

Course Change Request

New Course Proposal

Date Submitted: 01/26/26 10:42 am

Viewing: **MATH 546 : Numerical Analysis I**

Last edit: 03/06/26 11:26 am

Changes proposed by: esander

Programs referencing this course

[SC-MS-MATH: Mathematics, MS](#)

In Workflow

1. **MATH Chair**
2. **SC Curriculum Committee**
3. SC Assistant Dean
4. Assoc Provost-Graduate
5. Registrar-Courses
6. Banner

Approval Path

1. 01/28/26 10:55 pm
Maria Emelianenko (memelian):
Approved for MATH Chair

Are you completing this form on someone else's behalf?

No

Effective Term: Fall 2026

Subject Code: MATH - Mathematics

Course Number: 546

Bundled Courses:

Is this course replacing another course? No

Equivalent Courses:

Catalog Title: Numerical Analysis I

Banner Title: Numerical Analysis I

Will section titles vary by semester? No

Credits: 3

Schedule Type: Lecture

Hours of Lecture or Seminar per week: 3

Repeatable:

May only be taken once for credit (NR)

GRADUATE ONLY

Default Grade Mode: Graduate Regular

Recommended Prerequisite(s):

Math 203 and CS 112, or equivalents

Recommended Corequisite(s):

Required Prerequisite(s) / Corequisite(s) (Updates only):

Graduate-level students

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(Course/Test Code	Min Grade/Score	Academic Level)	Concurrency?

Registration Restrictions (Updates only):

Registrar's Office Use Only - Registration Restrictions:

Field(s) of Study:

Class(es):

Level(s):

Degree(s):

School(s):

Catalog Description:

This course introduces students to the mathematical foundations of scientific computing, as well as the design and implementation of algorithms for the solution of scientific and engineering problems. Topics include: Convergence, complexity and error propagation. Floating point representation and computer arithmetic, methods of solution of nonlinear equations, direct and iterative solution of linear systems, data fitting through interpolation, polynomial approximation, and least squares.

Justification:

What: Creating a new course.

Why: This course will be cross listed with Math 446. Design and implementation of algorithms for the solution of scientific and engineering problems. Emphasis will be placed on the written and graphical presentation of solutions.

Does this course cover material which crosses into another department? No

Learning Outcomes:

Will this course be scheduled as a cross-level cross listed section? Yes

Please use the **Additional Attachments** button to attach two syllabi for review, one undergraduate and one graduate, preferably as separate documents. These should be provided in order to demonstrate the difference in expectations and assessments for undergraduates and graduates taking the course.

Attach Syllabus

[Math546Syllabus_Mar6.pdf](#)

Additional Attachments

[446Syll.pdf](#)

Staffing:

Tim Sauer, Tyrus Berry, Evelyn Sander, Rayanne Luke, Dan Anderson, Harbir Antil

Relationship to Existing Programs:

This course will be cross listed with Math 446. Students in this course will have additional expectations on homework and exams. Enrollment in this course is not permitted for undergraduate students. This course is part of a proposed change to our MS program.

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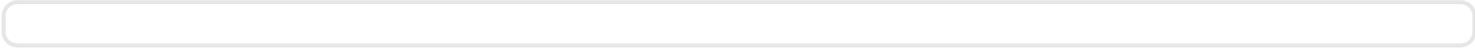
Have you reached out to the Libraries to determine whether there are adequate resources to support your course? If not, please email Meg Meiman, Associate University Librarian for Learning, Research, and Engagement at mmeiman2@gmu.edu.

No

Additional Comments:

This course is part of a proposed change to our MS program.

Reviewer Comments



Key: 19207

Math 546: Numerical Analysis I, Advanced knowledge level

Course Modality:	In person or online
Course Website:	Canvas
Credits:	3
Prerequisite:	Grade of C or better in MATH 203 and CS 112 (or equivalent)
Restrictions on registration:	Undergraduates cannot enroll in this class

Course Description

Significant figures, round-off errors, iterative methods of solution of nonlinear equations of a single variable, solutions of linear systems, iterative techniques in matrix algebra, interpolation and polynomial approximation.

Learning Outcomes

Students are expected to learn the definitions and properties of the following: Design and implementation of algorithms for the solution of scientific and engineering problems. Emphasis will be placed on the written and graphical presentation of solutions.

Advanced knowledge level: This graduate course is taught at a more advanced level than the undergraduate version of the material. Students will meet the following learning objectives beyond the scope of the undergraduate version of the course:

Students will be expected to examine the concepts at a high level, using independence of thought and sophisticated reasoning.

Students will be expected to apply the knowledge of the course to novel situations, integrating the concepts over multiple reasoning steps.

Students are expected to engage in deep connections between the different aspects of the topics covered, and to make observations regarding the overall framework of the field.

Students will be expected to solve problem sets with some different problems that are at a more advanced level, and to give solutions with higher degree of mathematical sophistication than is expected of undergraduates.

Some or all exam problems will cover more advanced material and require more independent reasoning, drawing on a student's ability to make deep mathematical connections.

