**MATH 4344 – 01I and 02I (Boundary Value Problem)**

**Syllabus for SPRING 2020**

**Classroom**: E-ENGR BUILDING 1.262, and B-SABAL HALL #96 2.110

**Time:** Monday & Wednesday 12:30 pm - 1:45 pm

**Instructor:**

Dr. Zhijun (George) Qiao

*Office: MAGC 3.722, Phone: 665-3406 (W), Email:* *zhijun.qiao@utrgv.edu*

Webpage: <http://faculty.utrgv.edu/zhijun.qiao> (**Online notes are available** at Dr. Qiao’s website)

**Office hours**: M, W 2:15pm – 3:30pm or by appointment.

**Prerequisite:**

A student must have completed and passed Differential Equation (Math 3349) with a grade C or better. In particular, you will need to know how to solve basic first order differential equations (linear and/or separable) and second order linear equations with constant coefficients. The student not meeting this requirement may be asked to drop the course.

**Textbook:** Required textbook: *Partial Differential Equations for Scientists and Engineers*, by *Stanley J. Farlow*, Dover Publications, Inc, ISBN-13: 978-0486676203  ISBN-10: 048667620X  Edition: Reprint

**Topics:** Introduction of PDEs, Diffusion-type Problems, Hyperbolic-type Problems, Elliptic-type Problems, Separation of Variables, Fourier Integrals, and Boundary Value Problems. See sections selected in Chapters 2, 3, 4, 5, 6, 7 and 9.

**Calculators and Other Electronic Equipment**: A basic scientific or graphing calculator will be recommended/needed for some of the homework and exam problems. Other electronic equipment such as pocket organizers, handheld or laptop computers, electronic writing pads or pen-input devices, and phones will not be permitted during any in-class exams.

Please make sure that cell phones and other noise-making equipment are turned off during class.

**Daily supplies:**  You need to bring Textbook, Notebook, Loose leaf paper, Graph paper, Pen, Pencil etc to the class.

**Course Objectives & Content:** The purpose of this course is to present an introduction to the theory and application of partial differential equations, with emphasis on those equations that result in a type of problem called a *boundary value problem*. Topics will include the derivation, solution, and analysis of the heat equation, wave equation, and Laplace's equation, as well as solution techniques such as Fourier series and integral transforms. The material covered and approximate time spent on each topic is

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| --- | --- |
| 0.5 week | Introduction to partial differential equations |
| 3 weeks | Diffusion-type problems |
| 3 weeks | Fourier series and boundary value problems |
| 2 weeks | Integral transform techniques |
| 3 weeks | Hyperbolic-type problems (vibrating strings, beams, and drums) |
| 2 weeks | Elliptic-type problems |
| 1.5 weeks | Numerical methods |

**Student Learning Outcomes:** After completing this course students will

* Know how to classify partial differential equations (PDEs), how to solve some typical linear PDEs, and why PDEs are useful in physics, mechanics, and other nonlinear sciences.
* Correctly apply the standard methods to solve heat equations, including separation of variables, transformations, integral transforms, Fourier series and Fourier transform, Laplace transform, and Duhamel’s principle.
* Correctly apply the standard methods to solve wave equations, including D’Alembert solutions, setting boundary and initial conditions, finite Fourier transforms, superposition, method of characteristics, conservation equations, and reducing wave equation in polar coordinates.
* Correctly deal with boundary value problems, Dirichlet problems with spherical harmonics and Green functions for elliptic-type problems.
* Be able to apply basic mathematical PDEs’ skill to deal with physical and engineering model problems.

**General Grade Policy**

**Homework and Quizzes – Quizzes and Homework –** Homework assignment is assigned daily through the Webwork, and will consist of problems from the textbook and occasional handout. Quizzes and Tests are based on the homework problems. A quiz will be taken every two weeks. It is strongly recommended that students work all those homework problems since quiz and test score are used to determine your grade. Completing the assignments is the ***single most important part*** of this course. You will be expected to spend, on average, about 4 hours each week to complete the assignments. The assigned problems will be graded automatically through webwork system. They will form the basis for quizzes and the mid-term and final exams. No late re-quiz will be accepted.

**Tests –** there will be three one-hour in-class tests. All tests must be taken during their scheduled times. The test time will be announced in advance (basically, a test will be given every two chapters), and a short review will be given before each test. All students must show their work on the tests. Score will be provided to you separately. No re-test opportunities.

**Final Exam –** The comprehensive final exam (it may be a take-home test) is scheduled on **Wednesday May 6 10:15 AM-12:00 PM**. All students must take the final exam on the scheduled time. A summary review will be given in the class before the final exam.

**Grading –** The course grade will be based on

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| Best 10 of the weekly HW/Quizzes at 10 pts each | 100 pts |
| Test 1  | 100 pts |
| Test 2  | 100 pts |
| Test 3  | 100 pts |
| Comprehensive Final Exam | 100 pts |
| Total | 500 pts |

The course grade will be assigned according to a scale no higher than A(90-100%), B(80-89%), C(70-79%), D(60-69%), F(below 60%).

