Math 1310, Section 004 (Tentative Syllabus)

Instructor: Dr. Gil Moss
Email: moss@math.utah.edu

Lectures: Mon, Tues, Wed, Fri 10:45 AM - 11:35 AM, in ST 205

Course website: the Canvas course page is available through CIS, and will contain vital course information.

Office: JWB 130
Office hours: to be announced

Exam times & place:

- Midterm 1: Friday, Feb 2 during class
- Midterm 2: Friday, Mar 2 during class
- Midterm 3: Friday, Apr 6 during class
- Friday, April 27, 2018, 10:30 am – 12:30 pm in regularly scheduled classroom (ST 205)


There will be weekly homework, weekly quizzes, weekly lab assignments, three midterm exams, and a comprehensive final exam. Homework will be turned in on Thursday in lab sections, and quizzes will typically be given every Friday via Canvas, except during exam days and holidays. The instructor may adjust these due dates if needed. The three lowest homework scores and two lowest quiz scores will be dropped. The grading rubric is as follows:

Homework: 12%
Final exam: 30%
Midterm exams: 10% each
Quizzes: 10%
Labs: 18%

Details are as follows:

1. **Homework:** Problems from roughly three to four textbook sections are due every Thursday, covering the material of the preceding week. If you click on a homework assignment, you will see a list of problems, about three of which will be randomly selected for grading by the grader. The lowest three homework scores will be dropped. **Homework will only be accepted in class at the beginning of lab section. No electronic copies and no late homework will be accepted.**
2. **Quizzes**: On Fridays, a short quiz will be administered through Canvas. The quiz will cover relevant topics covered in the week's lectures and in the lab section group work. The lowest two quiz scores will be dropped.

3. **Midterm exams**: Three 50-minute midterm exams will be given on select Fridays.

4. **Final exam**: A two-hour comprehensive exam will be given covering the entire content of the course.

5. **Lab**: Every Thursday students will meet for their laboratory section (in a different classroom than lecture). These lab days will be spent working on more challenging homework problems. The lab problems are to be completed and turned in the following Thursday. In lab, students will work in groups, supported by the Teaching Assistant. The goal of these problems is to give students a deeper understanding of the mathematical concepts and how they are applied. Students will improve problem solving skills, including combining multiple techniques to solve a problem, and interpreting results within context. The lowest lab score will be dropped.

Letter grades will be assigned roughly according to the following guideline, but can be changed at the discretion of the instructor. If X is your percentage grade, then {X ≥ 93% ⇒ A, X ≥ 90% ⇒ A−, X ≥ 87% ⇒ B+, X ≥ 83% ⇒ B, X ≥ 80% ⇒ B−, X ≥ 77% ⇒ C+, X ≥ 73% ⇒ C, X ≥ 70% ⇒ C−, X ≥ 67% ⇒ D+, X ≥ 63% ⇒ D, X ≥ 60% ⇒ D−, X < 60% ⇒ E}.

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice must be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

**Course learning objectives**

**Tools and skills**

- Students will understand how to transform functions into other functions through x- and y-translations and rescaling, re-parameterizations, and function composition. Students will also know the properties of special classes of functions including logarithms, exponential functions, polynomials, and rational functions; and know how to obtain function inverses $f^{-1}(y) = x$ when they exist.
- Students will master the concept of a limiting value of a function $f(x) = y$ when $x$ approaches a value $c$, know when limits exists, utilize limit laws, how the property of continuity of a function at $c$ relates to its limiting value, how asymptotic behavior can be described by limits, and how limiting values can be specified even when the $f(c)$ is not defined.
- Students will understand how to use limits to compute the derivative $f'(x)$ to describe the rate of change of a function $f(x)$. Students will be able to utilize derivatives to model how two related quantities change with respect to each other, including motion of objects in terms of velocity and acceleration. Students will learn methods of differentiation for several classes of functions including exponential and logarithmic functions, trigonometric and inverse trigonometric functions, power functions, compositions, sums, products, and quotients of functions, as well as
differentiating functions that are only implicitly defined by an equation. Students will also be
able to use the derivative in applied contexts, including function approximation, and how the
average slope of a function relates to the derivative through the mean value theorem. If two
quantities are related by an equation, students will be able to obtain the derivative of one
quantity by knowing the derivative of the other. Students will know how to use linear
approximations to perform numerical/algorithmic equation solving via Newton's method.
Students will be able to use the derivative to find maximum, minimum, or otherwise "optimal"
input values for equations important in science, business, and engineering.

- Students will understand the definition of the integral as the limiting value of an increasingly
large average of function values. They will be able to relate the integral to anti-differentiation,
when appropriate, through the fundamental theorem of calculus. Students will also be able to
relate the integral to the area under the function's curve, know how to approximate the integral
by a finite sum, and how to integrate over infinite-length domains. Specific integration
techniques will also be mastered, including substitution, integration-by-parts, and partial
fractions. Finally, students will understand the key concept underlying integration: that it
computes the net accumulation of a quantity by summing the change in the quantity per unit of
time or space, across a specified interval of time or space.

Problem solving skills:

Students will also gain problem solving skills. Students will be able to read and interpret problem
objectives, be able to select and execute appropriate methods to achieve these objectives, and be able to
interpret and communicate results.

Week by week guide:

Week 1: 1.3, 1.5-6 Functions, Compositions, Exponential Function, Logarithms, Inverse Functions
Week 2: 1.7, 2.1-2 Parametric Curves, Tangent and Velocity, Limits (MLK Jr. Day is Monday, Jan 15)
Week 3: 2.3-2.5 Limit Laws, Continuity, Limits at Infinity
Week 4: 2.6-7 Derivatives and Rates of Change, Derivative as a Function, Midterm 1 Friday Feb 2.
Week 5: 2.8,3.1-2 Functions and Their Derivatives, Derivatives of Polynomials and Exponential
Functions, Product and Quotient Rules
Week 6: 3.3-5 Derivatives of Trig Functions, Chain Rule, Implicit Differentiation
Week 7: 3.6-9, Inverse Trig Functions, Log Functions and their Derivatives, Scientific Applications,
Linear Approximation and Differentials (Presidents' day is Monday, Feb 19)
Week 8: 4.7, 4.2-3 Newton’s Method, Max and Min Values, Derivatives and Shapes of Curves,
Midterm 2 is on Friday, March 2nd.
Week 9: 4.3, 4.1, 4.5 Graphing, Related Rates ,l'Hopital's Rule
Week 10: 4.6, 4.8, 5.1 Optimization, Antiderivatives, Areas and Distances

SPRING BREAK: Mar 19-23

Week 11: 5.2-4 The Definite Integral, Evaluating Definite Integrals, Fundamental Theorem of Calculus

Week 12: 5.5-6 Substitution Rule, Integration by Parts Midterm 3 on April 6.

Week 13: 5.7, 5.9: Other Integration Techniques, Approximate Integration

Week 14: 5.10: Improper Integrals, Review

Week 15: Review. Last class is Tuesday, April 24 and final exam is on Friday, April 27.