

Course No & Title: MATH 6375.90L, Numerical Analysis	Instructor: Dambaru Bhatta
Term: Summer-II 2021	Phone: (956) 207-9156
Zoom Meeting time & ID: M-F: 3:00-4:30pm.	Email: dambaru.bhatta@utrgv.edu
Course Modality: Online Synchronous Course (OSYNC)	Office Hrs: MT:4:30-5:00pm

Zoom Link and zoom meeting ID

will be provided before the semester starts (during the first week of July).

WELCOME & INTRODUCTION TO COURSE MODALITY STATEMENT

Online Synchronous Courses: These courses will be delivered fully online. There will be a designated class meeting time for real-time instructor/student interaction, which will be conducted remotely via online platforms from the safety of your home. This real-time interaction may be supplemented by asynchronous video lectures and the digital presentation of course content. If this is the case it may mean a proportional reduction in number of synchronous class meetings. Your instructor will provide the details in the course syllabus. Your instructors will provide you with feedback on assigned work, communicate with you electronically, and be available to meet with you as defined on this syllabus.

COURSE DESCRIPTION, PREREQUISITES & MODE OF LEARNING

This course provides a fundamental introduction to numerical techniques used in mathematics, computer science, physical sciences and engineering. The course covers basic theory on classical fundamental topics in numerical analysis such as: computer arithmetic, approximation theory, numerical differentiation and integrations, solution of linear and nonlinear algebraic systems, numerical solution of ordinary differential equations and error analysis of the above mentioned topics. Connections are made to contemporary research in mathematics and its applications to the real world.

Prerequisite: MATH 2318 Linear Algebra and 2415 Calculus III with grades of "C" or better; and computer programming; or consent of instructor.

COVID-19 RESOURCES:

Please visit the [UTRGV COVID-19 Website](#) via the following link for the most up-to-date information and resources.

UTRGV VACCINE PORTAL

UTRGV Students are now eligible to receive the COVID-19 Vaccine. Students may access and complete their vaccine profile via the [UTRGV Vaccine Portal](#). For additional information on the COVID-19 Vaccine, please visit the [UTRGV COVID-19 Website](#).

Course Coverage:

- Computer Arithmetic
- Preliminaries (Review of Calculus, Matrix Algebra, Vector and Matrix Norms)
- Root Finding for Nonlinear Equations
- Numerical Solutions of Linear System of equations, Preconditioning
- Interpolation
- Approximations of functions
- Numerical Differentiations and Integrations
- Numerical Ordinary Differential Equations
- Numerical Partial Differential Equations

Student Learning Outcomes: After completing this course students will

- Understand the basic computer arithmetic.
- Familiar with the basic methods such as the Newton's method in finding the roots of nonlinear equations.
- Lagrange and Newton's interpolations and other optimal polynomial interpolations.

- Numerical integrations such as the Trapezoid, Simpson's Rules, and the Gaussian Quadrature Formulas.
- Solve the systems of linear equations by using the Gaussian elimination method and some iterative methods.
- Understand the concept of approximating functions and be able to approximate the functions by using the spline functions from the first degree splines to the cubic splines.
- Solve the initial value problems of ordinary differential equations by using the Taylor series methods and the Runge-Kutta methods.
- Solve boundary value problems of partial differential equations numerically.

Standards & Assessment:

These SLOs will be assessed based on your demonstrated mastery of each objective on homework, exams and project work according to the weights listed in the next section. Mastery of each technique means showing various steps precisely with full justification, using all necessary symbols, derivations and computations to explain your work.

Textbook: Class notes will be provided. Textbooks for Reference:

1. Numerical Analysis by Timothy Sauer.
2. Numerical Mathematics and Computing by Cheney and Kincaid.
3. An Introduction to Numerical Analysis by Kendall E. Atkinson.
4. Applied Numerical Methods for Engineers and Scientists by S. S. Rao.
5. Numerical Analysis by Burden and Faires.

GRADING POLICIES:

There will be a project and two tests, one comprehensive final through zoom at scheduled times.

Exam	Points
Test-1	25%
Test-2	25%
Project	20%
Final	30%

Grade Scale: **A:** 90-100% **B:** 80-89% **C:** 70-79% **D:** 60-69% **F:** below 60%.

BLACKBOARD SUPPORT

If you need assistance with course technology at any time, please contact the [Center for Online Learning and Teaching Technology \(COLTT\)](#).

Campus:	Brownsville	Edinburg
Location:	Casa Bella (BCASA) 613	Education Complex (EEDUC) 2.202
Phone:	956-882-6792	956-665-5327

Toll Free: 1-866-654-4555

Office Hours: Monday - Friday, 7:30 a.m. - 6:00 p.m.

Support Tickets Submit a Support Case via our [Ask COLTT Portal](#)

24/7 Blackboard Support

Need Blackboard assistance after hours? You can call our main office numbers, 956-882-6792 or 956-665-5327, to speak with a support representative.

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; have been provided such an accommodation by Student Accessibility Services (SAS); 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.

