MATH 2552 DIFFERENTIAL EQUATIONS

GEORGIA TECH EUROPE

COURSE SYLLABUS

Updated on Sep 28 2026

Welcome to Differential Equations!

All our students play an important role in our educational mission. Differential Equations are a fundamental topic of Engineering Sciences.

Course prefix : MATH **Course number :** 2552 **Section :** R1 (Lecture), R02 (Studio)

Semester : Spring **Academic Year :** 2027

Course Description : Differential Equations : Methods for obtaining numerical and analytic solutions of elementary differential equations. Applications are also discussed with an emphasis on modeling.

Lecture Meeting Times : M, W : 11:00 – 12:15 Yellow Room

Studio Meeting times : TBA

Instructor and Teaching assistant

Instructor First Name : Hyun Jeong **Instructor Last Name :** KIM **E-mail**: hkim3224@gatech.edu

Office: 303 **Office Hours**: TBA

TA : TBA

Textbook

Differential Equations: An Introduction to Modern Methods & Applications, 3rd edition, by Brannan & Boyce. Wiley. ISBN 9781118531778. A pdf version is posted on Canvas.

Pre- &/or Co-Requisites

MATH 1502 OR MATH 1512 OR MATH 1555 OR MATH 1504 ((MATH 1552 OR MATH 15X2 OR MATH 1X52) AND (MATH 1522 OR MATH 1553 OR MATH 1554 OR MATH 1564 OR MATH 1X53)).

Credit not awarded for both MATH 2552 and MATH 2403 or MATH 2413 or MATH 2562.

Topics and Learning Outcomes

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

- First Order Differential equations
- Systems of two first order equations
- Second order linear equations
- Modelling real-life situations
- Laplace Transform Methods
- Nonlinear Differential Equations and Stability
- Numerical approximation of solutions by Euler's method

The learning outcome for this course includes 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 visually (for example, by using a direction field or a phase portrait).
- **Write** logical progressions of precise mathematical statements to justify and communicate your reasoning.

The list of sections that will be covered in lecture is in the syllabus. Students are not expected to be familiar with the material in the sections that are not covered.

We will need to do a lot of calculus (differentiation and integration) and linear algebra (solving linear systems and computing eigenvalues and eigenvectors).

Office Hour and Help

To get help with our course materials, use the office hour of myself and TA. If you need help outside office hours, make appointment with me by email or in class. For those who need help with prerequisite materials such as College algebra, Precalculus and Calculus, a few sessions or more with a TA will be suggested.

Tips for Success

To succeed in Math class, the minimum work you need to do is : Read Course Slides and review examples done in class thoroughly. Try solving examples by yourself with blank slides and then compare with the lecture notes to make your solution complete – a very important step. Do NOT read solution to learn. Review examples done in Studio to learn how formulas are applied. Do homework and practice with suggested extra problems (list posted on Canvas) from our textbook. **Most importantly**, as soon as you find the course a bit challenging, you should use office hours **regularly** not to get behind.

Communication

Announcements, course-related documents and homework assignments will be posted on **Canvas**.

Expectations

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 or communicated orally in class.

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.

Instructor

As your instructor, my role is to facilitate interactive lectures, coordinate with teaching assistants to grade student's 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.

Homework, Participation, Tests Policies

HOMEWORK: Homework will be assigned on-line every week via **Webwork**. Each homework will be due on **Tuesdays** at 11:59 PM *at which time the solutions will also become available*.

Math is not a spectator sport! Homework is an essential part of the course; the only way to learn math is by doing math.

a. You are expected to understand **all** homework problems for the exams and quizzes. We strongly

recommend working homework problems out completely on paper even though that work is not graded- this is your chance to build good habits in your work and ensure you understand every step.

b. ***Late homework will not be accepted, and no extensions will be given for any reason.*** All homework due dates are currently posted in the WeBWork system and on our course Calendar.

c. There are 14 weekly homework of total 89 points approximately and each weekly homework consists of 2-3 sections of Webwork questions that are due on the same day. The homework component of your grade will be the fraction of points you earn out of 76, capped at 100% (equivalent to 5 pts of the final grade) and the rest of the points will be given as bonus to the final exam score up to 1% not to exceed 100%.

d. You are very welcome to **collaborate with other students on solving homework problems (and during Studio)** ; in fact, we encourage you to do so. Talking with others gives you a chance to consider issues you might not have thought of yourself and often improves your understanding. You learn the best when you teach someone. However, it is important that you understand the homework yourself by the end, or quizzes and exams will be of extreme difficulty. Of course, it is ***always*** unacceptable to copy a solution from any source or to look up answers online.

