The University of Texas Rio Grande Valley

# MATH 4346 Integral Transforms
## Syllabus

## Course Information

MON, TUE, WED, THU, FRI 04:45 PM 06:15 PM Edinburg EMAGC 1.208 Hybrid
This course is delivered in a hybrid way.

## Instructor Information

Zhijun Qiao
**Email:** zhijun.qiao@utrgv.edu
Office Location
EMAGC 3.722 or Zoom https://utrgv.zoom.us/j/2824166420) or by appointment.
**Office Hours:** M & W 3:30pm-4:30pm
Welcome to MATH 4346 – 01R: Integral Transforms! My name is Zhijun (George) Qiao and I will be your instructor for this course. The course syllabus was already uploaded to the Brightspace. Please check the syllabus window. Here is my brief information:

Email: zhijun.qiao@utrgv.edu  Webpage: http://faculty.utrgv.edu/zhijun.qiao

Office: EMAGC 3.722  Phone: 6653406

Office Hours: M & W 3:30pm-4:30pm (via Zoom at https://utrgv.zoom.us/j/2824166420) or by appointment.

BIO: Dr. Zhijun Qiao, President's Endowed Professor, University of Texas Rio Grande Valley. Dr. Qiao received PhD degree of Mathematics 1997 from Fudan University. His research interests include nonlinear partial differential equations, integrable systems and nonlinear cusp solitary waves, KdV equations and soliton theory, integrable symplectic mapping, R-matrix theory, radar image processing and inverse problems in mathematical physics. In 1999, he won one of the hundred best doctoral dissertations in all natural and social sciences in China. From 1999 to 2001, he was Humboldt fellow in Kassel University, Germany. He was awarded the University of Texas Distinguished Research Award in 2013 and the University of Texas President's Endowed Professor in 2016. Dr. Qiao was awarded a Fulbright Specialist in 2023. Dr. Qiao was the PI of more than 20 national and international research grants. He published more than 150 academic papers and 2 books including top ranking journals Communications in Mathematical Physics, IEEE Transaction on Geoscience and Remote Sensing (TGRS). He is currently serving on the editorial board of Studies in Applied Mathematics and editor-in-chief of Journal of Nonlinear Mathematical Physics. He advised more than 40 graduate students doing master thesis and doctoral dissertation. See more details at https://faculty.utrgv.edu/zhijun.qiao/

## Course Description

This course is an introduction to transform analysis based on the theory of Fourier and Laplace integrals. Topics include contour integration, inverse formulas, convolution methods, with application to mathematical analysis, differential equations and linear systems. Prerequisites: MATH 2415 and either MATH 3341 or MATH 2321, both with a grade of 'C' or better.

**Credit Hours:** 3

**Core Curriculum Component Area:**

## Tentative Calendar of Activities

Textbook: Required textbook:

1. An Introduction to Integral Transforms, 1st Edition, by Baidyanath Patra, Copyright 2018, ISBN 9781138588035, 428 Pages 7 B/W Illustrations, Published February 12, 2018 by CRC Press
2. Fourier Series and Integral Transforms, 1st Edition, by Allan Pinkus & Samy Zafrany, Cambridge University Press, 1997, https://www.cambridge.org/core/terms.

https://doi.org/10.1017/CBO9781139173117

Instructor will provide a free pdf version for the chapter needed.

Topics: Fourier Transform, Fourier Sine and Cosine Transforms, Laplace Transform, and Their Applications.

Software: Students are encouraged to use math software such as Maple or MATLAB to verify some results or do some calculations.

