Math 309 Differential Equations Syllabus
Agnes Scott College, Fall 2020
Jim Wiseman, jwiseman@agnesscott.edu

The class is online, through Canvas. If you have any technology issues (wifi, Zoom, Canvas, etc.), just let me know and we'll figure out something that will work for you.

All times are Atlanta (US Eastern) time zone.

Office hours: Mon 2:30-3:30, Tues 10:00-11:30, and by appointment. On Zoom - links on Canvas.

Required material: The textbook is Blanchard, Devaney, and Hall, *Differential Equations*, 2nd ed.

Class structure: (Details and links on Canvas.) We'll be using a flipped classroom approach, in which students study the material (textbook and videos) outside of class, and we meet (on Zoom) to discuss concepts, questions, and example problems. After the first day of class, **we will meet on Zoom once weekly, on Wednesdays, 1:55-2:45 - make sure that you're ready to discuss the assigned material each week**. (Zoom class meetings will be recorded. To preserve the integrity of the classroom experience and to protect students' privacy, which we are legally required to do, only students registered in the course may attend a Zoom class meeting.) There will also be online discussion on Canvas - each week, you are required to post at least one comment, and respond to another student's comment.

Plan: We'll cover most of chapters 1-5. There's a more detailed schedule below, but it's subject to change.

Homework: By now you've probably figured out that working problems is mostly how you learn math. There will be homework assigned nearly every week, due at midnight on Wednesdays. I strongly encourage you to work in groups, but you must make sure that you understand the problem completely yourself before submitting your answer. You will turn in some of each assignment on Webwork, which you can access through Canvas. You can submit answers as many times as necessary on Webwork (up to the due date), so I expect that you'll get 100% on each assignment. Some of the assignments you do not need to turn in, but you are responsible for the material - completing only the Webwork assignments is not enough to prepare you for the exams. This is a 4-credit course. In addition to in-class time, you will be spending time outside of class on various activities. The first and most important activity is to regularly read the text and to work through and understand the examples in each section. You should try to spend time on this every day.

Proficiency tests: You will need to pass two online tests on differential equations proficiency skills, one on first order equations (chapter 2 material), and the other on second order linear equations and linear systems (chapter 3 material). Each will consist of 4 differential equations with initial values for you to solve, and you must get all 4 correct. Each test is 5% of your final grade, and no partial credit will be given. You may retake the Proficiency tests (with different problems) as many times as necessary. These must be completed by hand without help from any technology, websites, or other people.

Honor code and group work: All students are expected to follow the honor code throughout the semester; all exams and assignments should be pledged.
I strongly encourage you to work on the homework in groups. I suggest that you work on the problems by yourself first, making a note of anything giving you trouble; then meet with your group and work through the remaining problems together; and finally submit the solutions by

yourself. Every group member must submit her own solutions independently; just copying the group's answers is plagiarism and is unacceptable.

Getting help: Chances are that sooner or later you'll get stuck on something, so don't get frustrated. Think hard, and if you're still stuck, do something else for a while. (It's amazing how often that works.)
My office hours are above - these are times when I'm guaranteed to be sitting around on Zoom waiting to talk to someone. If you want to see me at other times, please let me know and we'll find a time.
Finally, I can't emphasize enough that your classmates are your best source of help.

Course goals:
Learn to
Solve differential equations graphically, numerically, and analytically, and understand which methods are appropriate for which problems
Understand and make use of differential equations in modeling the real world
Communicate mathematics effectively, both orally and in writing

Projects: There will be no exams (midterm or final). Instead, you will complete 4 group projects. There will be more information on Canvas.

Assessment: Each project 15%, each proficiency test 5%, homework 20%, weekly discussion participation 10%.

Late work: Late work won't be accepted, and you won't be allowed to make up missed exams, except under very exceptional circumstances (e.g., the sasquatch attacks - and even then you should get a note from the sasquatch). In the case of a conflict that you absolutely can't resolve (for example, a religious holiday), you may arrange to take a midterm exam early.

Attendance and participation: I expect you to be at Zoom class meeting, on time, unless you've talked to me about having to be absent for technological or other reasons. However, tardiness or absence will have no (direct) effect on your grade. Participation in the weekly discussions on Canvas is required,

Dates and deadlines:
Project #1: Fri., 9/11.
1st Order Separable/Linear proficiency test: Fri., 9/18.
Project #2: Wed., 10/7.
2nd Order Linear and Systems proficiency test: Fri., 10/30.
Project #3: Fri., 11/6.
Project #4: Mon., 11/23.

Week 1: 8/21	Introduction, modeling, separation of variables, 1.1-2
Week 2: 8/24-8/28	Slope fields, numerical methods, 1.3-4
Week 3: 8/31-9/4	Existence/uniqueness, equilibria, bifurcations 1.5-7
Week 4: 9/9-9/11	Linear equations, 1.8 **Project #1 due 9/11**
Week 5: 9/14-9/18	Systems 2.1, 2.2 **1st Order Separable/Linear proficiency test due** (online), 9/18
Week 6: 9/21-9/25	Analytic and numerical methods, 2.3-4
Week 7: 9/28-10/2	Epidemic models, linear systems, 2.1
Week 8: 10/5-10/7	Eigenvectors and solutions, 3.2 **Project #2 due 10/7**
Week 9: 10/12-10/16	Real and complex eigenvalues
Week 10: 10/19-10/23	Repeated eigenvalues, 2nd-order equations
Week 11: 10/26-10/30	Linear nonhomogeneous systems, 4.1-2 **2nd Order Linear and Systems Proficiency test due** (online), 10/30
Week 12: 11/2-11/6	Forcing and resistance, equilibrium point analysis 4.2-4, 5.1 **Project #3 due 11/6**
Week 13: 11/9-11/13	Qualitative analysis, Hamiltonian systems 5.2, 5.3
Week 14: 11/16-11/20	Chaos and the Lorenz attractor, 2.5
Week 15: 11/23	Summary/review **Project #4 due 11/23**

Course evaluation: Your feedback on the course is extremely valuable to me, the math department, and the administration. In particular, I take your comments very seriously and use them to improve the course the next time I teach it. You are responsible for completing an evaluation of the course at the end of the semester.

Title IX: For the safety of the entire community, any incidence of or information about sexual misconduct must be reported immediately to Title IX Coordinator Marti Fessenden (mfessenden@agnesscott.edu, 404-471-6547) or Deputy Title IX Coordinator Karen Gilbert (kgilbert@agnesscott.edu, 404-471-6435).

Inclusion: This course adheres to the principles of diversity and inclusion integral to the Agnes Scott community. We respect people from all backgrounds and affirm people's decisions about gender expression and identity. Please let me know your preferred name or gender pronoun if different from the class roster. The Gay Johnson McDougall Center for Global Diversity and Inclusion is centered and grounded in dismantling systems of oppression, including structural and systemic racism, as well as empowering each individual to take action that uplifts and builds community. Students can contact them at diversity@agnesscott.edu or 404.471.6118.

ADA: Agnes Scott College seeks to provide equal access to its programs, services and activities for people with various abilities. If you will need accommodations in this class, please contact the Office of Academic Advising and Accessible Education (404-471-6150) to complete the registration process. Once registered, please contact me so we can discuss the specific accommodations needed for this course.