PARTICIPATION: Attending class is important. Class attendance and participation for both lectures and studios will be recorded and scored on a 0-2.5 scale. The scale is determined as follows: 2.5 points for above 90% attendance for both Lecture and Studio, 2 points for above 80% attendance for both Lecture and Studio, and 1 point for above 80% in one and 80-60% in the other, and 0 otherwise. The participation grade will be added onto the final average with a possible 0.5 bonus at the end of the term, affecting all borderline grades. Late arrivals and early departure will be also noted down as late arrivals and three of late count for one absence.

QUIZZES: There will be 5 quizzes of 20 minutes on Thursdays during Studio. **One** lowest quiz score will be dropped. Each quiz is graded out of 25 points, and the total of 4 best quizzes is out of 100, which is 24% of the final grade – see below the distribution table.

MIDTERMS: There will be 2 midterms of 1 hour 15 minutes on **Wednesdays** during Lecture. There's no dropping for midterm. Each midterm is graded out of 50 points and the total midterm grade out of 100 consists of 60% of the better midterm + 40% of the other, which is 31% or 38% of the final grade - see below the distribution table.

Important : The dates for all the exams are already published – See the last page. Please do not make any plan for travel for these dates as no make-up or earlier tests will be allowed! Missing test will be marked as 0.

FINAL EXAM: The final exam will cover all course materials and will be administered during the final exam period (the exact date will be announced later.) for 2 hours and 50 minutes. All students must take the final examination. The final exam schedule is non-negotiable. No earlier or late final exam is allowed. There will be a make-up exam on the last day of the final exam period for all the students who need to make up their final exam with an excused absence. An absence due to travel is NOT an excused absence.

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.
- 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 and Solutions will be posted on Canvas.

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.

Grades

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

Assessment	Weight 1	Weight 2
Participation	2% (possible 0.5pt bonus to total of final grade)	2%
Webwork Homework	5% (possible 1pt bonus to final exam score)	5%
4 best Quizzes	24%	24%
2 Midterms (Better midterm 60% + The other 40%)	31%	38%
Final Exam	38%	31%

CIOS Bonus: When the participation to the survey for both Lecture and Studio is above 85%, there will be 1pt bonus awarded to the entire class.

A **midterm grade** will be assigned around **Mar 1**. A satisfactory grade will be assigned to all students with a midterm average of 70% or higher.

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. There will be NO changes to these intervals because there will be an appropriate curve or make-up test depending on the average for each test. No individual curve, extra credits, or make-up exam (except for absences.) Please do NOT email me asking for extra credits.

Re-Scheduled/Missed Exams

NO MAKE-UP EXAMS! All the test dates are already published. No make-up or earlier test will be allowed due to travel. Please do not make any plan for travel for these dates and missing test score will be "0".

- In the case of illness and emergency, please contact me as early as possible.
- 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 me 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.

Class Policies

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. If you need to leave the class early, please let me know at the beginning of the class. Late arrivals and early departures will be marked as Late on Canvas.
- Refrain from conversing with your fellow students while the instructor is lecturing.
- Put away any reading materials unrelated to the course.
- **No laptop or cell phone is allowed on tables.** These are distractions for yourself and your classmates. Please keep them **in your bag** with sound off.
- **No Food allowed in Classroom.** This is a strict rule at GT-Europe.

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.

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

Campus-wide Dates

Verification of Participation (VOP) : Jan 20 – 26

Midterm Progress Reports (MPR) : Mar 1

Final Instructional Class Days : April 26 and 27

Final Exam Period : April 29 – May 6

Section titles and contents summary

1.1 : Mathematical models and solutions of differential equations

1.2 : Qualitative Methods : Phase lines and Direction Fields

1.3 : Classifications and Terminologies of differential equations

2.1 : First order Separable Equations

2.2 : First order Linear Equations

2.3 : Modeling and real-life applications

2.4 : Intervals of existence of solutions : for linear and nonlinear

2.5 : Autonomous Equation and phase lines again

3.1. : Linear Algebra Review - Eigenvalues and Eigenvectors

3.2/6.1-2 : Systems of First order Linear Differential Equations

3.3/6.3 : Homogeneous Linear Systems with Constant Coefficients – distinct real eigenvalues

3.4/6.4 : Homogeneous Linear Systems with Constant Coefficients – complex eigenvalues

3.5 : Homogeneous Linear Systems with Constant Coefficients – repeated real eigenvalues