## Brightspace Assignments

| Due Date | Assignment | Type | Points |
|---|---|---|---|
| 7/20/26 | Student Introductions | Discussion | 2 |
| 7/24/26 | Quiz 1 | Test | 10 |
| 8/3/26 | Project 1 | Discussion | 75 |
| 8/4/26 | Mid-Term Test | Test | 100 |
| 8/18/26 | Final Review + Quiz 2 | Test | 10 |
| 8/19/26 | Project 2 | Discussion | 75 |

| Due Date | Assignment | Type | Points |
|---|---|---|---|
| 8/20/26 | HW 1-5 | Homework | 30 |
| 8/21/26 | Final Exam | Test | 100 |

## Program Learning Objectives

Objective:

This course is an introduction to transform analysis based on the theory of Fourier and Laplace integrals. Topics include contour integration, inverse formulas, convolution methods, with applications to mathematical analysis, differential equations, and linear systems.

Student Learning Outcomes: After completing this course students will be able to

1. Understand the intellectual structure of integral transforms and its major theorems, definitions, axioms, and problems.
2. Understand the definitions, axioms, major theorems and properties underlying the Fourier transform, Laplace transform, and other integral transforms.
3. Apply the concepts of integral transforms to solve problems in which their use is fundamental to obtaining and understanding the solution.
4. Apply integral transforms to solve ordinary differential equations, partial differential equations, difference equations.
5. Write mathematics in a precise, effective, and understandable way.

## Learning Objective for Core Curriculum Requirements

N/A

## Course Learning Objectives

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5. Write mathematics in a precise, effective, and understandable way.

## Assessment of Learning

General Grade Policy

Homework and Projects – Homework assignment is assigned daily and will consist of problems and reading from the textbook and occasional handout. Projects are based on the homework problems. A project will be taken two weeks, namely, ~ 3 times in the whole semester. Projects will be designed in two formats: each student gives presentation based on the homework, and the other is to solve some physical problems I will assign. It is strongly recommended that students work all those

homework problems since projects score are used to determine your project 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 not be collected or graded, but they will form the basis for projects, midterm exams, and the final exam. I will select your best 2 of your project scores in final grade. A homework assignment sheet will be delivered to everybody on the 1st day class. No late re-project will be accepted.

Tests – There will be one one-hour test. All test problems must be taken during their scheduled times. The test time will be announced in advance (basically, a test will be given every two topics or chapters), and a brief 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 has been scheduled on 8/21/2026, Friday 6:00pm -7:45pm. 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 Components**

Grading – The course grade will be based on

1. HW, Quizzes, Discussion Board, 50 points
2. Best 2 out of 3 projects at 75 pts each, total150 pts for projects
3. Midterm Test 100 pts
4. Comprehensive Final Exam 100pts

Total 400pts

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%).

Grading Scale

| Letter | Numerical Value |
|---|---|
| A | 360 - 400 |
| B | 320 - 359 |
| C | 280 - 319 |
| D | 240 - 279 |
| F | Below 240 |

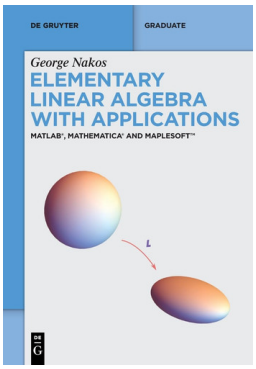
## Required Readings and Materials


**Fourier Series and Integral Transforms**
**ISBN:** 9781139173117
**Authors:** Allan Pinkus, Samy Zafrany
**Publisher:** Cambridge University Press
**Publication Date:** 2012

## Recommended Readings and Materials

**1. An Introduction to Integral Transforms**
**ISBN:** 9781138588035

## Technology Needs




**Elementary Linear Algebra with Applications MATLAB®, Mathematica® and Maplesoft(tm)**

https://www.maplesoft.com/

## University Attendance Policy

UTRGV's attendance policy

## Course Attendance

Course Attendance is mandatory.

