

MATH 6702 MATHEMATICAL METHODS OF APPLIED SCIENCES II

GEORGIA TECH EUROPE

COURSE SYLLABUS

Updated - 5 November 2025

(The syllabus may be updated during the semester, depending on the flow of the course.)

Welcome to Mathematical methods of applied sciences 2!

*All of our students play an important role in our educational mission.
Mathematics provides efficient and powerful tools for Sciences and
Engineering. Enjoy learning these at GT!*



1. Course Description

Course Title: Mathematical Methods of Applied Sciences II

Course Meeting Times: Mondays & Wednesdays, 11:00 - 12:15 (Green room)

2. Instructor Information

Instructor: Pr. Salah MEHDI

Office: TBC

Office Hours: Mondays & Wednesday (10:00 - 11:00), or by appointment

E-mail: salah.mehdi@univ-lorraine.fr & smehdi32@gatech.edu

Webpage: <https://mehdi.perso.math.cnrs.fr/index.html>

3. Textbook

Mathematical Methods in the Physical Sciences, 3rd edition, by Mary L. Boas. Wiley. ISBN-139780471198260.
The GT Bookstore has online, hard cover, and soft cover editions available.

4. Assessments & Information

Assessments: Tests (quizzes and midterms) will be returned in class. Two assessments to take home.

Information: Announcements and course-related documents will be posted on Canvas.

5. Prerequisites

A great deal of tools from calculus, including trigonometry, complex numbers, functions, differentiation, integration and partial fraction decomposition, will be used extensively. Topics from linear algebra are also supposed to be well understood, these include: row reduction, linear combinations, and linear independence. The codes for prerequisites are (from GT course official website): MATH 6701 or MATH 2403, and one of MATH 2406, MATH 4305.

6. Grades

Final grades will be calculated using whichever of the following weights yields the highest grade.

Assessment	Weight 1	Weight 2
Home assessments (x2)	10%	10%
Quizzes (x3)	20%	20%
Midterm	40%	30%
Final Exam	30%	40%

Letter grades will be determined based on the usual intervals. **A:** 90% and higher, **B:** [80%, 90%), **C:** [70%, 80%), **D:** [60%, 70%), **F:** [0%, 60%). For example, a final grade of 89.99% is converted into a B, a final grade of 79.99% is converted into a C, and so on. Any changes to these intervals would only be made after the final exam.

There will be two assessments to take home, four quizzes in class, one midterm exam in class and a final exam. Only the best three quizzes will be kept for the calculation of the final grade. Homework will be assigned as suggested problems, but will not be collected nor graded. Some of these problems will be discussed in class.

7. Learning Outcomes and Topics

Learning outcomes (or learning **objectives**) are statements that articulate what students are expected to do in a course. The learning outcomes for this course include the following.

- **Solve** PDE, using basic tools involved in linear algebra, complex analysis and differential equations.
- **Compute** explicit solutions of fundamental PDE such as Laplace, Heat and Wave equation.
- **Use** maximum principle, Huyghen's principle, boundary conditions.
- **Analyze** a problem and find the adequate technique to solve it.
- **Understand** the meaning of a well-posed problem, of a parabolic or hyperbolic problem.
- **Write** logical progressions of precise mathematical statements to justify and communicate your reasoning.

Topics covered include multidimensional calculus, potential problems, Laplace's equation, Heat equation, wave equation, Huyghen's principle, maximum principle. Topic outline:

- Basic technics for certain differential equations.
- Potential problems, Laplace's equation, Dirichlet and Neumann problems, maximum principle, Green's identities, variational problems.
- Parabolic problems, heat equation, boundary and initial conditions, fundamental solution, Duhamel's principle.
- Hyperbolic problems, characteristics, wave equation, Huyghen's principle.
- Multidimensional calculus, curves and surfaces, gradient, divergence, curl, Stockes theorem, well-posed problems, classification of PDE.

8. Expectations

8.1 Students

Students are expected to attend lectures and recitations and behave at all times in a respectful manner to their instructor, teaching assistants, and fellow students. Students are expected to study the subject matter outside of class time, review this syllabus, review their graded work in a timely manner for potential marking errors and to review where mistakes were made (if any), and ask for help when needed. Students are responsible for obtaining any announcements or materials sent by email, communicated orally in class or posted on Canvas.