Shifted Systems. : Non-homogeneous Linear Systems with Constant Coefficients

4.1 : Definition and Examples of Second Order Linear Equations

4.2 : Theory of Second Order Linear Homogeneous Equations in relation with Systems of two first order linear equations

4.3 : Second Order Linear Homogeneous Equation with Constant Coefficients

4.4 : Application of Second order linear homogeneous equations: Mechanical Vibrations

4.5 : Non-homogeneous Equations 1 : Method of Undetermined Coefficients

4.6 : Application of Second order linear non-homogeneous equations : Forced Vibrations, Resonance

4.7 : Non-homogeneous Equations 2 : Method of Variation of Parameters

5.1 : Definition of Laplace Transform

5.2 : Properties of Laplace Transform : Linearity

5.3 : Inverse Laplace Transform and Laplace Table

5.4 : Solving Differential Equations with Laplace Transform

5.5 : Laplace Transform of Piecewise continuous and Periodic Functions

5.6 : Mechanical Vibrations with discontinuous forcing functions

5.7 : Laplace Transform of Impulse Functions.

5.8 : Convolution Product and Laplace Transform

7.1-2 : Nonlinear systems and their approximation by linear systems

7.3-4 : Applications of nonlinear systems and their application: Population dynamics: Competing species and Predator-Prey

8.1-2 : Numerical Approximation of Solutions: Euler's Method and its accuracy.

TENTATIVE SCHEDULE

Week and Dates	Lecture	Studio	Tests	Important Dates
Week 1 Jan13, 14, 15	Syllabus,1.1, WS 1.3 (#2,3), Pretest 1.2, 1.3, 2.1	WS Review on Antiderivatives, WS 1.3 (#4)	Prerequisite test on Wed.	Class on Friday Jan 15
Week 2 Jan 18 – 21	2.2, 2.3, 2.3, 2.4	WS 1.2, 1.3 (#1), 2.1, 2.2 WS 2.3, 2.4		HW 1 Tue Jan 19
Week 3 Jan 25 – 28	2.5 3.2/6.1-2	WS 2.5, WS 3.1 WS 3.2, Quiz 1	**Quiz 1**	**Quiz 1 on Thu Jan 28** HW 2 Tue Jan 26
Week 4 Feb. 1 - 4	3.3/6.3 3.4/6.4	WS 6.1, 6.2, WS 3.3 WS 3.3, WS 3.4		HW 3 Tue Feb 2
Week 5 Feb. 8 – 11	3.5 Shifted Systems	WS 3.5 WS -Shifted System,Quiz2	**Quiz 2**	**Quiz 2 on Thu Feb 11** HW 4 Tue Feb 9
Week 6 Feb. 15 – 18	4.1-2 Midterm 1	Review for Midterm 1 WS 4.1-2	**Mid 1**	**Mid 1 on Wed Feb 17** HW 5 Tue Feb 16
Week 7 Feb. 22 -- 25	4.3 4.5	WS 4.3 WS 4.5		HW 6 Tue Feb 23
Week 8 Mar 1-5	**No Class**	**Spring Break**		
Week 9 Mar 8-11	4.7 4.4	WS 4.7 WS 4.4, Quiz 3	**Quiz 3**	**Quiz 3 on Thu Mar 11** HW 7 Tue Mar 9
Week 10 Mar 15-18	4.6, 5.1-2 5.1-2	WS 4.6 WS 5.1-2		HW 8 Tue Mar 16
Week 11 Mar 22-25	5.3 5.4	WS 5.3 WS 5.4, Quiz 4	**Quiz 4**	**Quiz 4 on Thu Mar 25** HW 9 Tue Mar 23
Week 12 Mar 30 – Apr 2	5.5 5.6 (Friday)	WS 5.4 WS 5.5	Mar 29 (Monday) Easter Holiday	HW 10 Tue Mar 31 **Class on Friday April 2**
Week 13 Apr 5-8	5.7 Midterm 2	WS 5.6, Review WS 5.7	**Mid 2**	**Mid 2 on Wed April 7** HW 11 Tue April 6
Week 14 Apr 12-15	5.8 7.1-2	WS 5.8 WS 7.1-2		HW 12 Tue April 13
Week 15 Apr 19-22	7.3-4 8.1-2	WS 7.3-4 WS 8.1-2	**Quiz 5**	**Quiz 5 on Thu April 22** HW 13 Tue April 20
Week 16 Apr26, 27	Review for Final	Review for Final	Last instructional Day	HW 14 Tue April 27