

**SABANCI UNIVERSITY**  
**MATH 322/574 PARTIAL DIFFERENTIAL EQUATIONS**  
**SPRING 2021-2022**

*This syllabus may be subject to update and change.*

**Instructor:** Nilay Duruk Mutlubaş

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**Office Hours:** Thursdays 13.40-14.30. Otherwise, make an appointment by e-mail. In both cases will be held online via Zoom.

**Lectures:**

Day / Time	Classroom
Monday 12.40-13.30	Online
Thursday 14.40-16.30	Online

*You can find the Zoom links for lectures on SUCourse+. In order to have access to them, you must be logged in with your Sabancı account.*

**Attendance:** Students are expected to attend all class meetings on time. Even though attendance is not compulsory keep in mind that you will not be able to learn the lecture entirely and have a high grade unless you attend the classes properly.

**You are responsible for 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.**

**Textbook:**

“Partial Differential Equations: An Introduction”, Walter A. Strauss.

**Recommended Textbooks:**

“A First Course in Partial Differential Equations”, H.F. Weinberger and all “Partial Differential Equations” books in the library.

**Condensed guideline of the present syllabus:**

- Read this syllabus from top to bottom.
- Check that you have a Zoom account using your sabanciuniv.edu address.
- Follow the announcements on SUCourse+.
- Attend the lectures via Zoom.
- Keep your webcam on, for better interaction.
- Prepare for the Midterm and the Final exams.
- Take advantage of the Office Hours, to ask your questions.

**Course Objective:** Students who completed this course are expected to learn basic partial differential equations and obtain a "feel" that will help to understand more complex problems.

### Course Content

Classification, the concept of a well-posed problem. Initial and boundary value problems. Fourier series. The heat equation, the wave equation and the Laplace equation.

### Course Description:

This course covers the following subjects which can be found in chapters 1, 2, 3, 4, 5, 6 of the textbook:

- i. Introduction to partial differential equations;
- ii. Waves and diffusions;
- iii. Reflections and sources;
- iv. Boundary problems;
- v. Fourier series;
- vi. Harmonic functions.

### Learning Outcomes

- i. Understand the basic types of problems PDE deals with.
- ii. Differentiate types of PDE's (hyperbolic, parabolic, etc).
- iii. Solve the basic equations.
- iv. Apply basic techniques of PDE to similar problems.
- v. Use and understand the usage of Fourier series.
- vi. Understand (have a feel of) text dealing with more complicated equations.

### Exams:

- There will be **one** midterm exam and **one** final exam. Exam subjects will be announced for each during the class hours before the exam. These are tests performed in person on campus.
- During the exams, the use of books, notes, electronic devices (including cell phones, smart watches, calculators, computers etc.), or any other kind of supporting learning material is NOT allowed. A student violating this rule will receive 0 points for that exam.
- However weeks of the midterm exams are announced in the tentative schedule, it may change according to special situations. The university will later announce the final exam date. The final may be given on any day between 11/06/2022 and 23/06/2022. Student Resources will determine the dates and times for all final exams, and instructors cannot change it. So, do not plan to leave Istanbul before 23/06/2022.
- Unless you have a serious excuse, such as health problem, it is not allowed to make up any exam. In such a case, you must contact the instructor Nilay Duruk Mutlubaş **as soon as possible** and explain your situation. If it is a health problem you need to bring a medical report, that must be given or checked by SU Health Center within 3 days of the date of the report. Make-up for the midterm or the final will be at the end of the semester (after the finals period). Only students that had contacted the instructor with

a valid excuse will be informed about the time and format. The make-up exam will contain all topics and counted for only one of the missed exams. If a student miss both (Final and Midterm) exams even with a valid excuse, then (s)he will be allowed to take make-up for Final exam only and receive 0 (zero) point for Midterm exam.

### **Grading:**

- Midterm Exam : %30
- Final Exam: %30
- Homeworks: %40

### **NA Policy:**

Students missing both the midterm and the final exams, without a valid excuse, will receive NA if they also miss the make-up. In general, if you will have serious issues preventing you from regularly following the course, you are required to contact Nilay Duruk Mutlubaş. Please see also Class Discipline below.

### **Academic Integrity:**

All university policies on academic integrity apply to our course, and they will be enforced. (more information on <http://www.sabanciuniv.edu/en/academic-integrity-statement>). In general, to ensure Academic Integrity, any student might be asked to validate any activity contributing to their grade in an interview via Zoom (recorded, with audio and video). A student failing to explain the submitted work, or refusing/missing the interview, will receive zero from that work. In particular, no form of cheating is welcome in the exams such as copying whole or part of each other's answers, using cheat-sheets etc. The action against such violations could range from getting a zero on the particular assignment to explaining the case in front of the Disciplinary Committee.

### **Class Discipline:**

It is our responsibility to provide students with excellent teaching and learning environments. We are therefore asking you to respect both our responsibility to teach and the right of other students to learn. Any action that disturbs your classmates or disrupts the online activities is unacceptable. Repeated violations of the above rules may cause a student to be counted as absent for a lecture. Attention must be taken regarding COVID-19 spread prevention. Students attending exams in classes must comply with the rules listed at <https://mysu.sabanciuniv.edu/en/covid-19-rules>, especially those regarding "OPEN AND CLOSED AREAS". The maximum capacity of the classrooms will always be respected and students are required to correctly wear a mask and sit only in the designated seats at all time.

### **Registration Overrides**

Time conflict requests will be accepted if you do not exceed one hour. However, any and all negative outcomes that may result are solely the student's responsibility.

**GOOD LUCK ☺**

## Tentative Weekly Schedule

<b>Week</b>	<b>Topic</b>
1	First order linear PDEs
2	Well-posed problems
3	Classification of second-order linear PDEs
4	Waves and reflections
5	Waves and reflections
6	Diffusions, comparison of waves and diffusions, sources
7	Diffusions, comparison of waves and diffusions, sources
8	<b>Midterm Exam (21.04.2022)</b>
9	Boundary Problems: Separation of Variables
10	Fourier Series; orthogonality, expansions, convergence
11	<b>May 19th Holiday</b>
12	Solution of basic boundary value problems by Fourier Series
13	Laplace equation, maximum principle
14	Poisson's formula