

MATH 675: Partial Differential Equations *Spring 2021 Graduate Course Syllabus*

NJIT Academic Integrity Code: All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description: This course is intended to provide a modern introduction to the theory of partial differential equations, based on the notion of weak solutions and to develop existence and regularity theory for several prototypical examples. Specifically, first order PDEs, as well as second order elliptic, parabolic and hyperbolic PDEs will be discussed within appropriate functional settings.

Number of Credits: 3

Prerequisites: **Math 690** or departmental approval.

Course-Section and Instructors

Course-Section	Instructor
Math 675-002	Professor C. Turc

Office Hours for All Math Instructors: [Spring 2021 Office Hours and Emails](#)

Required Textbooks:

Title	<i>Partial Differential Equations</i>
Author	L. C. Evans
Edition	2nd Ed.
Publisher	AMS
ISBN #	0-821849743

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 5, 2021**. It will be strictly enforced.

POLICIES

DMS Course Policies: All DMS students must familiarize themselves with, and adhere to, the **Department of Mathematical Sciences Course Policies**, in addition to official **university-wide policies**. DMS takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

Homework	30%
Midterm Exam	30%
Final Exam	40%

Attendance Policy: Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the **Math Department's Attendance Policy**. This policy will be strictly enforced.

Homework Policy: Homework problems will be assigned and collected bi- weekly.

Exams: There will be one midterm exam held in class during the semester and one comprehensive final exam. Exams are held on the following days:

Midterm Exam	TBA
Final Exam Period	May 7 - 13, 2021

The final exam will test your knowledge of all the course material taught in the entire course. Make sure you read and fully understand the **Math Department's Examination Policy**. This policy will be strictly enforced.

Makeup Exam Policy: To properly report your absence from a midterm or final exam, please review and follow the required steps under the DMS Examination Policy found here:

- http://math.njit.edu/students/policies_exam.php

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times.

ADDITIONAL RESOURCES

Accommodation of Disabilities: The Office of Accessibility Resources and Services (OARS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director of Office of Accessibility Resources and Services at **973-596-5417** or via email at lyles@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and Services authorizing your accommodations will be required.

For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Office of Accessibility Resources and Services (OARS) website at:

- <https://www.njit.edu/studentssuccess/accessibility/>

Important Dates (See: **Spring 2021 Academic Calendar, Registrar**)

Date	Day	Event
January 19, 2021	T	First Day of Classes
January 23, 2021	S	Saturday Classes Begin
January 25, 2021	M	Last Day to Add/Drop Classes

March 14 - March 21, 2021	Su - Su	Spring Recess - No Classes
April, 2, 2021	F	Good Friday - No Classes
April 5, 2021	M	Last Day to Withdraw
May 4, 2021	T	Friday Classes Meet
May 4, 2021	T	Last Day of Classes
May 5 & May 6, 2021	W & R	Reading Days
May 7 - May 13, 2021	F - R	Final Exam Period

Course Outline

Title	Topics
1	Representation formulas for solutions: Laplace's equation, heat equation, wave equation
2	Sobolev spaces: weak derivatives, definition of Sobolev spaces, traces, Sobolev embeddings, Poincaré's inequality
3	Second-order elliptic equations: weak solutions, Lax-Milgram theorem, energy estimates, Fredholm alternative, regularity of solutions, maximum principles, eigenvalues and eigenfunctions
4	Second-order parabolic equations: existence of weak solutions, regularity, maximum principles
5	Second-order hyperbolic equations: existence of weak solutions, regularity, propagation of singularities
6	Calculus of variations: Euler-Lagrange equations

*Updated by Professor C. Turc - 1/10/2021
Department of Mathematical Sciences Course Syllabus, Spring 2021*