Math 212 Differential equations

Spring 2019

Instructor: Nicolas Petit, Pierce Hall 126
E-mail: nicolas.petit@emory.edu
Meeting times:
MWF 8:00-8:50 AM, Humanities 201
MWF 9:00-9:50 AM, Humanities 201
Tentative Office Hours:
Tu 3-5 PM, Wed 10-11:30 AM, Fri 2-4 PM
and by appointment.
I also have an open door policy: if my office door is open I'm happy to talk with you and answer any questions you might have. I am typically in my office between 10 and 5 PM every weekday.

Course Content and Goals: Mathematics 212 is a one-semester course in differential equations. The course will focus on ordinary differential equations (ODE), and be centered on the ability to algebraically solve ODEs and how to use them to create models of situations taken from a variety of fields. A tentative calendar of topics is provided at the end of this syllabus.

Prerequisites: Mathematics 212 requires completion of Math 112 (Calculus 2) or equivalent AP credit. Note that all the content from Calc 2 (integrals AND power series) will be extensively used throughout the term. You are strongly encouraged to do a thorough review of all the techniques of integrations before the end of the first week.

Text Material: D.G. Zill, *A First Course in Differential Equations, with Modeling Applications*, 10th edition. A copy of the book is on reserve in the library. Further resources will also be posted on Canvas.

Grading: Course grades will be determined as follows:

Classroom Participation	75 points
Homework	75 points
In-Class Quizzes	150 points
Reading Quizzes	100 points
Tests (3×100 pts)	300 points
Final Exam	200 points
Total	900 points

Letter grades will be determined based on the total points each student earns: A: at least 810 points; B: 720-809 points; C: 630-719 points; D: 540-629 points; F: fewer than 540 points. Plus and minus grades may be assigned for sums of points near cut-off values.

Class Participation: Barring emergencies or health issues, students are expected to attend class regularly. You will be assigned a participation grade, based on your attendance record and your participation in class and during our daily group work activities. Any student that regularly comes to class, is attentive, participates and generally contributes to a positive classroom atmosphere will get the full amount of points. Conversely, being excessively distracted during group work, studying other material during class or checking your phone will have negative repercussions on the participation grade.

Homework: You will be assigned daily homework from the textbook. You are expected to solve every problem and write a full solution for each of them. I will regularly collect a subset of the assigned

homework every week or so and check it for completion. If your homework is deemed "incomplete", you will have the opportunity to fix it by turning it in complete the next time homework is collected. No late homework will be accepted.

Quizzes: The class will have both reading quizzes and in-class quizzes. As part of your homework, you'll be asked to read ahead of time the sections of the book that we will cover in class; you will then often be required to complete a short reading quiz on Canvas about the section you read. These will be graded for completion; you are welcome to go over them while consulting the book, but once again no late submission will be accepted. Note that reading quizzes close at 7:30 AM on the morning they're due, so plan accordingly. I will drop roughly 10% of the reading quiz scores at the end of the term (so likely one or two). We will also every an in-class, 10-minute quiz every couple of weeks (usually every time we went over a decent chunk of material). These quizzes will be graded like problems on the exam, and are meant to ensure you're keeping up with the material. No late quizzes will be administered, and I'll drop the lowest in-class quiz score at the end of the term.

Tests: Three tests will be given throughout the semester on the 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.

Final Exam: The final exam will be given on the time assigned by the registrar and will be comprehensive. Rescheduling a final exam is rarely accommodated and must be approved by the associate dean of academic affairs.

Laptop/Cell Phone policy: While laptops and phones are not formally banned from the class (after all, some of you might like to take notes on them), if I see you being regularly distracted by your computer screen or your (not-so-sneakily hidden) cell phone it will have negative repercussions on your participation grade.

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 may 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.
- **Study Groups:** When used appropriately, study groups can be a useful tool in learning math-

ematics. 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 2019

Monday	Tuesday	Wednesday	Thursday	Friday
Jan 14th	Jan 15th	Jan 16th **1** Intro to Diffeq	Jan 17th	Jan 18th No Class
Jan 21st No Class (MLK Day Holiday) *Drop/Add Ends on Jan 23*	Jan 22nd	Jan 23rd **2** Direction Fields and Autonomous equations	Jan 24th	Jan 25th **3** Separable Equations
Jan 28th **4** Linear Equations	Jan 29th	Jan 30th **5** Exact Equations	Jan 31st	Feb 1st **6** Solving by Substitution
Feb 4th **7** Linear Models	Feb 5th	Feb 6th **8** Non-Linear Models	Feb 7th	Feb 8th **9** Modeling with Systems
Feb 11th **10** IVPs and BVPs	Feb 12th	Feb 13th **11** Reduction of Order	Feb 14th	Feb 15th **12** Homogeneous w/ constant coefficients
Feb 18th **13** Undetermined Coefficients	Feb 19th	Feb 20th **14** Test 1 wrap-up	Feb 21st **Test 1** (8:00am)	Feb 22nd **15** Variation of Parameters
Feb 25th **16** Cauchy-Euler equations	Feb 26th	Feb 27th **17** Non-linear ODEs	Feb 28th	Mar 1st **18** Free mass-spring systems
Mar 4th **19** Damped and forced mass-spring systems	Mar 5th	Mar 6th **20** Other higher-order modeling questions	Mar 7th	Mar 8th **21** Power Series review

Monday	Tuesday	Wednesday	Thursday	Friday
Mar 11th No Class (Spring Break)	Mar 12th	Mar 13th No Class (Spring Break)	Mar 14th	Mar 15th No Class (Spring Break)
Mar 18th **22** Series Solutions: Ordinary point I	Mar 19th	Mar 20th **23** Series Solutions: Ordinary point II	Mar 21st	Mar 22nd **24** Series Solutions: Singular point I
Mar 25th **25** Series Solutions: Singular point II	Mar 26th	Mar 27th **26** Test 2 review	Mar 28th **Test 2** (8:00am)	Mar 29th **27** Intro to matrices I
Apr 1st **28** Intro to matrices II	Apr 2nd	Apr 3rd **29** Homogeneous Systems I	Apr 4th	Apr 5th **30** Homogeneous Systems II
Apr 8th **31** Non-homogeneous Systems I	Apr 9th	Apr 10th **32** Non-homogeneous Systems II	Apr 11th	Apr 12th **33** Fourier series I
Apr 15th **34** Fourier series II	Apr 16th	Apr 17th **35** Separation of variables	Apr 18th	Apr 19th **36** The heat equation: standard setup
Apr 22nd **37** The heat equation: other cases	Apr 23rd	Apr 24th **38** Test 3 review	Apr 25th **Test 3** (8:00am)	Apr 26th **39** Final review
Apr 29th **40** Jeopardy!	Apr 30th Reading Day	May 1st Final exam on 5/8 9-12 PM (9AM sec) 2-5PM (8AM sec)	May 2nd	May 3rd