Welcome to Differential Equations! All of our students play an important role in our educational mission. We hope that you will find this to be a useful, fundamental course for your future studies.

1. Course Description

Course Title: Differential Equations

Course Meeting Times: Mondays & Wednesdays, 5:00 - 6:30, Red Room

2. Instructor and TA Contact Information

Instructor: Dr. Salah MEHDI
Office: 212
Office Hours: Mondays & Wednesdays from 3:30 to 4:30; or by appointment
E-mail: salah.mehdi@univ-lorraine.fr

Teaching Assistant: Mr Taha AYARI
Office: PhD students room (floor below lecture room level)
Office Hours: see with TA
E-mail: ayaritaha@gatech.edu

3. Textbook


4. Course Websites

Course Website: canvas.gatech.edu

Canvas will be used for course grades, announcements, and course-related documents.

Discussion Forum: piazza.com/georgiatech-metz.fr/spring2018/gtl/home

Please also join our class page on Piazza so you can view/participate in course-related discussions. Please make use of the forum in a positive and constructive manner. The forums are moderated and posts are not anonymous to the instructor.

Assessments: crowdmark.com

Quizzes and midterms will be returned by email via Crowdmark. Students do not need to create an account on Crowdmark. Students who do not want their work returned by email or through Crowdmark can request to have a hard copy of their work returned to them.
5. Grades

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

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weight 1</th>
<th>Weight 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>Midterms</td>
<td>45%</td>
<td>35%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>35%</td>
<td>45%</td>
</tr>
</tbody>
</table>

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. You will be guaranteed a minimum of the following grading scale, but do not expect any adjustments. Any changes to these intervals would only be made after the final exam.

**Midterm grades** will be assigned on **February 19**. A satisfactory grade will be assigned to all students with a midterm average of 70% or higher (based on 90% midterm grade and 10% quiz grade).

6. 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.

- **Classify** differential equations (by order, linearity, homogeneity, exact, separable, etc) and apply their classification to determine which methods can be used to solve them.
- **Solve** differential equations using techniques introduced throughout this course, and **interpret** the solution to characterize a system.
- **Model** real-life situations using differential equations.
- **Analyze** mathematical statements and solutions of differential equations (for example, by using a direction field or a phase portrait).
- **Write** logical progressions of precise mathematical statements to justify and communicate your reasoning.

Topics covered include methods for obtaining numerical and analytic solutions of elementary differential equations. Applications are also discussed with an emphasis on modeling. Topic outline:

- Introduction and Euler’s method
- First Order Differential equations
- Systems of two first order equations
- Second order linear equations
- Laplace Transform Methods
- Systems of first order equations
- Nonlinear Differential Equations and Stability
7. Expectations

6.1 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 placed on the course website.

6.2 Teaching Assistants (TAs)
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.

6.3 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 midterms, and be available for assistance when requested.

8. Preparing for Midterms and the Final Exam
Practice materials and additional office hours will be offered prior to midterms and the final exam. Depending on your goals, you may need to complete additional work beyond homework, worksheets, and practice materials to adequately prepare for them.

9. Homework, Participation, Midterms, Final Exam Policies

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

9.2 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. The lowest \( N \) participation grades will be dropped, \( N \geq 4 \), and will be determined near the end of the course.

9.3 Midterm Schedule and Topics
We will have 50-minute midterms. Tentative dates are on the last page of the syllabus. Unless stated otherwise, midterms cover the following sections.

- Midterm 1: Covers Chapter 1, Chapter 2, 3.1-3.4 and 6.1-6.4
- Midterm 2: Covers 3.5, 3.6, Chapter 4 and 5.1-5.5
9.4 Midterm and Final Exam Procedures

9.4.1 Midterm and Final Exam Procedures

- Books, notes, cell phones, and calculators are not allowed during midterms and the final exam.
- Students may have something to write with and an eraser when taking midterms and the final.
- 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 midterm and the final exam.
- Unless indicated otherwise, students must adequately justify their reasoning for full marks.
- Marks can be taken off in a midterm or final exam for not using the correct notation.
- The midterms and the final exam are comprehensive.
- Students who are unable to take any midterms or the final exam for any reason are responsible for notifying their instructor prior to the exam and as soon as possible.
- Midterms will be returned to students through the Crowdmark system. Further details about Crowdmark will be given in lecture.

