

MATH 212 DIFFERENTIAL EQUATIONS

SPRING 2018

Instructor: Dr. Nicolas Petit

Email: nicolas.petit@emory.edu

Office: Pierce 126

Phone: 4-8516

Office Hours: To be announced on Canvas.

Course Content: Mathematics 212 is the one-semester course in the theory of differential equations. Throughout the term, you will learn how to solve ordinary differential equations using a variety of method, and how to interpret a collection of “real-world” problems in terms of differential equations. The (tentative) list of day-by-day topics are listed at the end of this syllabus.

Prerequisites: Mathematics 212 will make heavy use of all single-variable calculus material. The various techniques of integration, as well as the theory of power series, are a fundamental building block for this course.

Text Material: D.G. Zill, *A First Course in Differential Equations with Modeling Applications*, 10th edition.

Grading: Course grades will be determined as follows:

Class Participation	50 points
Reading Quizzes	50 points
In-class Quizzes	100 points
Homework	100 points
In-class Midterm exams (3×100)	300 points
Final Exam	200 points
<hr/>	
TOTAL	800 points

Letter grades will be determined based on the total points each student earns: A: at least 720 points; B: 640-719 points; C: 560-639 points; D: 480-559 points; F: fewer than 480 points. Plus and minus grades will be assigned for sums of points near cut-off values.

Class Attendance: Students are expected to regularly attend the class, engage in group work and (at least sporadically) come to office hours. Repeatedly missing class without a good reason or being excessively distracted by your phone during lecture (yes, I can tell!) can have a negative impact on your participation grade.

Homework: You will be assigned a daily set of homework problems, and you are expected to work out a complete solution for most (if not all) of them. Every week, I will collect a subset of these problems and grade it; you will be warned in advance of what problems will be collected. Some of the problems are computational, and will be graded for correctness, while some of the problems are open-ended, and will be graded for completeness.

Quizzes: Reading quizzes will be regularly posted on Canvas. They will be graded for completion, and you can complete these while accessing the book, if you so wish. They are a way of ensuring that you keep up with the reading ahead of class. Reading quizzes cannot be made up; to compensate, I

will drop up to two incomplete reading quizzes at the end of the term.

We will also have a 15-minute quiz at the beginning of class every couple of weeks (typically when we're done with a sizable topic). These will be graded in the standard way. The lowest quiz score will be dropped at the end of the term.

Tests: Three tests will be given throughout the semester on the Tuesday and Thursday mornings indicated on the course calendar at the end of this syllabus. Students are expected to take tests at the scheduled times. Conflicts, problems and emergencies will be handled on an individual basis. For legitimate excuses, arrangements may be made far in advance to take a test prior to the scheduled testing time. Please note that it is the student's responsibility to warn the instructor of upcoming conflicts.

Final Exam: The final exam will be given according to the exam schedule and will be comprehensive. Rescheduling a final exam is rarely accommodated and must be approved by the associate dean of academic affairs.

Inclusivity: Students with a documented disability who anticipate barriers related to the format or requirements of this course, or presume to have a disability (e.g. mental health, attention, learning, vision, hearing, physical or systemic) and are in need of accommodations this semester should contact the Office of Accessibility Services (OAS) as soon as possible to learn more about the registration process and steps for requesting accommodations.

Students who are currently registered with OAS who do not receive an accommodation notification letter within the first week of class must notify OAS immediately by emailing adsroxford@emory.edu. Students who have accommodations in place are encouraged to coordinate a face to face meetings with the instructor to communicate specific needs for the course as it relates to approved accommodations. All discussions with OAS and faculty members concerning the nature of a student's disability remain confidential. For additional information regarding OAS and how to register, please visit the website: equityandinclusion.emory.edu/access.