**Some important dates for Spring 2020 include:**

January 13 First day of classes

January 16 Last day to add a course or register for Spring 2020

January 20 Martin Luther King Jr. Holiday – NO classes

March 9-14 Spring Break – NO classes

April 9 Last day to drop a course; will count toward the 6-drop rule

April 10-11 Easter Holiday – NO classes

April 30 Study Day – NO classes

May 1-7 Final Exams

May 7 Spring classes end; Official last day of the term

May 8-9 Commencement Exercises

**UTRGV Policy Statements**

**STUDENTS WITH DISABILITIES:**

Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive academic accommodations should contact **Student Accessibility Services (SAS)** for additional information. In order for accommodation requests to be considered for approval, the student is responsible for providing sufficient documentation of the disability to SAS and participating in an interactive discussion with SAS staff. Accommodations may be requested at any time but are not retroactive. Please contact SAS early in the semester/module for guidance. Students who experience a broken bone, severe injury, or undergo surgery may also be eligible for temporary accommodations.

**Pregnancy, Pregnancy-related, and Parenting Accommodations**

Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting (reasonably immediate postpartum period) are encouraged to contact Student Accessibility Services for additional information and to request accommodations.

**Student Accessibility Services:**

**Brownsville Campus**: Student Accessibility Services is located in 1.107 in the Music and Learning Center building (BMSLC) and can be contacted by phone at (956) 882-7374 or via email at ability@utrgv.edu.

**Edinburg Campus:** Student Accessibility Services is located in 108 University Center (EUCTR) and can be contacted by phone at (956) 665-7005 or via email at ability@utrgv.edu.

**MANDATORY COURSE EVALUATION PERIOD:**

Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (<http://my.utrgv.edu>); you will be contacted through email with further instructions. Students who complete their evaluations will have priority access to their grades. Online evaluations will be available on or about:

Module 1 Feb 19-25, 2020

Module 2 Feb 15-21, 2020

Full Spring Semester April 10-29, 2020

**ATTENDANCE:**

Students are expected to attend all scheduled classes and may be dropped from the course for excessive absences. UTRGV’s attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics; for observance of religious holy days; or for military service. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

**SCHOLASTIC DISHONESTY:**

As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarism (including self-plagiarism), and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regulations, STU 02-100, and UTRGV Academic Integrity Guidelines). **All scholastic dishonesty incidents will be reported to Student Rights and Responsibilities.**

**SEXUAL MISCONDUCT and MANDATORY REPORTING:**

In accordance with UT System regulations, your instructor is a “Responsible Employee” for reporting purposes under Title IX regulations and so must report to the Office of Institutional Equity & Diversity (oie@utrgv.edu) any instance, occurring during a student’s time in college, of sexual misconduct, which includes sexual assault, stalking, dating violence, domestic violence, and sexual harassment, about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at [www.utrgv.edu/equity](https://nam01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.utrgv.edu%2Fequity&data=02%7C01%7Cmarissa.alaniz%40utrgv.edu%7Ccdba6e51db19402b2a0f08d7062784d4%7C990436a687df491c91249afa91f88827%7C0%7C0%7C636984639122459545&sdata=5hndVru5iLHMQARX2XhtCu41F8pbn0A6sKxkK1lXYss%3D&reserved=0), including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect that is free from sexual misconduct, discrimination, and all forms of violence. If students, faculty, or staff would like confidential assistance, or have questions, they can contact OVAVP (Office for Victim Advocacy & Violence Prevention) at (956) 665-8287, (956) 882-8282, or OVAVP@utrgv.edu.

**COURSE DROPS:**

According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the “3-peat rule” and the “6-drop” rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.

**STUDENT SERVICES:**

Students who demonstrate financial need have a variety of options when it comes to paying for college costs, such as scholarships, grants, loans and work-study. Students should visit the Students Services Center (U Central) for additional information. U Central is located in BMAIN 1.100 (Brownsville) or ESSBL 1.145 (Edinburg) or can be reached by email (ucentral@utrgv.edu) or telephone: (888) 882-4026. In addition to financial aid, U Central can assist students with registration and admissions.

Students seeking academic help in their studies can use university resources in addition to an instructor’s office hours. University Resources include the Advising Center, Career Center, Counseling Center, Learning Center, and Writing Center. The centers provide services such as tutoring, writing help, counseling services, critical thinking, study skills, degree planning, and student employment. In addition, services such as the Food Pantry are also provided. Locations are listed below.

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| **Center Name** | **Brownsville Campus** | **Edinburg Campus** |
| **Advising Center**AcademicAdvising@utrgv.edu  | BMAIN 1.400(956) 665-7120 | ESWKH 101(956) 665-7120 |
| **Career Center**CareerCenter@utrgv.edu  | BCRTZ 129(956) 882-5627 | ESSBL 2.101(956) 665-2243 |
| **Counseling Center**Counseling@utrgv.edu [Counseling and Related Services List](https://www.utrgv.edu/facultysuccess/_files/documents/syllabus-statement-for-counseling-12-16-19.pdf) | BSTUN 2.10(956) 882-3897 | EUCTR 109(956) 665-2574 |
| **Food Pantry**FoodPantry@utrgv.edu  | BCAVL 101 & 102(956) 882-7126 | EUCTR 114(956) 665-3663 |
| **Learning Center**LearningCenter@utrgv.edu | BMSLC 2.118(956) 882-8208 | ELCTR 100(956) 665-2585 |
| **Writing Center**WC@utrgv.edu  | BUBLB 3.206(956) 882-7065 | ESTAC 3.119(956) 665-2538 |

Math 4344 Homework Assignments

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