Math 345: Numerical Methods

Spring 2026: Section 1

	Instructor Information		**Course Information**
Name:	Dr. Christina Durón	**Days**:	TF
Email:	christina.duron@pepperdine.edu	**Time**:	10:00AM – 11:50AM
Office:	RAC 105	**Location**:	RAC 178
Office Phone:	(310) 506 – 4832	**Module**:	In-person

Course Pages:

1. Canvas (Required): `https://canvas.pepperdine.edu/`
2. Homepage (Optional): `https://cduron.info`

Office Hours: Office Hours will be held regularly in RAC 105 on

- Mondays: 10:00AM – 11:00AM
- Wednesdays: 1:00PM – 2:00PM
- Thursdays: 10:00AM – 11:00AM
- By appointment

In addition, questions may be addressed through email between 8AM – 5PM (PST) during the academic week (i.e., Monday through Friday). Please allow up to 24 hours for a response, though replies are often provided sooner. Emails received over the weekend will receive a reply on the first University academic day (excluding any national, state, or University holiday) following the weekend.

Course Materials:

- *Textbook*: The course textbook (electronic or hardcover) is *Numerical Analysis*, 9th Edition by Richard L. Burden and J. Douglas Faires. While the textbook is not required, it is an encouraged resource. Should you purchase/rent the textbook, it is important that you *read the sections in addition to attending lectures and doing assigned work.*
- *Calculator*: A calculator is a tool that will be used in this course. Any model in the TI-83 or TI-84 series is recommended. Models that can perform symbolic calculations (also known as CAS) are not allowed on exams and quizzes. CAS models include (but are not limited to) the TI-89, TI NSpire CAS and HP 50g. Students are not allowed to share calculators during quizzes and exams.
- *Special Tools*: We will be making extensive use of the MATLAB computer algebra system. To circumvent the need of a MATLAB license, students may use MATLAB Online or Octave Online, an open-source alternative to MATLAB.
- *Software*: For this course, you will need daily access to a device with a reliable internet signal that can:
  - Access MATLAB Online or Octave Online.
  - Access Canvas.
  - Scan and upload written work to Canvas.
  - View and download PDF documents.

Course Communications: All course materials will be posted on Canvas. Email, in-class announcements, and Canvas announcements will be the primary methods to communicate course information. It is ultimately the student's responsibility to keep informed of any announcements, syllabus adjustments, or policy changes made during scheduled classes, by email, or through Canvas.

Course Prerequisites: The enrollment requirement includes a C− or better in Math 260.

Course Description: Math 345 explores computational techniques for solving mathematically formulated, real-world problems. Topics include modern approximation methods, numerical algorithms, and analysis of when and why these methods are effective. The course provides an introduction to numerical methods with sufficient depth to support continued study in mathematical and scientific computing. Students will develop fluency with tools and methods applicable to scientific problem-solving across multiple disciplines.

Student Learning Outcomes: Upon completing this course, students should be able to:

1. Demonstrate knowledge of major numerical methods, including strategies for constructing and analyzing such methods.
2. Explain the limitations of mathematical approximations and the impact of computer rounding errors.
3. Apply concrete numerical techniques to solve various types of equation systems, and approximate functions using simpler forms such as polynomials and piecewise polynomials.
4. Implement numerical methods effectively through programming.
5. Use numerical methods to solve practical problems, interpret and analyze results, and articulate the role of reproducibility.
6. Present and communicate computational results clearly and effectively.

Relation to Mathematics Program Learning Outcomes: A student who completes a mathematics degree should be able to:

1. Formulate mathematical proofs that are clear, correct, complete, and logical.
2. Use appropriate mathematical ideas in applied or real-world contexts.
3. Integrate mathematical ideas from multiple courses to solve advanced problems.

Relation to Pepperdine's Mission: Pepperdine is a Christian university committed to the highest standards of academic excellence and Christian values, where students are strengthened for lives of purpose, service, and leadership. This course is designed to complement and supplement the overall mission of Pepperdine. Mathematics courses have historically been used to "train the mind" of students, to help students think more carefully and clearly. In logical preparation and in application of concepts, the study of mathematics helps prepare you for a life of purpose, service, and leadership.

