equations

Instructor: Ryan Utke

Fall 2024

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Class Hours: W/F 8:30-9:45am

Classroom: LL-502

Office Hours: W 11:30am-1:30pm

Course Description

This course is an introduction to ordinary differential equations (commonly abbreviated ‘ODEs’). This includes some practical techniques for first order equations and some second order equations (and difficulties associated therein), theoretical aspects of ODEs such as existence and uniqueness of solutions and the structure of the space of solutions. Depending on student interest and time, additional topics include series solutions, the Laplace transform, systems of ODEs, Fourier series, numerical methods, etc..

Textbook

We will follow Paul’s Online Notes (<https://tutorial.math.lamar.edu/Classes/DE/DE.aspx>) for the beginning of the semester. Other resources will be posted on the course webpage.

Technology

Exams will not require a calculator, but you are encouraged to use calculators and/or graphing software when doing homework.

Grading

Grades will follow the chart below:

Letter Grade	G.P.A	Percentage	Letter Grade	G.P.A	Percentage
A	4.00	94-100	C+	2.33	77-79
A-	3.67	90-93	C	2.00	74-76
B+	3.33	87-89	C-	1.67	70-73
B	3.00	84-86	D	1.00	60-69
B-	2.67	80-83	F	0	0-59

Grades will be determined by the following material:

Homework and Quizzes: 30%

Midterm Exams: 30% (there will be one midterm exams)

Final Exam: 40% (the final exam will be cumulative, i.e., cover all course material)

Solutions to homework should be written up independently. You are allowed to work with others and use the internet, but you must give credit where appropriate.

If there is a conflict with any exam, you should contact me as soon as possible to reschedule.

Attendance

You are expected to arrive on time for each class. Accumulating more than 4 unexcused absences may result in being assigned a (failing) WF grade. An appropriate excuse, if applicable, should be emailed as soon as possible. You are responsible for any material from a missed class (and are welcome at office hours to discuss it).

Academic Integrity Policy

You are expected to hold yourself to the highest standards of academic integrity. This included, but is not limited to, ensuring all work that you claim as your own is in fact your own work, not receiving aid during exams, quizzes, and homework without proper acknowledgement. See the academic-integrity-policy for more information

Disability Policy

If you are a student with a documented disability and require academic accommodations, please register with the Office of Disability Services for Students (ODS) in order to request academic accommodations for your courses. Please contact the main ODS number at 718-817-0655 to arrange services. Accommodations are not retroactive, so you need to register with ODS prior to receiving your accommodations. Please see me after class or during office hours if you have questions or would like to submit your academic accommodation letter to me if you have previously registered for accommodations.

Important Dates

Date	Event
August 28	First day of class
September 2	University Closed for Labor Day
September 4	Classes follow Monday schedule
September 5	Add/Drop period ends
September 13	Last day of Attendance Reporting
September 20	Deadline for removal of INC, NGR, ABS, grades from Summer 2024
October 4-6	Family Weekend
October 14	University Closed for Columbus Day
October 29	Mid-semester evaluations are due
November 5	University closed - Presidential Election
November 27-29	University Closed for Thanksgiving Recess
December 2	Classes Resume; Last day for Pass/Fail; Last day to withdraw without WF
December 10	Last Day of Classes
December 11	Reading day (may be used as make up day for campus wide cancellations)
December 12-20	Final Examinations
December 24-January 1	University closed for Christmas Recess

Schedule of Topics

Date	Topic
August 28	Introduction, Analysis of $y' = y$
August 30	First Order Homogeneous Linear Differential Equations
September 6	First Order Non-homogeneous Linear Differential Equations
September 11	Separable Differential Equations
September 13	Line integrals and conservative vector fields
September 18	Exact Differential Equations
September 20	Exact Differential Equations Continued
September 25	2nd order linear homogeneous differential equations with constant coefficient
September 27	2nd order constant coefficients continued
October 2	2nd order constant coefficients with complex roots, Wronskian
October 4	Wronskian Applications
October 9	Non-homogeneous second order differential equations
October 11	Harmonic oscillators
October 16	EXAM
October 18	Linear Algebra review
October 23	Systems of differential equations, reduction of order
October 25	Phase planes
October 30	Equilibria solutions and singularities
November 1	Wronskian revisited
November 6	Harmonic oscillators revisited
November 8	Limit Cycles
November 13	The Laplace Transform, Definition and Examples
November 15	Inverse Laplace Transform, Applications to Differential Equations
November 20	Convolution and Distributions
November 22	Boundary Value Problems
December 4	Fourier Series
December 6	Convergence Issues
December 11	Existence and Uniqueness 1