

MATH 202 - DIFFERENTIAL EQUATIONS SYLLABUS – SPRING 2023

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Office Hours: Monday 9:40-10:30, or by appointment.

Disclaimer

We may have to revise the course plan according to the countrywide reassessment to be made regarding higher education. This is expected to happen at the beginning of April. The content to be delivered is certain but the method of course delivery, the number and dates of exams, and some other details are subject to change.

Lectures. Monday 8.40-9.30, Wednesday 14.40-16.30. synchronous, online

Zoom: <https://sabanciuniv.zoom.us/j/4650827080>

Recitations. Section A Wednesday or Section B Thursday 17.40-18.30. synchronous, online

Course Description. Differential equations are used to model the behavior of systems in the natural world, such as population growth and decay, spring-mass systems or electrical circuits, and predict how these systems will behave in the future. This course will present the basics of solving differential equations.

We will cover the topics First-order ordinary differential equations and solution methods. Direction fields, qualitative methods. First order, second-order linear and higher order ordinary differential equations. Mathematical models. Laplace transform. Linear systems.

Goals. The purpose of the course is to give knowledge of how to solve ordinary differential equations. Upon completing this course, students should understand the general theory of ordinary differential equations and the basic techniques for solving differential equations involving one unknown function and one independent variable.

Text Book. (look at SuCourse for more info on textbook!) Fundamentals of Differential Equations and Boundary Value Problems 6th edition, R. K. Nagle, E. B. Saff, A. D. Snider, Pearson Education International, 2012

Recitations. The lectures in the recitation classes will be in discussion format. In the recitations only some selected problems will be discussed. There will **not** be a review of the course material so make sure to study the lecture notes before coming to the recitations. Please follow the recitations online via zoom.

You must try the problems at the end of each section in the book.

Exams. There will be one midterm and one final exam. **It is your responsibility to be present in the exams.** The tentative date of the midterm is below. The date of the final exam will be announced by SR later.

Makeup Policy. If you miss an exam and wish to make it up, you must contact the instructor N. G. Göğüş by email, and explain your excuse as soon as possible. Only students that have contacted the instructor with a valid excuse will be contacted to arrange the terms of the exam. **If it is a health problem, you must bring a medical report, which must be given or checked by the SU Health Center within 3 days of the end date of the report.**

Academic Honesty. The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Cheating hurts our community by undermining academic integrity, creating mistrust, and fostering unfair competition. The university will punish cheaters with failure on an assignment, failure in a course, permanent transcript notation, suspension, and/or expulsion. Violations can include cheating on exams, plagiarism, reuse of assignments without permission, improper use of the Internet and electronic devices unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Ignorance of these rules is not an excuse. In this course, as in many math courses, working in groups to study particular problems and discuss theory is strongly encouraged. For more information, see the guide on the SU website (http://mysu.sabanciuniv.edu/yonerge/Akademik_durustluk/E-Investigation.html)

Attendance. Attendance to lectures and recitations is encouraged, however, it will not be followed, at least until a change in regulations of the course delivery that is expected to be in April. If you miss a class, it is your responsibility to make up the material.

Grading: There will be one midterm exam and one final exam. Formula to compute your total grade:
 $Total = 0.45 * M + 0.55 * F$

The dates of the midterm may change!

Midterm	10 May 2023	45%
Final	To be announced by SR	55%

The grading scale is **89-100 A, 84-88 A-, 79-83 B+, 74-78 B, 69-73 B-, 64-68 C+, 57-63 C, 53-56 C-, 49-52 D+, 41-48 D, and below 41 F. Plus and minus grades will be given at my discretion.**

Sec	Name of TA	Lecture Time	zoom link	Office hrs
A1	Umutcan Erdur	Wednesday 17.40-18.30	https://sabanciuniv.zoom.us/j/94144647015?pwd=WjYvTCt0cXVpM1dnUXJacHNyUGpaZz09	36
A2	Pouriya T. Ziarati	Wednesday 17.40-18.30	https://sabanciuniv.zoom.us/j/93607179202	36
A3	Ender Akpınar	Wednesday 17.40-18.30	https://sabanciuniv.zoom.us/j/5216341396	36
B1	Umutcan Erdur	Thursday 17.40-18.30	https://sabanciuniv.zoom.us/j/94144647015?pwd=WjYvTCt0cXVpM1dnUXJacHNyUGpaZz09	36
B2	Pouriya T. Ziarati	Thursday 17.40-18.30	https://sabanciuniv.zoom.us/j/93607179202	36

Course Schedule:

Weeks	Sections
1	1.1, 1.2
2	2.1, 2.2, 2.3
3	2.4, 2.5, 2.6
4	3.1, 3.2, 3.4
5	4.1, 4.2
6	4.3, 4.4
7	4.5, 4.6, 4.7
8	7.1, 7.2, 7.3, 7.4, 7.5
9	7.6, 7.7, 7.8, 7.9
10	9.1, 9.2
11	9.3
12	9.4
13	9.5
14	9.6 if time permits

Add-drop period:

Withdrawal:

Content of the exams. Roughly the following topics will be the content of the exams.

Midterm	10 May 2023 Wednesday 19.40-21.30
1.1, 1.2	Solutions of initial value problems.
2.1, 2.2, 2.3	Separable equations, linear first order equations.
2.4, 2.5, 2.6	Exact equations, integrating factors, substitutions and transformations.
3.1, 3.2, 3.4	Modeling problems involving first order differential equations, mixing problems, population models and Newtonian mechanics.
4.1, 4.2, 4.3	Mass-spring example, general solution of a homogeneous second order linear equation, auxiliary equations with complex roots.
4.4, 4.5, 4.6, 4.7	Undetermined coefficients, variation of parameters, variable-coefficient equations.
7.1, 7.2, 7.3	Laplace transform: Definition and properties.
7.4, 7.5, 7.6	Inverse Laplace transform, solving IVPs.

Final All topics above plus the following

7.7, 7.8	Convolution, Dirac Delta function.
9.1, 9.2, 9.3	Review of linear algebra.
9.4, 9.5, 9.6	Linear systems in normal form, homogeneous linear systems with constant coefficients, complex eigenvalues.
9.7, 9.8	Nonhomogeneous linear systems, matrix exponential function.

If you need extra help:

Always keep in mind that it is very natural and all right if you do not understand a concept or some thing in the lecture. I and teaching assistants are available to help. Ask questions. Benefit office hours.

- **Regular study habits are sufficient to get a decent grade.**
- **Attend the classes and recitation hours regularly.** Make sure you attend your own (registered) recitation section.
- Studying out of class for this course should become a routine. Key to success in mathematics is practice. **Solve many problems** related to each concept.
- **You are responsible from every announcement made in class or in SUCourse.** Not attending the class or not following SUCourse regularly is not an excuse, in case you miss something.
- **I am available to help.** Feel free to ask me and your TA a question in and out of class. If you cannot make it to our office hours, you should e-mail me (or your TA) ahead of time and make an appointment.

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