Attendance and Class Participation Policy: Participating in the course and attending lectures and other course events are vital to the learning process. As a result, students are expected to attend each class meeting and to arrive on time and ready to participate in discussion or group work with their peers. Students are responsible for the material covered if they are late or absent. If you are unexpectedly absent for medical or personal reasons, please inform the instructor within 24 hours, if at all possible, and provide a note from the appropriate party (e.g., doctor, Divisional Dean) excusing the absence.

Classroom Behavior Policy: To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, browsing a website, making phone calls). Students are asked to refrain from disruptive conversations during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion, and may be reported to the Divisional Dean.

Assignments and Examinations:

- **Quizzes** will be administered in class every Friday, except during midterm examination weeks. Each quiz will be given at the start of class and must be turned within 20 minutes. Each quiz is worth 10 points. Students may use their class notes and an approved calculator on all quizzes; however, peer collaboration and the use of unapproved resources (e.g., generative AI tools, the internet, cell phones, computers, programming languages) are not permitted. Work must be shown clearly and legibly in order to receive credit.

- **Homework** will be distributed electronically on Canvas, based on the problems from the textbook. Students are responsible for uploading properly scanned work (as a single PDF file) to Canvas by 11:59PM on the indicated due date, and assigning the appropriate pages for each problem. Either a subset or all of the problems will be graded each week; graded work will be returned through Canvas. Students must show all work in a legible, neat and organized manner to receive credit. No credit will be given if the solution is not justified, if the work is illegible, or if the submitted file is corrupted (e.g., cannot be viewed on Canvas).

  You are strongly encouraged to work with other students in doing the homework, but the homework turned in must be your own and represent your own thinking and your own work. Turning in the work of others (including that provided by generative AI tools), allowing others to copy your work, or copying from a solutions manual or other source is a violation of Seaver College' Code of Ethics (see your student handbook for more information). This can lead to a lowering of your course grade as well as counting as one of two ethics violations allowed at Seaver College. On each assignment, you will be asked to provide your collaborators.

  Please be aware that checking unsanctioned online sources for solutions is not allowed and may be reported as cheating. In addition, the use of generative AI tools is strictly prohibited; the use of such source will result in an automatic zero on the assignment/assessment and will be reported as cheating.

- **Midterms** will be taken during the class period. Please refer to the calendar for the dates of these two exams. Each exam will be written to be completed within 60 minutes, but you will have the full class period to complete it. See the cover page on each exam for specific instructions about the use of notes and technology.

- The **Final Project** for this course is designed to allow you to go beyond the syllabus and develop expertise in a specialized area. This assessment consists of two distinct components: a collaborative presentation and an individual technical "defense".

  - **Group Presentation (Collaborative)**: Working in groups no larger than 3, you will select a topic relevant to Numerical Methods that was not covered in our primary lectures. Your goal is to teach the core concepts of this topic to your peers during a brief presentation on the final day of the semester (April 24).
  - **Individual Whiteboard Session (Individual)**: During our scheduled final exam period, each student will meet with the instructor individually. You will be given a specific problem or scenario related to your group's chosen topic and asked to "work it out" at the whiteboard. This session is designed to assess your personal depth of understanding.

  A detailed rubric for each component will be distributed by April 10. Your final grade will be a composite of the group's presentation and your individual performance during the whiteboard session. Please visit Final Exams and Schedule of Classes for more information.

  - All students enrolled in the course must complete the final project's individual component at the scheduled time. Exceptions are only granted if a student has two exams scheduled at the same time, or three exams scheduled on the same day. Students in these situations are expected to notify the instructor at least three weeks in advance.

- **Participation** is a vital component of class success. Students are expected to keep up with class, engage and participate both in large class discussions and group work, and in general contribute to a sense of classroom community. The participation grade is meant to encourage and reward class-wide (rather than individual) efforts to create a sense of classroom community so that this course can be effective, regardless of course modality. If each of you do all you can every day to participate as you are able, this can be a great course with everyone receiving 100% for participation. However, if you personally stop regularly attending and participating in class (without excused reasons) or if too few students participate for the course to run smoothly and effectively, the instructor reserves the right to implement individual or group participation requirements.