Makeup Work: Students are encouraged to begin working on the module material as soon as one becomes available. Leaving work for the end of the week, or the last few hours is highly discouraged. Internet interruption or technological issues in the last hours may prevent students from completing assignments by the deadline. Only students with documented excuse (doctor's excuse, work schedule conflict that cannot be changed, etc.) may be given a chance to make up a missed assignment. Students must notify the instructor ahead of time, provide the excuse, and be ready to submit the work within a limited time if the instructor accepts the excuse. There will be no makeup test for missed tests. **If someone misses a test and has valid excuse for the same then the final exam percentage will be the percentage score for the test missed.**

Use of Recording:

The use of recordings will enable you to have access to class lectures, group discussions, etc. in the event you have to miss a synchronous or face to face class meeting due to illness or other extenuating circumstance. Our use of such technology 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.** Doing so may result in disciplinary action under UTRGV HOP Policy STU 02-100 Student Conduct and Discipline.

ACADEMIC INTEGRITY:

Members of the UTRGV community uphold the Vaquero Honor Code's shared values of honesty, integrity and mutual respect in our interactions and relationships. In this regard, 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 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 (Board of Regents Rules and Regulations, STU 02-100, and UTRGV Academic Integrity Guidelines). **All violations of Academic Integrity will be reported to Student Rights and Responsibilities through Vaqueros Report It.**

UTRGV POLICY STATEMENTS

The UTRGV disability accommodation, mandatory course evaluation statement and sexual misconduct statement are required on all syllabi. Additional policy statements are optional, such as those covering attendance, academic integrity, and course drop policies.

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. In order for accommodation requests to be considered for approval, the student must apply using the *mySAS* portal located at www.utrgv.edu/mySAS and is responsible for providing sufficient documentation of the disability to SAS. Students are required to participate in an interactive discussion, or an intake appointment, with SAS staff. Accommodations may be requested at any time but are not retroactive, meaning they are valid once approved by SAS. 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) should submit the request using the form found at <https://www.utrgv.edu/pregnancy> for review by **Student Accessibility Services**.

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 encouraged 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:

Summer Module 1	June 23-29, 2021
Summer I	June 28- July 5, 2021
Summer II	August 7-12, 2021
Summer Module 2	August 12-18, 2021

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 (OIED@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, 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 (drop) 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 Student 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.

Center Name	Brownsville Campus	Edinburg Campus
Advising Center AcademicAdvising@utrgv.edu	BMAIN 1.400 (956) 665-7120	ESWKH 101A (956) 665-7120
Career Center CareerCenter@utrgv.edu	BINAB 1.105 (956) 882-5627	ESSBL 2.101 (956) 665-2243
Counseling Center Counseling@utrgv.edu	BSTUN 2.10 (956) 882-3897	EUCTR 109 (956) 665-2574

Center Name	Brownsville Campus	Edinburg Campus
<u>Mental Health Counseling and Related Services List</u>		
Food Pantry <u>FoodPantry@utrgv.edu</u>	BCAVL 101 & 102 (956) 882-7126	EUCTR 114 (956) 665-3663
Learning Center <u>LearningCenter@utrgv.edu</u>	BMSLC 2.118 (956) 882-8208	ELCTR 100 (956) 665-2585
Writing Center <u>WC@utrgv.edu</u>	BUBLB 3.206 (956) 882-7065	ESTAC 3.119 (956) 665-2538

CALENDAR OF ACTIVITIES (Tentative):

Day	Topic	Assignments
July 8, 9, 12	Basics, Computer Arithmetic, Polynomials	HW
July 13, 14, 15	Matrices, Vectors, Norms, Review of Calculus	HW
July 16, 19, 20	Convergence, Solving Equations, Bisection, Fixed Point, Newton's & Secant Methods	HW/Test-1
July 21, 22, 23, 26	System of Equations, Gaussian Elimination, LU Decomposition, CG Method	HW
July 27, 28, 29, 30	Iterative Methods, Error Analysis, Tridiagonal System, Interpolation, Preconditioning	HW
Aug 2, 3, 4	Polynomial Approximations, Numerical Differentiation (ordinary and partial)	HW/Test-2
Aug 5, 6, 9, 10	Numerical Integration, Gaussian Quadrature, Multiple Integrals, Numerical ODE	HW/Project
Aug 11, 13	Numerical PDE	Final

Be sure to include important dates relative to the academic calendar. The UTRGV academic calendar can be found at <https://my.utrgv.edu/home> at the bottom of the screen, *prior to login*. Some important dates for Summer-II 2021 include:

July 8	First day of classes.
July 9	Last day to add a class or register for Summer II 2021 classes.
Aug. 4	Last day to drop a class or withdraw.
Aug. 12	Study Day – NO classes
Aug. 13	Final Exams
Aug. 16	Grades Due at 3 p.m.

DEAN OF STUDENTS RESOURCES:

The Dean of Students office assists students when they experience a challenge with an administrative process, unexpected situation such as an illness, accident, or family situation, and aids in resolving complaints. Additionally, the office helps to advocate on behalf of students and inform students about their rights and responsibilities as well as serving as a resource and support for faculty and campus departments.

Vaqueros Report It allows students, staff and faculty a way to report concern about the well-being of a student, seek assistance in resolving a complaint, or report allegations of behaviors contrary to community standards or campus policies.

The Dean of Students can also be reached by emailing dos@utrgv.edu or visiting Virtual Office hours in which a representative is available Monday-Friday 9:00-11:00 a.m. and 1:00-4:00 p.m.