8.2 Teaching Assistants (TAs), if applicable

TAs are responsible for facilitating learning activities during recitations, holding office hours, marking, and responding to questions from students via email and during office hours and recitations.

8.3 Instructor

As your instructor, my role is to facilitate interactive lectures, coordinate with teaching assistants to grade student work and facilitate learning activities, provide students with assessments that both develop and measure their understanding and knowledge of the subject matter, provide feedback on their performance, provide solutions to midterm, and be available for assistance when requested.

9. Preparing for Tests

Practice materials and additional office hours will be offered prior to each test. Depending on your goals, you may need to complete additional work beyond homework, worksheets, and practice materials to adequately prepare for them.

10. Homework, Participation, Assessments to take home, Tests Policies

10.1 Homework

Homework are assigned exercises (not necessarily from the textbook) and will not be collected. You are expected to understand all homework problems for all quizzes, midterms and the exam. In order to increase the effectiveness of lectures, you should attempt problems before lectures.

10.2 Assessments to take home

There will be two assessments to take home. Students will be allowed to return common work, provided they contribute equally to solutions.

10.3 Participation

The purpose of participation activities is to encourage participation and active learning, foster community among students, offer feedback to the instructor on student understanding and course activities, and help students become more aware of their level of understanding of course material. Participation activities will be held during lecture and recitation sessions. Participation activities will not be held in the first and last weeks of the course, and will only be graded for completion (not for accuracy). Participation activities could include activities such as individual problem solving, practice quizzes, group work activities, and surveys.

10.4 Midterm Schedule and Topics

We will have a 50 or 55-minutes midterm. Tentative date is on the last page of the syllabus. Topics to be covered in the midterm will be announced in class and posted on Canvas.

10.5 Midterm and Final Exam Procedures

10.5.1 Tests Procedures

- Books, notes, cell phones, and calculators are not allowed during tests.
- Students may have something to write with and an eraser when taking tests.
- Unless students are asked to use a particular method or theorem, they are allowed to use any approach to solve any problem they are given on any test.
- Unless indicated otherwise, students must adequately justify their reasoning for full marks.
- Marks can be taken off in a test for not using the correct notation.
- The tests are comprehensive.
- Students who are unable to take any test for any reason are responsible for notifying their instructor prior to the exam and as soon as possible.
- Tests will be returned to students in class.

10.5.2 Additional Final Exam Procedures

Students take their final exam in the room where they have lectures (as per institute policy). The duration, date, and time of the final exam for local students is listed on the registrar website: <http://www.registrar.gatech.edu/registration/exams.php> Note that the schedule of the final exam is non negotiable.

10.5.3 Re-grade Requests for Tests

- 1) If any of your work has been graded in error, you should contact your **instructor** as soon as possible.
- 2) Teaching assistants are not permitted to handle re-grade requests.
- 3) Should you wish to have your work re-graded, do not change or add to the work on your paper.
- 4) A re-grade request can only be submitted if you did something correct that was marked as incorrect.
- 5) Re-grade requests **must be requested within two weeks** after the work has been returned to you.
- 6) You must check your answers with the solutions before submitting such a request.
- 7) To submit a re-grade request, you must send your instructor an email from your GT email account that contains your first and last name, the midterm you are referring to, the question(s) you are referring to, and a description of what was graded incorrectly.

11. Illnesses, Emergencies, Absences

Students who will miss a midterm or final exam due to a university-sponsored event or athletics should provide their instructor with the official documentation in advance. Any student who misses a test, with reasonable explanation, can write a make-up. Students must notify their instructor as soon as they can to make necessary arrangements.

12. Re-Scheduled/Missed Exams

NO MAKE-UP EXAMS! In general, no make-up exams will be given and any missed exam results in a "0" score.

