

Office of Academic Affairs
Tarleton State University
Master Course Syllabus Outline

Department: Mathematics, Physics & Engineering

Course Prefix/Number: MATH 560-3 now 5360

Official Course Title: Numerical Analysis

Master Syllabus Approved by Department on: ___10___/ ___1___/ ___2007___/
Month day year

- I. Catalog Description: An advanced study of numerical analysis. Topics will be selected from linear systems, approximation theory, numerical differential and integral equations, integration theory.
- II. Prerequisites: MATH 360 (now 3360)
- III. Expanded Course Description: MATH 560 provides students with an in-depth knowledge of how to obtain and analyze approximate solutions to problems arising in the areas of science, engineering and mathematics. Areas of study will be selected from linear systems, approximation theory, numerical differential and integral equations, integration theory. Students will compare the accuracy of different techniques for a given problems and analyze the error in the approximations. Emphasis will be placed on depth of understanding in selected areas as opposed to breadth over many areas.
- IV. Intended Student Outcomes: Upon successfully completing MATH 560, students should be able to do the following:
 - a. Communicate sources of error in approximation techniques.
 - b. Demonstrate an understanding of the derivation of and motivation for selected approximation techniques.
 - c. Choose an appropriate technique for a given problem and apply the technique successfully.
 - d. Critically interpret the results of the approximation technique and discuss the accuracy of the results.
- V. Unless otherwise stipulated in this master syllabus by the department, the following items are subject to faculty discretion as described in each faculty member's individual course outline/syllabus:
 - a) Course Requirements
 - b) Required Text(s)
 - c) Bibliography

MATH 5360 - Numerical Analysis
Summer 2015

Instructor: Dr. Peter W. White

Phone #: 254-968-1982

Math Office #: 254-968-9168

Office: MATH 331

e-mail: white@tarleton.edu

Office Hours: MTWRF 9-9:50 a.m., or by appointment.

University Policy: Students are responsible for knowing and abiding by the policies and information contained in the Tarleton Student Handbook. [TSUSH]

Student Responsibilities: The student is *solely* responsible for:

- Completing each assignment by the specified due date.
- Obtaining assignments and other materials for classes from which they are absent.
- Utilizing, as needed, all available study-aid options (including meeting with the instructor, purchasing a students solutions manual, referring to outside texts, etc.) to resolve any questions that they might have regarding homework, course material, and/or technology projects.
- Giving as much of an effort as it takes to pass this course.

Academic Conduct: Students guilty of academic dishonesty, cheating, or plagiarism in academic work shall be subject to disciplinary action. [TSUSH] The instructor may initiate disciplinary action in any case of academic misconduct.

Services for Students with Disabilities: *It is the policy of Tarleton State University to comply with the Americans with Disabilities Act and other applicable laws. If you are a student with a disability seeking accommodations for this course, please contact the Center for Access and Academic Testing, at 254.968.9400 or caat@tarleton.edu. The office is located in Math 201. More information can be found at www.tarleton.edu/caat or in the University Catalog.*

Absence Policy: Class absence policies will be established and enforced by each individual course instructor. The course instructor may recommend to the Dean of Students that a student be dropped from a course if excessive absences prevent satisfactory progress. [TSUSH]

Makeup Policy: Each course instructor has the responsibility and authority to determine if work can be made-up because of absences. [TSUSH] Students may request make-up considerations for valid and verifiable reasons such as the following:

- Illness
- Death in the immediate family
- Legal proceedings
- Participation in sponsored University activities (It is the responsibility of students who participate in University-sponsored activities to obtain a written explanation for their absence from the faculty/staff member who is responsible for the activity.)

Drop Policy: A student who withdraws from a course before the thirteenth class day of a regular semester or before the fifth class day in a summer term receives no grade, and the course will not be listed on that student's permanent record. A student who withdraws from a course before the end of the tenth week of a regular semester or the fourteenth class day of a summer term receives a grade of W. [TSUCAT]

Calculator Policy: Students may be allowed to use an approved graphing calculator when taking this course. During the administration of a test, the use of calculators may be restricted, at the discretion of the instructor. Students may also be restricted to the use of a calculator that does not have course notes stored in the memory. The instructor reserves the right to examine and delete material from the memory of a student's calculator before approving its use on an exam.

Text: Suggested: "Numerical Analysis" by Burden & Faires, 10th edition. We will use class notes and web resources for the material covered.

Homework Policy: Exercises from the instructor will be assigned and due-dates will be given in class or via the web.

Quizzes: Not likely, but possible if deemed necessary by the instructor.

Projects: Implementation of numerical methods using MATLAB or approved computer language will be assigned.

Exams: There will be two exams, one at midterm and a final exam. The final exam is scheduled for the last day of class.

Calculator Policy: Could be helpful on homework and exams. TI-83 or higher recommended.

Attendance Policy: This course meets only three days a week for eight weeks. While attendance is not mandatory, it is strongly recommended. The student will be held responsible for any material/assignments given in class.

Grading Policy: Homework and projects: 60%. Midterm exam: 20%. Final exam: 20%. A student is expected to successfully complete at least 90% of the collected material to earn an A grade for the course, 80% for a B, 70% for a C, 55% for a D.

Notes:

- In the event that the university is closed for a scheduled class time, whatever was scheduled for that day and/or whatever was due that day will be scheduled and/or due on the next scheduled class time.
- You are expected to present a TSU ID upon request.

- All items contained in this syllabus are subject to change as the semester progresses. Students will be notified in advance of any changes.

Course Outline:

- Mathematical Preliminaries and Error Analysis
 - Review of Prerequisite Mathematics
 - Round-off Errors and Computer Arithmetic
 - Algorithms and Convergence
 - Introduction of Matlab
- Approximating Solutions of Linear Systems
 - Linear Systems of Equations
 - Elimination and Pivoting Strategies
 - Matrix Inversion
 - Determinants
 - Matrix Factorization
 - Norms of Vectors and Matrices
 - Eigenvalues and Eigenvectors
- Approximation Theory
 - Discrete Least Squares Approximation
 - Orthogonal Polynomials and Least Squares Approximation
 - Rational Function Approximations
 - Fast Fourier Transforms
- Approximating Solutions of Nonlinear Systems of Equations
 - Fixed Points
 - Newton's Method
 - Quasi-Newton Methods
 - Steepest Descent Techniques