9.4.2 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

9.4.3 Re-grade Requests for Midterms and Quizzes

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.

10. 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 quiz or midterm, with reasonable explanation, can write a make-up. Students must notify their instructor as soon as they can to make necessary arrangements.

11. Class Policies

11.1 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, they are a distraction to others. 
Please do not bring food to eat during lectures, eating is a distraction to others.

11.2 Academic Dishonesty
All students are expected to comply with the Georgia Tech Honor Code (the honor code can be found at 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.

11.3 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.

12. Campus-Wide Dates
01 08 18 First day of classes
02 19 18 Progress report due
03 14 18 Withdrawal deadline: last day to withdraw with a grade of "W"
03 5-9 18 Break
04 23-24 18 Final Instructional Class days
04 25 18 Reading period and final exam periods begin
05 07 18 Grade submission deadline (noon, Atlanta time)
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.
13. Tentative Course Schedule

All dates in the table below are tentative, but please use this as an approximate class schedule. Section coverage may change depending on the flow of the course.

<table>
<thead>
<tr>
<th>Week and Dates</th>
<th>Section Coverage in Lecture</th>
<th>Quizzes, Midterms</th>
<th>Registrar</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>1.1, 1.2, 1.3</td>
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<tr>
<td>Jan 8 - 12</td>
<td></td>
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<tr>
<td>Week 2</td>
<td>2.1, 2.2, 2.3, 2.4, 2.5</td>
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<tr>
<td>Jan 15 - 19</td>
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<tr>
<td>Week 3</td>
<td>2.6, 2.7, 3.1, 3.2, 6.1</td>
<td>Quiz 1 (Thursday)</td>
<td>Verification of Participation Due Jan 26</td>
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<tr>
<td>Jan 22 - 26</td>
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<tr>
<td>Week 4</td>
<td>3.3, 6.2, 6.3</td>
<td>Quiz 2 (Thursday)</td>
<td></td>
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<tr>
<td>Jan 29 - Feb 2</td>
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<tr>
<td>Week 5</td>
<td>3.4, 6.4, 3.5</td>
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<tr>
<td>Feb 5 - 9</td>
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<tr>
<td>Week 6</td>
<td>3.6, 4.1, 4.2, 4.3</td>
<td>Midterm 1 (Wednesday)</td>
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<td>Feb 12 - 16</td>
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<tr>
<td>Week 7</td>
<td>4.3, 4.5, 4.7</td>
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<td>Progress Report Due Feb 19</td>
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<td>Feb 19 - 23</td>
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<tr>
<td>Week 8</td>
<td>4.7, 4.4</td>
<td>Quiz 3 (Thursday)</td>
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<tr>
<td>Feb 26 - Mar 2</td>
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<tr>
<td>Week 9</td>
<td>NO CLASS</td>
<td>NO CLASS</td>
<td>NO CLASS</td>
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<tr>
<td>Mar 5 - 9</td>
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<tr>
<td>Week 10</td>
<td>4.4, 4.6, 5.1, 5.2</td>
<td>Quiz 4 (Thursday)</td>
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<td>Mar 12 - 16</td>
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<tr>
<td>Week 11</td>
<td>5.3, 5.4</td>
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<td>Withdrawal Deadline March 14</td>
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<tr>
<td>Mar 19 - 23</td>
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<tr>
<td>Week 12</td>
<td>5.5, 5.6</td>
<td>Midterm 2 (Wednesday)</td>
<td></td>
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<tr>
<td>Mar 26 - 30</td>
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<tr>
<td>Week 13</td>
<td>(class of Monday moved to Friday) 5.7, 5.8, 6.5</td>
<td>Quiz 5 (Thursday)</td>
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<tr>
<td>Apr 2 - 6</td>
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<tr>
<td>Week 14</td>
<td>6.6, 6.7, 7.1</td>
<td>Quiz 5 (Thursday)</td>
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<td>Apr 9 - 13</td>
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<tr>
<td>Week 15</td>
<td>7.2, 7.3, 7.4</td>
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<tr>
<td>Apr 16 - 20</td>
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<tr>
<td>Week 16</td>
<td>Final Instructional Days</td>
<td></td>
<td>Review for Final Exam</td>
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<tr>
<td>Apr 23 - 27</td>
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</table>
MATH 2552 Differential Equations, Suggested Homework List, Spring 2018

