

# Syllabus for Math 1320-001

**Instructor:** Dr. Predrag Krtolica

**Email:** krtolica@math.utah.edu

**Lecture when and where:** M,T,W,F 9:40 AM - 10:30 AM, <https://utah.zoom.us/j/97717012859>  
(Passcode: calc2)

**Course website:** check the Canvas course page in your CIS (you're in it now!)

**Office Hours:** Mondays 10:40am-11:30pm, Thursdays 5:00pm-5:50pm in  
(<https://utah.craniumcafe.com/predragkrtolica/lobby>)

**Final Exam time & place:** 5/3 at 8 am, in regular zoom-classroom.

**Midterm exam dates:**

Midterm 1: Friday February 26th (week 6)

Midterm 2: Friday April 9th (week 12)

**The textbook:** Calculus: Concepts and contexts, fourth edition, by James Stewart (ISBN- 978-0495557425)

**Weekly Workload:** The work you will complete in Math 1320 comprises weekly homework and quizzes, weekly lab assignments, two midterm exams, and a comprehensive final exam. Homework will be turned in typically on Fridays, and quizzes will typically be given every Friday except during exam days and/or holidays. The instructor will adjust the due dates when needed. The two lowest homework and quiz scores will be dropped. Assignment weightings, point values, and grading rubrics are given to the right of this document, but could be slightly changed by instructor discretion.

Details about the content of each assignment type are as follows:

**Homework:** Roughly three to four textbook sections are due every Friday from lectures covering through the preceding week to Thursday. If you click on a homework assignment, you will see listings of problems, about three of which will be randomly selected for grading by the grader. Three of a student's lowest homework scores will be dropped. No late homework will be accepted.

**Quizzes:** At the end of most Friday classes, a short 1-4 problem quiz will be given online in 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.

**Midterm exams:** Two 50-minute midterm exams will be given on select Fridays. A practice exam and knowledge checklist will be posted roughly a week prior to the midterm that will cover the same material.

**Final exam:** A 90-min comprehensive exam will be given covering the entire content of the course. As with the midterms, a practice final will be posted about a week prior. The exam will be held on the date set by the university final exam schedule.

**Lab:** Every Thursday students will meet for their laboratory section. These lab days will be spent working on more challenging homework problems. Students will work in groups, with facilitation by the Teaching Assistant. The goal of these problems is to give students a deeper understanding of how the mathematics is applied, with the goal of concept learning, and improving problem solving fluency---the skill of orchestrating many methods and skills, and interpretation of results, in order to achieve and stated objective. The lowest lab score will be dropped.

Letter grades are determined as follows: If  $X$  is your percentage grade, then  $\{X \geq 93\% \Rightarrow A, X \geq 90\% \Rightarrow A-, X \geq 87\% \Rightarrow B+, X \geq 83\% \Rightarrow B, X \geq 80\% \Rightarrow B-, X \geq 77\% \Rightarrow C+, X \geq 73\% \Rightarrow C, X \geq 70\% \Rightarrow C-, X \geq 67\% \Rightarrow D+, X \geq 63\% \Rightarrow D, X \geq 60\% \Rightarrow D-, X < 60\% \Rightarrow E\}$ . Letter grade assignments can be changed at the discretion of the instructor.

Exams will be scored on gradescope.com. Regrade requests (in gradescope, not email) must be lodged in a timely fashion within a week of grade posting. Final exams will be posted and three days will be allotted to lodge regrade requests before final scores are posted. Regrade requests can be used to simply ask a question about the problem and you are encouraged to do so. Regrade requests may involve crafting an argument for why you deserve more points. All regrade requests will be considered but should be based on the facts of the problem, the rubric employed, and the work given on the page of the exam. The goal of grading is to fairly apply a grading procedure to every student, so, a regrade request may result in a increase, or no change in score, and in rare cases a decrease in score.

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 needs to 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:**

#### The tools and skills

Students will be able to utilize methods of integration to compute volumes of objects with circular-shaped aspects, and compute lengths of curves. These applications introduce a higher-level concept of integration, involving the summation of small volume segments  $dV$  or small length segments  $ds$ , which are computed by performing an appropriate parameterization to a real-number-line integral in terms of  $dx$ .

Students will be skilled in using integration to compute problems important in physics and engineering. Students will know how to compute of an average value of a function using the

mean value theorem for integrals, the center of mass for objects, and the computation of energy as a force integrated over a distance.

Students will become skilled in computations and applications of infinite sequences and sums. Students will become familiar with the properties of infinite sums to either converge to a finite value or diverge to an infinite value, and will learn about methods to determine convergence. Students will be able to represent functions as a Taylor series, and use Taylor's theorem to approximate functions and estimate error from using finitely many terms of the Taylor series.

