NJIT New Jersey's Science & Technology University

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 608: Partial Differential Equations for Finance
Spring 2017 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 presents the subject of partial differential equations (PDE's) with a strong emphasis on the PDE's arising in the study of stochastic processes and finance. The focus is on analytical and numerical methods for obtaining solutions in a form useful for solving problems in financial engineering. Topics include modeling with PDE's, classification of PDE's, analytical and numerical methods for PDE's and application to finance. Effective From: Fall 2009

Number of Credits: 3

Prerequisites: Departmental Approval.

Course-Section and Instructors

Course-Section	Instructor
Math 608-102	Professor J. Luke

Office Hours for All Math Instructors: Spring 2017 Office Hours and Emails

Required Textbooks:

Title	*Introduction to Partial Differential Equations with Applications*
Author	E.C Zachmanoglou and Dale W. Thoe
Edition	---
Publisher	Dover
ISBN #	0-486-65251-3

University-wide Withdrawal Date:The last day to withdraw with a **W** is **Monday, March 27, 2017**. It will be strictly enforced.

LEARNING OBJECTIVES

In this course, students will:

- learn properties of and solution methods (including numerical methods) for PDEs arising in financial modeling,
- understand how PDEs are used to analyze stochastic processes that model financial markets,
- utilize analytical and numerical methods to monitor and manage a simulated portfolio

N.B. Implementation of numerical methods are an essential part of this course. Students should be prepared to spend a significant amount of time designing, writing and testing code to implement the various numerical methods discussed.

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:

Weekly Homework	40%
Midterm Exam	30%
Final Exam	30%

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.

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

Midterm Exam	March 20, 2017
Final Exam Period	May 5 - 11, 0217

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: Disability Support Services (DSS) 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 Disability Support Services at 973-596-5417 or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260. For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Disability Support Services (DSS) website at:

- http://www5.njit.edu/studentsuccess/disability-support-services/http://www5.njit.edu/studentsuccess/disability-support-services/">

Important Dates (See: Spring 2017 Academic Calendar, Registrar)

Date	Day	Event
January 17, 2017	T	First Day of Classes
January 23, 2017	M	Last Day to Add/Drop Classes
March 12 - 19, 2017	Su - Su	Spring Recess - No Classes - University Open
March 27, 2017	M	Last Day to Withdraw
April 14, 2017	F	Good Friday - No Classes - University Closed
May 2, 2017	T	Friday Classes Meet - Last Day of Classes
May 3 & 4, 2017	W & R	Reading Days
May 5 - 11, 2017	F - R	Final Exam Period

Course Outline

Week	Date	Topic
1	1/23	First-order ODEs: Analytical and Numerical Methods
2	1/30	Second-order Linear ODEs: Analytical and Numerical Methods
3	2/6	First-order PDEs: Analytical Methods
4	2/13	First-order PDEs: Numerical Methods
5	2/20	Brownian Motion and the Heat Equation
6	2/27	Numerical Methods for the Heat Equation
7	3/6	The Fokker-Planck Equation
8	3/20	**MIDTERM EXAM**
9	3/27	Black-Scholes Equation I
10	4/3	Black-Scholes Equation II
11	4/10	Black-Scholes Equation III
12	4/17	Managing Risk I
13	4/24	Managing Risk II
14	5/1	Project Review
15	5/8	Project Presentations

Updated by Professor J. Luke - 1/13/2017
Department of Mathematical Sciences Course Syllabus, Spring 2017