

Summer Online Math 1149 - Calculus I - Syllabus

Course Information

Textbook: Larson, Hostetlet & Edwards, Calculus, eighth edition

Zoom Q&A sessions: TBA, twice a week

Instructor

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Goals of the Course

- to improve your mathematical reasoning and manipulative skills as you work with a beautiful, rule-based system, sometimes on an abstract and symbolic level
- to instill an appreciation for the calculus, one of the greatest contributions to knowledge in this history of the human race
- to make you appreciate the power and be comfortable with the use of a computer algebra system
- to expose you to the applications of the calculus
- to prepare you for a wide range advanced subjects founded on basic calculus knowledge

Course Objectives

- Limits and Continuity
 - Use graphical and numerical evidence to estimate limits, and to identify situations where limits fail to exist.
 - Apply rules of limits to calculate limits.
 - Use the limit concept to determine where a function is continuous.
 - Use the Intermediate Value Theorem to identify an interval where a continuous function has a root.
- Differentiation
 - Use the limit definition to calculate a derivative, or to determine when a derivative fails to exist.
 - Using rules of the derivative, calculate derivatives (of first and higher orders) with pencil and paper.
 - Calculate derivatives with computer algebra software.
 - Use the derivative to find tangent lines to curves.
 - Calculate derivatives of functions defined implicitly.

- Interpret the derivative as a rate of change.
- Solve problems involving related rates of change of variables.
- Use differentials to approximate the change in value of a function due to a small change in its argument.
- Use Newton’s method to approximate a zero of a differentiable function.
- Applications of Derivatives
 - Find critical points, local maxima and minima.
 - Use First and Second Derivative Tests to sketch the graph of a function.
 - Use the first derivative to find intervals where a function is increasing or decreasing.
 - Use the second derivative to determine concavity and find inflection points.
 - Apply the first and second derivative tests to classify critical points.
 - Use Differential Calculus to solve optimization problems.
- Integration and Its Application
 - Find antiderivatives of functions.
 - Use the limit of Riemann Sum to represent and evaluate a definite integral.
 - Apply the Fundamental Theorem of Calculus I and II to evaluate definite integrals and to differentiate functions defined as integrals.
 - Using rules of integrals and substitution technique, calculate elementary integrals with pencil and paper,
 - Using computer algebra software, calculate indefinite and definite integrals.
 - Use integration to find the area under curves and the area between curves.

Zoom Group Meetings (optional)

The group meetings twice a week (one hour each time) are for practice purpose and it is also my chance to answer your questions regarding course material, homework problems and exam preparation. These meetings will be recorded and posted for students who miss them.

Homework

Homework will be assigned for each week and will be graded within 24 hours within the deadline. Homework assignments worth 100 in total. Homework problems are considered as a minimum set and you are always encouraged to do more. Show all steps to get credits. Students should write down HW solutions with steps. Scan the solution sheets (in pdf format) or take pictures of the sheets and have them submitted on Moodle.

Exams

There will be two tests and a cumulative final exam, each worth 100 points. A non-graphic calculator is permitted but you may not use any other resources. Using any additional help or resources will be viewed as violation of the honor code at Randolph College.

Since this is an online class, a short video clip (no more than two minutes) of the student solving at least one problem shall be submitted along with each test. Students may choose any problem on the test they want to tape for the video. The video clips are used only for the proof of independence of test taking, the correctness of the presentation on such video clips won't be considered in test grading.

Grading

Grades will be determined by your percentage out of the total possible 400 points with the standard:

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

Software

Wolfram Alpha is a computer algebra system, used in many scientific, engineering, mathematical, and computing fields. With the aid of Wolfram Alpha, we are able to simplify, solve, and graph given expressions. The results return fast and help to build our understanding to the problems.

A Discord discussion forum channel for this course will be posted on Moodle. Join the forum will help you easily get in touch with your instructor, TAs and peer students.

Key to Success

- Set up a study plan and stay solid with it. Summer class moves fast and students who are behind with some material usually find them challenged to catch up.
- Taking elaborate notes is highly recommended. This helps your mind to focus and stay penetrating.
- Try practice problems yourself before you play my solution video clips and open my solution sheet.
- Actively being engaged in group meetings and/or discussion channels.
- Solutions to homework problems and tests will be posted online once they are submitted. Use these wisely.
- Self-scheduled tutoring is available via Randolph College portal.

Tentative Schedule

Week of	Material
Week 1	Common Errors/Common Algebra Errors
Week 2	Limits and Continuity, Test 1
Week 3	Differentiation, Application of Derivatives
Week 4	Application of Derivatives, Integration, Test 2
Week 5	Integration, Supplementary Material, Final Exam