- If you have a valid reason to request a make-up exam, please contact Dr. Mehdi or the TA as early as possible. Only extraordinary cases will be considered.
- In the case of illness and emergency, please contact the Office of Dean of Students immediately. The Dean's office will verify the case, determine the severity of the problem, and then interact with the instructor if necessary.
- Requests for student organization excused absences must be made no later than two weeks prior to the date of the event. No late requests will be honored. Please have your advisor send me a written notice or an e-mail.
- Students who are absent because of participation in a particular religious observance will be permitted to make up the work missed during their absence with no late penalty, provided the student informs Dr. Mehdi of the upcoming absence, in writing, within the first two weeks of class, and provided the student makes up the missed material within the timeframe established by the course instructor.
- If you have off campus interviews for jobs or graduate/professional schools on the test dates, please contact me as early as possible with a supporting document.

13. Class Policies

13.1 Attendance

In the event of an absence, you are responsible for all missed materials, assignments, and any additional announcements or schedule changes given in class. Class disruptions of ANY kind will NOT be tolerated and may result in your removal from the classroom. Please show courtesy to your fellow classmates and instructor by adhering to the following class rules.

- Come to class on time and stay for the entire class period.
- Refrain from conversing with your fellow students while the instructor is lecturing.
- Put away any reading materials unrelated to the course.
- Please, refrain from using laptops and do not bring food to eat during lectures, they are a distraction to others.

13.2 Academic Dishonesty

All students are expected to comply with the Georgia Tech Honor Code (see <http://www.policylibrary.gatech.edu/student-affairs/code-conduct>). Any evidence of cheating or other violations of the Georgia Tech Honor Code will be submitted directly to the Dean of Students. Cheating includes, but is not limited to the following.

Using a calculator, cell phone, books, or any form of notes on exams.

Copying directly from **any** source during an exam, including friends, classmates, or a solutions manual.

Allowing another person to copy your work. Taking a test using someone else's name, or having someone else take a test in your name.

Asking for a re-grade of a paper that has been altered from its original form.

Using someone else's name to gain participation points for them, or to take tests for them, or asking someone else to use your identity for any graded or participation submission.

13.3 Students with Disabilities and/or in need of Special Accommodations

Georgia Tech complies with the regulations of the Americans with Disabilities Act of 1990 and offers accommodations to students with disabilities. If you are in need of classroom or testing accommodations, please make an appointment with the ADAPTS office to discuss the appropriate procedures. More information is available on their website, <http://www.adapts.gatech.edu>

14. Campus-Wide Dates (TBC)

1st day of class: January 14

Spring break: February 23-March 1

Easter Monday: April 6

Reading day: April 29

Course registration deadline: January 16

Bank Holiday: April 3

Last instructional class: April 27

Final exams: April 30 - May 7

For further information on campus-wide dates see <http://www.registrar.gatech.edu/calendar>

The date and time of the final exam is scheduled by the registrar.

For **final exam schedules**, see <http://www.registrar.gatech.edu/students/exams.php>.

15. TENTATIVE SCHEDULE (TBC)

Please use this as an approximate class schedule. Section coverage may change depending on the flow of the course.

Week and Dates	Topics Coverage in Lecture	Tests in class	Assessments to take home
Week 1	Basic tools for certain DE		
Week 2	Basic tools for certain DE		
Week 3	Basic tools for certain DE	Quiz 1	
Week 4	Laplace transform of DE & IVP		
Week 5	Laplace transform of DE & IVP	Quiz 2	
Week 6	Laplace & Fourier transforms		
Spring Break Feb 23 - March 1			
Week 7	Fourier transform and inverse Fourier transform		Home assessment 1 due
Week 8	Fourier transform and inverse Fourier transform	Midterm	
Week 9	Picard approximation, Peano theorem		
Week 10	Dependence on the initial data, continuity theorem, strong continuity theorem, existence theorem	Quiz 3	
Week 11	classification of order 2 PDE (hyperbolic, parabolic, elliptic)		
Week 12	classification of order 2 PDE (hyperbolic, parabolic, elliptic)		Home assessment 2 due
Week 13	Canonical forms of PDE	Quiz 4	
Week 14	Gradient, divergence and Stockes theorem		
Week 15	Review for final exam		