Important Dates:

Last day of Add/Drop period	January 16, 2026
Withdraw period begins	January 17, 2026
Last day to change Cr/NC status	January 26, 2026
Midterm #1	**February 27, 2026** (*tentative*)
Last day to withdraw (with W)	March 16, 2026
Midterm #2	**April 17, 2026** (*tentative*)
Last day to submit Change of Final Exam form	April 17, 2026
Last day to withdraw (with WP/WF)	April 17, 2026 (by 5PM)
Final Project	**April 29, 2026**

Make-Up Exams and Homework Extensions: In general, there will be no make-up exams. However, in unusual circumstances beyond your control, a make-up exam may be given on a case-by-case basis. This may require providing a detailed account of the situation and, if applicable, supporting documents. Approval in these cases is at the sole discretion of the instructor and/or the Divisional Dean.

Homework assignments not turned in by the due date will receive an automatic zero. Extensions may be granted on a case by case basis (a valid reason must be given). All extension requests must be made at least 48 hours in advance of the due date(s); requests made within 48 hours of the due date(s) will not be granted.

Dispute of Grade Policy: Any questions regarding the grading of any assignment, quiz or exam need to be cleared up within one week after the graded item has been returned.

Grading Scale and Policies: Your work in this course will be weighted as follows:

- Participation (4%)
- Quizzes (10%)
- Homework (12%)
- Midterms (44%; 22% each)
- Final Project (30%)

The weighted percentages below correspond to your final letter grade:

A: 93 – 100%	B+: 87 – 89%	C+: 77 – 79%	D+: 67 – 69%	F: 0 – 59%
A−: 90 – 92%	B: 83 – 86%	C: 73 – 76%	D: 63 – 66%	
	B−: 80 – 82%	C−: 70 – 72%	D−: 60 – 62%	

Note: No extra credit or bonus points are offered in this course.

Assistance: I will be available in my office for questions during the posted Office Hours or whenever the door is open. If you need to reach me outside of those hours, please email me to make an appointment. There will be peer tutoring available in the Student Success Center most evenings. See https://seaver.pepperdine.edu/academics/academic-support/student-success-center/departmental-tutoring.htm for details.

Class Expectations: It is my goal to teach you all the material necessary to be successful in this course. In return, I expect that you will show up to class on time and ready to work. We will use calculators for mathematical applications, but I expect that you will refrain from the use of cell phones, tablets or laptops unless instructed otherwise.

In order to make the class more interesting, I will alternate between lectures and group activities. We can only cover all of the material successfully in this way if you make an effort to stay on task. Working in groups is an excellent opportunity to learn from each other. You will know that you have mastered a subject when you can successfully teach that topic to a fellow student.

It is my expectation that you will spend at least two hours outside of class for every hour you spend in class studying and working on homework. If you put in eight hours a week, then you should be able to complete your assignments and study for your exams. If you do this for each class, then a 16 – 18 unit load will give you a 48 – 54 hour work week, which is not unreasonable in many professions.

As students at Pepperdine University, you are expected to approach this class with a Christian attitude. You should be willing to help your fellow classmates understand the material while working in groups or outside of class. Our classroom is a place to ask questions without feeling ashamed or looking foolish. Since your peers are entering this course with a broad spectrum of mathematical backgrounds, you should be patient with others asking questions and encourage one another in love.

As a professor at Pepperdine University, I will approach this class with a Christian attitude, viewing my role as that of a servant, being concerned first for your personal, especially intellectual, development. One of my goals is to build a community that is understanding and encourages one another. I commit to reporting grades that accurately and honestly reflect the level of work done in the class, as described in the paragraphs above.

Accommodations for Students: Pepperdine University provides services and accommodations in accordance with the ADA and section 504 of the Rehabilitation Act. Pepperdine recognizes that each student is a unique individual and that the effect of a particular disability can vary from student to student. As a result, accommodations are determined through an interactive process with the student, the Office of Student Accessibility, and medical/mental health professionals.