Week 1 Jan 8 – 12
  • Sec 1.1: 1, 2, 4, 5, 15, 17
  • Sec 1.2: 1-13,
  • Sec 1.3: 1-6, 13-17, 23-24, 25-26, 27-28, 33

Week 2 Jan 15 – 19
  • Sec 2.1: 1-8, 13-20, 30-34
  • Sec 2.2: 1-6, 17-20, 22, 31
  • Sec 2.3: 1-5, 10-13, 16, 19
  • Sec 2.4: 1-6, 7-11, 13, 15-16, 25
  • Sec 2.5: 1, 2, 6, 7, 9, 10, 11, 12

Week 3 Jan 22 – 26
  • Sec 2.6: 1-12 (a) and (b) only, 15, 16, (19-21 (a) and (b))
  • Sec 2.7: 1-6, 13-17, 24-36
  • Sec 3.1: 1-5, 13-18, 27-30, 33-36
  • Sec 3.2: 1-8, 9(a)-10(a), 15-17 (a) only, 21-26, 30(a)-(c), 31
  • Sec 6.1: 1-3, 4-9

Week 4 Jan 29 – Feb 2
  • Sec 3.3: 1-16, 17-24, 34
  • Sec 6.2: 1-6, 8-9, 11-14
  • Sec 6.3: 1-8

Week 5 Feb 5 – 9
  • Sec 3.4: 1-10, 13-18
  • Sec 6.4: 1-8
  • Sec 3.5: 1-12, (15)

Week 6 Feb 12 – 16
  • Sec 3.6: 7-12 (a) and (b) only
  • Sec 4.1: 1-7, 8-16
  • Sec 4.2: 1-7, 15, 18, 21, 22-25, 26, 28-33
  • Sec 4.3: 1-10, 27-37, 44, 45, 47, 48, 51
Week 7 Feb 19 – 23
  * Sec 4.3: 52, 54-58, 62-65
  * Sec 4.5: 1-10, 17-20, 23a-30a, 31, 32-34
  * Sec 4.7: 2-5

Week 8 Feb 26 – Mar 2
  * Sec 4.7: 2-5, 10-12, 14-16, 22-24, (39, 40)
  * Sec 4.4: 1-4

Week 9 Mar 5 – 9
  * Spring Break

Week 10 Mar 12 –16
  * Sec 4.3 (Cauchy-Euler), 4.5, 4.7
  * Sec 4.4: 1-4, 5a, 6a, 7, 10, 15-17, 24, 25, 29, 30, 5: 1-10, 17-20, 23a-30a, 31, 32-34
  * Sec 4.6: 1-4, 5, 6, 9, 10, 11, 16-18, 20-22
  * Sec 5.1: 1-4, 5-12, 14-17, 22-26, 28, 31-34
  * Sec 5.2: 1-10, 11, 12-18

Week 11 Mar 19 – 23
  * Sec 5.3: 9-20
  * Sec 5.4: 4-8, 11-13, 16-19, 20-21

Week 12 Mar 26 – 30
  * Sec 5.5: 1-4, 8-11, 13-15, 22-24
  * Sec 5.6: 1-7, (19, 20)

Week 13 Apr 2 – 6
  * Sec 5.7: 1-8 (finding solution only), 15
  * Sec 5.8: 3-6, 7-12
  * Sec 6.5: 1-8, 15, 16, 17, 18
Week 14 Apr 9 – 13
  • Sec 6.6: 2-8 (using variation of parameters)
  • Sec 6.7: 1-8
  • Sec 7.1: 1-12 (a and c only)

Week 15 Apr 16 – 20
  • Sec 7.2: 1-12 (a,b,c only), 21, 22, 25
  • Sec 7.3: 1-6
  • Sec 7.4: 1-5