## University Policy on Recordings in Class

The use of classroom recordings is governed by the Federal Educational Rights and Privacy Act (FERPA), UTRGV's acceptable-use policy, and UTRGV HOP Policy STU 02-100 Student Conduct and Discipline. A recording of class sessions will be kept and stored by UTRGV, in accordance with FERPA and UTRGV policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community- based learning partners with whom we may engage during a class session. You may not share recordings outside of this course. As referenced in UTRGV HOP Policy STU 02-100 Student Conduct and Discipline, doing so may result in disciplinary action. This is an instruction from university officials.

## Course Use of Artificial Intelligence (AI)

Students are encouraged to use AI to understand the math problems, including homework problems, but not allowed to use on any quizzes/tests.

## University Academic Integrity Statement

Academic integrity is fundamental in our actions, as any act of dishonesty conflicts as much with academic achievement as with the values of honesty and integrity. Violations of academic integrity constitute academic dishonesty and include, but are 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 (UT System Board of Regents Rules and Regulations, UTRGV Handbook of Operating Procedures STU 02-100, and UTRGV Academic Integrity Guidelines). **All violations of Academic Dishonesty will be reported to Student Rights and Responsibilities in accordance with HOP STU 02-100, Student Code of Conduct.**

## Course Academic Integrity Policy

SCHOLASTIC INTEGRITY:

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, 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 and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

## Student Support Resources

Student Support Services

| Center Name | E-Mail |
|---|---|
| Advising Center | AcademicAdvising@utrgv.edu |
| Career Center | CareerCenter@utrgv.edu |
| Counseling Center | Counseling@utrgv.edu |
| Food Pantry | FoodPantry@utrgv.edu |
| Learning Center | LearningCenter@utrgv.edu |

| Center Name | E-Mail |
|---|---|
| University Library | circulation@utrgv.edu |
| Writing Center | WC@utrgv.edu |
| UCentral | ucentral@utrgv.edu |
| Brightspace Assistance (COLTT) | Ticket Portal |

## University Policy Statements

### SEXUAL MISCONDUCT AND MANDATORY REPORTING

In accordance with UT System and institutional policies, your instructor is a "Responsible Employee" for mandatory reporting purposes under Title IX regulations and Texas Education Code sections 51.251-252 and must report any instance of sexual misconduct by or against a student or employee of the institution, which includes sexual assault, stalking, dating violence, domestic violence, and sexual harassment to the Office of Title IX and Equal Opportunity (otixeo@utrgv.edu). More information can be found on the OTIXEO website. If students, faculty, or staff would like confidential assistance, or have questions, they can contact OAVP (Office for Advocacy & Violence Prevention).

### STUDENT ACCESSIBILITY SERVICES

Student Accessibility Services has offices on Brownsville and Edinburg campuses. Visit the SAS web page to learn more and explore accessibility services.

### STUDENTS WITH DISABILITIES

Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive reasonable academic accommodations should contact Student Accessibility Services (SAS) for additional information. The student must apply for accommodations using the mySAS portal and is responsible for providing sufficient documentation of the disability to SAS. Upon submission of the request, students should expect to participate in an interactive discussion, or an intake appointment, with

SAS staff. Accommodations may be requested at any time but are not granted retroactively, meaning they are valid moving forward after approval by SAS. Academic accommodations will not apply prior to SAS' approval. Students should 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. Please contact Student Accessibility Services (SAS) for more information.

## PREGNANCY, PREGNANCY-RELATED, AND PARENTING ACCOMMODATIONS

Title IX of the Education Amendments of 1972 prohibits discrimination based on sex, which includes discrimination based on pregnancy, marital status, or parental status.

Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting should submit the request using the form found at Pregnancy and Parenting | UTRGV.

## MANDATORY COURSE EVALUATION PERIOD

Students have the opportunity to complete an ONLINE evaluation of this course through Watermark Course Evaluations and Surveys, which may be accessed through my.UTRGV or the Brightspace course module. Course evaluations are used by the instructor to inform revisions of the course to ensure student success. Course evaluations are also used by the instructor for annual performance review, promotion applications, teaching award applications, among others.