Support Services: Students should utilize the following resources:

- **Office Hours:** Office hours will be posted on Canvas. These times vary due to meetings and other obligations, but most afternoons should have some availability.
- **Canvas:** Announcements and important documents will be posted on the course's Canvas site. The student is responsible for regularly checking the site for new announcements and resources, including homework assignments and handouts.
- **Math Center:** Student tutors are generally available in the Math Center (in Pierce) Monday through Thursday afternoons. Additional online resources from the Math Center are available at <http://www.oxfordmathcenter.com>.
- **Study Groups:** When used appropriately, study groups can be a useful tool in learning mathematics. Study groups should complement and enrich individual study of course material; with particular regard to homework assignments, it is suggested that study groups discuss completed (or attempted) assignments rather than work through homework problems for the first time.

THE HONOR CODE OF OXFORD COLLEGE APPLIES TO ALL WORK SUBMITTED FOR CREDIT IN THIS COURSE. BY SUBMITTING SUCH WORK, YOU PLEDGE THAT WORK WAS DONE IN ACCORDANCE WITH THE RULES STIPULATED ON THE ASSIGNMENT AND IN THIS SYLLABUS.

TOPICS BY DAY
Math 212, Spring 2018

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Jan 15th No CLASS (MLK Day)	Jan 16th	Jan 17th 1 Intro to Diffeq, integral review	Jan 18th	Jan 19th 2 Direction Fields
Jan 22nd 3 Separable Equations	Jan 23rd	Jan 24th 4 Linear Equations	Jan 25th	Jan 26th 5 Exact Equations
Jan 29th 6 Solving by Substitution	Jan 30th	Jan 31st 7 Euler's Method	Feb 1st	Feb 2nd 8 Linear Models
Feb 5th 9 Non-Linear Models	Feb 6th	Feb 7th 10 Modeling with Systems	Feb 8th	Feb 9th 11 IVPs and BVPs
Feb 12th 12 Test 1 wrap-up	Feb 13th Test 1 (8:00AM)	Feb 14th 13 Reduction of Order	Feb 15th	Feb 16th 14 Homogeneous w/ constant coefficients
Feb 19th 15 Undetermined Coefficients	Feb 20th	Feb 21st 16 Variation of Parameters	Feb 22nd	Feb 23rd 17 Cauchy-Euler equations
Feb 26th 18 Systems of linear equations	Feb 27th	Feb 28th 19 Non-linear ODEs	Mar 1st	Mar 2nd 20 Linear Models: IVPs
Mar 5th 21 Linear Models: BVPs	Mar 6th	Mar 7th 22 Test 2 review	Mar 8th Test 2 (8:00AM)	Mar 9th 23 TBA

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Mar 12th NO CLASS (Spring Break)	Mar 13th	Mar 14th NO CLASS (Spring Break)	Mar 15th	Mar 16th NO CLASS (Spring Break)
Mar 19th 24 Power Series review	Mar 20th	Mar 21st 25 Series Solutions: Ordinary point I	Mar 22nd	Mar 23rd 26 Series Solutions: Ordinary point II
Mar 26th 27 Series Solutions: Singular point I	Mar 27th	Mar 28th 28 Series Solutions: Singular point II	Mar 29th	Mar 30th 29 Intro to matrices
Apr 2nd 30 Homogeneous Systems I	Apr 3rd	Apr 4th 31 Homogeneous Systems II	Apr 5th	Apr 6th 32 Non-homogeneous Systems I
Apr 9th 33 Non-homogeneous Systems II	Apr 10th	Apr 11th 34 Test 3 review	Apr 12th Test 3 (8:00 AM)	Apr 13th 35 Numerical Solutions I
Apr 16th 36 Numerical Solutions II	Apr 17th	Apr 18th 37 Numerical Solutions III	Apr 19th	Apr 20th 38 Fourier Series
Apr 23rd 39 Fourier Transform I	Apr 24th	Apr 25th 40 Fourier Transform II	Apr 26th	Apr 27th 41 Final Review
Apr 30th 42 Jeopardy!	May 1st	May 2nd 43	May 3rd Final Exam 5/3 at 9AM	May 4th 44