Any student with a documented disability (chronic medical, physical, learning, psychological, or temporary) needing academic accommodations should contact the Office of Student Accessibility (Student Assistance Center, SAC #105, Phone: (310) 506 – 6500, Email: student.accessibility@pepperdine.edu) as early in the semester as possible. All discussions will remain confidential. For additional information, please visit http://www.pepperdine.edu/student-accessibility/.

Ethics: Academic Integrity is the expression of intellectual virtue in human beings as a result of their creation in God's image. It represents the convergence of the best of the human spirit and God's spirit, which requires personal, private and community virtue. As a Christian institution, Pepperdine University arms that integrity begins in our very created being and is lived out in our academic work. In order for the code to be effective, the community must maintain its health and vitality. This requires a genuine sense of maturity, responsibility, and sensitivity on the part of every member. Each member of the Seaver College community is expected to pursue their academic work with honesty and integrity.

Academic integrity is violated when one of the following events occurs:

- Plagiarism
- Cheating
- Fabrication, or
- Facilitating Academic Dishonesty

For a more detailed description of these violations, see http://seaver.pepperdine.edu/academicintegrity/policies/violations.htm. All violations will be reported and handled according to the Academic Integrity Committee Procedures. In particular, any instance of cheating or plagiarism on an assignment or exam will be reported and result in no credit. As a reminder, the use of generative AI, AI writing, or similar AI tools

or services is not permitted in any aspect of this class; the use of such tools will be considered a violation of academic integrity and be reported accordingly.

Course Evaluations: Online course evaluations are conducted for all Seaver College courses and are part of Pepperdine University's commitment to excellence in teaching and learning. The evaluations provide useful feedback that faculty and schools use to improve the quality of instruction. Each instructor receives a compilation of the anonymous responses and comments to use in evaluating their own teaching and planning future courses. Faculty do not have access to course evaluation data until all course grades are posted. The course evaluation period opens at 7AM on Monday, April 13 and closes before final exams begin (3AM on Monday, April 27). To access the online course evaluation system, you may log on directly at https://courseeval.pepperdine.edu/.

Consent to be Recorded: Class sessions may be recorded by the professor using the Zoom recording feature for instructional purposes. Participation in the class during live sessions implies consent to the recording of those sessions. If a student does not wish to be recorded, they must notify the instructor to see if arrangements can be made. If this is not possible for educational reasons, the student may need to enroll in a different course.

Student and Faculty Privacy: In order to safeguard the privacy of all our students and faculty in online learning environments, no individual may record, reproduce, screenshot, photograph or distribute any video, audio, or visual content from an online course. This restriction applies to, but is not limited to, live sessions, recorded lectures, live discussions, and discussion boards. The only exceptions to this policy are the instructional recordings referenced above and one screenshot per meeting/ discussion that faculty may take as a form of attendance. These screenshots may not be shared or used for any other purpose. Any violation of this policy may subject the individual to disciplinary and/or legal action.

Intellectual Property Rights: Course materials prepared by the instructor, together with the content of all lectures and review sessions presented by the instructor, are the property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor is prohibited. Unless explicit permission is obtained from the instructor, recordings of lectures and review sessions may not be modified and must not be transferred or transmitted to any other person. Electronic devices other than laptops (e.g., cell phones, recording devices) are not to be used during lectures or exams without prior permission of the instructor.

All class lectures and materials herein, including but not limited to, pre-recorded and live lectures, live discussions and discussion boards (and recordings thereof), posted course materials, visual materials that accompany lectures/discussions, and virtual whiteboard notes (collectively "Course Intellectual Property") remain the intellectual property of the faculty member or other third-parties. No individual may record, reproduce, screenshot, photograph, or distribute any Course Intellectual Property in partial or full-format without the permission of the professor. Any violation of this policy may subject the individual to disciplinary and/or legal action.

