MATH 202 - DIFFERENTIAL EQUATIONS
SYLLABUS – SPRING 2024

Faculty: Nihat Gökhan Göğüş **Office / Phone:** FENS G051; 483 9615
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Office Hours: Monday 9:40-10:30, or by appointment.

Lectures. Monday 8.40-9.30, Wednesday 14.40-16.30. University Center G030
Recitations. Sec A Wed 16.40-17.30 Sec B Wed 17.40-18.30 Sec C Thu 17.40-18.30.

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. Make sure to study the lecture notes before coming to the recitations. You must try the problems at the end of each section in the book.

Exams. See "Grading" for details. **It is your responsibility to be present in the exams.** The tentative date of the midterm is below.

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 https://mysu.sabanciuniv.edu/surecharitasi/en

Attendance. Attendance to lectures and recitations is encouraged, however, it will not be followed. If you miss a class, it is your responsibility to make up the material.

Grading: There will be three midterm exams (100 points each) and NO final exam. The highest of the first and third midterm grade will be added to the highest of the second and third midterm grade; the sum will be divided by 2. **You must take two midterms out of three; if you take only one midterm, the corresponding grade in the formula below will be zero.** For example, if you take M3 only and you do not attend M1 and M2, one of the summands in the formula below will be zero, the other one will be the M3 grade. Formula to compute your total grade:
Total= (max{M1,M3} + max{M2,M3}) / 2

The dates of the midterms may change!

Midterm 1	23 March 2024
Midterm 2	12 May 2024
Midterm 3	25 May 2024

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**	**Office hrs**
A1	Feyza Teker	Wed 16.40-17.30	**Wednesday 11.40-12.30**
A2	Navid Paknameh	Wed 16.40-17.30	**Wednesday 18.40-19.30**
B1	Feyza Teker	Wed 17.40-18.30	**Wednesday 11.40-12.30**
B2	Navid Paknameh	Wed 17.40-18.30	**Wednesday 18.40-19.30**
C1	Feyza Teker	Thu 17.40-18.30	**Wednesday 11.40-12.30**
C2	Umutcan Erdur	Thu 17.40-18.30	**Thursday 16.30-17.30**

Tentative Course Schedule:

Weeks	**Sections**
1	1.1, 1.2, 2.1
2	2.2, 2.3, 2.4
3	2.5, 2.6 some parts omitted
4	3.1,3.2, 3.3, 3.4
5	4.1, 4.2, 4.3
6	4.4, 4.5, 4.6
7	4.7, 6.1, 6.2, 6.3
8	7.1, 7.2, 7.3, 7.4, 7.5
9	7.6, 7.7, 7.9
10	9.1, 9.2
11	9.3, 9.4
12	9.5
13	9.6
14	Review

Add-drop period: 22-23 Febr 2024
Withdrawal: 28 Mar-3 May 2024

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

Midterm I 23 March 2024 Saturday 15.30-17.30
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, 3.3, 3.4 Modeling problems involving first order differential equations, radioactive decay, 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.

Midterm II 12 May 2024 Sunday 12.00-14.00
4.4, 4.5, 4.6, 4.7 Undetermined coefficients, variation of parameters, variable-coefficient equations.
6.1, 6.2, 6.3 Higher order differential equations
7.1, 7.2, 7.3 Laplace transform: Definition and properties.
7.4, 7.5, 7.6 Inverse Laplace transform, solving IVPs.
7.7 Convolution.

Midterm III 25 May Saturday 10.00-12.00
All topics above plus the following
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.

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.