Course Topics

The course will cover the following topics

- Weeks 1-3: The solution of nonlinear equations in one variable
- Week 4-5: Floating point arithmetic
- Weeks 6-8: The solution of systems of linear equations
- Weeks 9-10: The solution of nonlinear systems
- Weeks 11-12: Interpolation and polynomial approximation
- Week 13: Curve-fitting; cubic and Bezier splines
- Week 14: Least squares problems

Course Textbook

Optional Text: Numerical Analysis by T. Sauer, THIRD EDITION, Pearson 2018

Technology: This course will either use Matlab or Python, depending on the instructor. Both are available for download for no cost for GMU students.

Course Policies

Grading: Grading is based on the following:

Canvas Quizzes (20 pts. each) weekly

Final Exam (50 pts.)

Computational Projects (20 pts. each) There will be 6 throughout the semester

AI Tools: The use of Artificial Intelligence tools for the solution of the computer projects is not allowed. All submitted solutions should be solely the work of the student.

Grades in the course will be based on your INDIVIDUAL effort on the quizzes, exams and projects. Discussion of course topics with others is helpful and encouraged; however, all work toward the solution of quizzes, exams, and Python projects submitted for credit, including computer code and written summaries, must be done SOLELY by you. Do not attempt to use ChatGPT or its cousins; it is instantly recognizable to your instructor.

Grading scale:

A, A- : 80 - 100

B, B+ : 70 - 79

C : 60-69

F : Below

Late Assignments: In case of illness, please contact the instructor to set up a plan for make-up work. Late assignments will not be accepted unless due to emergency, illness, quarantine, work-related, or other documented reasons.

Class assignments: The student is responsible for reading the assigned sections of the text and viewing the assigned videos by the due date. There will be a Weekly Quiz, which should be completed by Monday (midnight) of the corresponding week. In addition, a number of Computational Projects will be assigned that are due usually one week after assignment.

Course Logistics

Content distribution: The course uses Canvas for distributing lecture materials and links to the homework assignments. Canvas can be accessed by visiting <https://canvas.gmu.edu/> and logging in with your Mason ID and password.

Communication: This course uses Canvas for announcements to distribute class updates, and Mason e-mail to communicate with students. If you wish, please share your name and gender pronouns with me and how best to address you in class and via email. My pronouns are given in Canvas, and you may address me by my title in email and verbally. Communication over email is largely preferred, and I will respond to student emails promptly within 24 hours.

Course Technology Requirements

Technical Help: If you have difficulty with accessing Canvas, please contact the ITS Support Center at (703) 993-8870 or support@gmu.edu. If you have trouble with using the features in Canvas, email courses@gmu.edu.

Other Details

Disability Statement

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Resources at 703.993.2474. All academic accommodations must be arranged through that office.

Honor Code

The University Honor Code is to be followed at all times. Sharing information of any kind about exams or quizzes is prohibited. Any violations will be sent to the Honor Committee and will result in a grade of zero. See the University Honor Code.

It is not an Honor Code violation a priori to use GPT or other AI, and you may find it useful to chat with a computer about many aspects of the course. You are strongly discouraged from asking an AI to answer the questions on the problem set. You will fail the exams and quizzes if you don't come up with your own solutions and exercise the part of your creative mind that figures things out. You need to "own" what you know.

AI Honor Code Violations: Do not use AIs such as ChatGPT, Gemini, Claude, Grok, etc. It is an honor code violation to have an AI do any part of your homework, quizzes, or other graded work, even if you ask it to "explain" what it does before you copy in the answer.

AI Use Policy

Using AI to "help" with homework, quizzes, or other graded work is a violation of the Honor Code.

Getting Help

Come to Office Hours!

Student Responsibilities

1. Students must use their Mason email account to receive important University information, including communications related to this class. Per University policy, I will not respond to messages sent from or send messages to a non-Mason email address.
2. It is expected that each student will conduct himself or herself within the guidelines of the Honor Code. All academic work should be done with the level of honesty and integrity that this University demands.

3. You are responsible for the accuracy of your own schedule. Check Patriot Web regularly to verify that you are registered for the classes that you think you are. A student who is not registered may not continue to attend class. Faculty are not permitted to grade work of students who do not appear on the official class roster. You are responsible for knowing the last days to drop and add this class.
4. Once the add and drop deadlines have passed, instructors do not have the authority to approve any requests from students to add or drop/withdraw late. It is NOT permissible to drop the class and leave it at that. It needs approval. Late adds (up until the last day of classes) must be reviewed and approved by the department chair of the course being offered. They will be approved only in the case of a documented university error (such as a problem with Financial Aid being processed). All student requests for withdrawals and retroactive adds (after the last day of classes) must be reviewed by the student's academic dean.
5. Once final grades have been recorded, instructors cannot accept any work to change that course grade. Grade changes can only be approved when they are due to a calculation or recording error on the part of the instructor.
6. An IN (incomplete) grade is a very special grade that can only be applied for in writing. It can only be given in cases in which a student is passing a course and has a very limited amount of work left to complete the course.
7. Federal law (a law known as FERPA) requires the protection of privacy of student information. Therefore, no instructor on campus can speak about a student's record with anyone other than the student. The record includes how a student is doing in a course, whether a student has attended class, information about grades, whether a paper has been turned in. Anything. This prohibition includes parents, siblings, and spouses, anyone. This course adheres to the common course policies set by George Mason University, which includes polices about Academic Standards, Accommodations for Students with Disabilities, FERPA, and Title IX. These policies are described in more detail at the following link:
<https://stearnscenter.gmu.edu/home/gmu-common-course-policies/> .