Subject to Change Statement: Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

Tentative Schedule:

Tuesday	Wednesday	Friday
Jan 13th **1** Lecture 1: Machine Representation of Numbers (Section 1.2)	**14th** **2**	**16th** **3** Lecture 2: (Un)Avoidable Errors in Computing on Machines (Section 1.2) **Quiz #1 Due in Class (Get to Know You Survey)**

Tuesday	Wednesday	Friday
20th 4 Lecture 3: Sequences, Order and "Big Oh" (Section 1.3) **HW #1 Due on Canvas at 11:59 PM (PST)**	**21st** 5	**23rd** 6 Lecture 4: Order of Convergence for Functions (Section 1.3) **Quiz #2 Due in Class (Section 1.2)**
27th 7 Lecture 5: Introduction to Algorithms and Pseudocode (Section 1.3) **HW #2 Due on Canvas at 11:59 PM (PST)**	**28th** 8	**30th** 9 Lecture 6: Rates of Convergence of Iterative Sequences (Section 2.4) **Quiz #3 Due in Class (Section 1.3)**
Feb 3rd 10 Lecture 7: Introduction to Fixed Point (Picard) Iteration (Section 2.2) **HW #3 Due on Canvas at 11:59 PM (PST)**	**4th** 11	**6th** 12 Lecture 8: Introduction to Root Finding (Section 2.1) **Quiz #4 Due in Class (Section 1.3 and Section 2.4)**
10th 13 Lecture 9: Other Root Finding Methods (Section 2.3) **HW #4 Due on Canvas at 11:59 PM (PST)**	**11th** 14	**13th** 15 Lecture 9: Other Root Finding Methods (Section 2.3) **Quiz #5 Due in Class (Section 2.1 and Section 2.2)**
17th 16 Lecture 10: Analyzing Root Finding Methods (Section 2.4) **HW #5 Due on Canvas at 11:59 PM (PST)**	**18th** 17	**20th** 18 Lecture 10: Analyzing Root Finding Methods (Section 2.4) **Quiz #6 Due in Class (Section 2.3)**
24th 19 Midterm #1 Review **HW #6 Due on Canvas at 11:59 PM (PST)**	**25th** 20	**27th** 21 **MIDTERM #1**
Mar 3rd 22 **NO CLASS** *Spring Break*	**4th** 23	**6th** 24 **NO CLASS** *Spring Break*

Tuesday	Wednesday	Friday
10th **25** Lecture 11: Solving Systems of Nonlinear Equations (Section 10.1 and Section 10.2)	**11th** **26**	**13th** **27** Lecture 12: Solving Systems of Linear Equations (Section 7.1 and Section 7.3)
17th **28** Lecture 13: Matrix Formulas for Iterative Techniques (Section 7.3 and Section 7.4) **HW #7 Due on Canvas at 11:59 PM (PST)**	**18th** **29**	**20th** **30** Lecture 14: Polynomial Interpolation and Extrapolation (Section 3.1) **Quiz #7 Due in Class (Sections 7.1, 10.1 and 10.2)**
24th **31** Lecture 15: Implementation of Polynomial Interpolation (Section 3.2) **HW #8 Due on Canvas at 11:59 PM (PST)**	**25th** **32**	**27th** **33** Lecture 16: Newton Polynomials and Divided Differences (Section 3.3) **Quiz #8 Due in Class (Section 7.3 and Section 7.4)**
31st **34** Lecture 17: Introduction to Approximation Theory (Section 8.1) **HW #9 Due on Canvas at 11:59 PM (PST)**	**Apr 1st** **35**	**3rd** **36** Lecture 18: Implementation of Curves of Best Fit (Section 8.1) **Quiz #9 Due in Class (Sections 3.1, 3.2 and 3.3)**
7th **37** Lecture 19: Piecewise Polynomial Interpolation (Section 3.5) **HW #10 Due on Canvas at 11:59 PM (PST)**	**8th** **38**	**10th** **39** Lecture 20: Finite Differences (Section 4.1) **Quiz #10 Due in Class (Section 8.1)**
14th **40** Midterm #2 Review **HW #11 Due on Canvas at 11:59 PM (PST)**	**15th** **41**	**17th** **42** **MIDTERM #2**
21st **43** Work Day: Final Project	**22nd** **44**	**24th** **45** **FINAL PROJECT (Group Component)**
28th **46**	**29th** **47** **FINAL PROJECT (Individual Component)** 10:30AM – 1:00PM	**May 1st** **48**

Note: This calendar is tentative. For up-to-date information, see the course page on Courses.