Students will learn important tools of calculus in higher dimensions. Students will become familiar with 2- and 3-dimensional coordinate systems, vectors and vector operations including the dot and cross product, and equations of lines, planes, and other surfaces. Students will also learn how to represent motion of objects in 3D using vector functions, how to represent velocity and acceleration using vector projections into tangential and centripetal coordinates of acceleration, and how to characterize curves in space by computing arc length and curvature. For functions of 3D surfaces, students will be able to characterize aspects of surfaces and volumes using partial derivatives and the gradient vector. Partial derivatives will also be used to describe approximating tangent planes to points on surfaces, and how to compute derivatives of multi-dimensional function compositions can be performed using a multi-dimensional version of the chain rule.

Students will also learn the elementary procedures of multivariable integration on varied 2- and 3D domains using cartesian and polar coordinates. Students will learn applications of double and triple integrals including center-of-mass, moments, and probability.

### **Problem solving fluency**

Students will be able to read and understand problem descriptions, then be able to formulate equations modeling the problem usually by applying geometric or physical principles. Solving a problem often requires a series of transformations that include utilizing the methods of calculus. Students will be able to select the appropriate calculus operations to apply to a given problem, execute them accurately, and interpret the results using numerical and graphical computational aids.

Students will gain experience with problem solving in groups. Students should be able to effectively transform problem objectives into appropriate problem solving methods through collaborative discussion. Students will also learn how to articulate questions effectively with both the instructor and TA, and be able to effectively articulate how problem solutions meet the problem objectives.

**Addressing Sexual Misconduct:** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

**Student Names & Personal Pronouns:** Class rosters are provided to the instructor with the student's legal name as well as "Preferred first name" (if previously entered by you in the Student Profile section of your CIS account). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class, on papers, exams, group projects, etc. Please advise me of any name or pronoun changes (and update CIS) so I can help create a learning environment in which you, your name, and your pronoun will be respected. If you need assistance getting your preferred name on your UIDcard, please visit the LGBT Resource Center Room 409 in the Olpin Union Building, or email [bpeacock@sa.utah.edu](mailto:bpeacock@sa.utah.edu) to schedule a time to drop by. The LGBT Resource Center hours are M-F 8am-5pm, and 8am-6pm on Tuesdays.

**Safety Statement:** The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit [safeu.utah.edu](http://safeu.utah.edu)

**Come to my office hours.** This time is scheduled for you to come and ask questions on any of the material covered in class/homework/exams or any mathematical inquiry you may have.

#### **Additional Help:**

- Math Center Online Tutoring, (Paid for by Your Student Fees):  
<https://www.math.utah.edu/undergrad/mathcenter.php>
- The Learning Center, 3 free tutoring sessions, \$5 after that, learning consultations:  
<https://learningcenter.utah.edu/>
- Here is information from the University about logistics in light of COVID-19. There is also information about financial assistance, counseling, the food pantry, and much more:  
<https://coronavirus.utah.edu/#students>.

**Incompletes:** According to university policy, to be considered for an incomplete, a student must have 20% or less of the course work remaining and be passing the course with a C or better. You must request an incomplete grade and I will consider giving that grade only under exceptional circumstances.

**Syllabus subject to change:** This syllabus is meant to serve as an outline and guide for our course. Please note that I may modify it with reasonable notice to you. I may also modify the Course Schedule to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas.

## Week by week guide:

### Week 1: Integration applications

- 6.4: Arc length
- 6.5: Average values of a function
- 6.6: Applications of integration to engineering (work/energy integrals)

### Week 2: Sequences and series.

- 8.1: Sequences
- 8.2: Series
- 8.3: Integral and comparison tests for series

### Week 3: Integral and comparison tests, other convergence tests, power series

- 8.4: Other convergence tests
- 8.5: Power series

### Week 4: representing functions as power series, Taylor polynomials and applications;

- 8.6: Representing functions as power series
- 8.7: Taylor and maclaurin series
- 8.8: Applications of Taylor polynomials

### Week 5: Vectors, Dot Product

- 9.1: Three dimensional coordinates
- 9.2: Vectors
- 9.3: Dot product

### Week 6: Review of series; Midterm 1

### Week 7: Cross Product, Equations of Lines and Planes, Functions and Surfaces,

- 9.4: Cross product
- 9.5: Equations of lines and planes
- 9.6: Functions and Surfaces (cover lightly)
- 9.7: Cylindrical and Spherical coordinates (cover lightly)

### Week 8: Vector Functions, Arc Length and Curvature

- 10.1: Vector functions and space curves
- 10.2: Derivatives and integrals of vector functions
- 10.3: Arc length and curvature (cover curvature lightly)
- 10.4: Velocity, acceleration in space

**Week 9:** Multivariate functions

- 10.5: Parametric surfaces (cover very lightly)
- 11.1: Functions of several variables

**Week 10:** Partial Derivatives

- 11.2: Limits of multivariate functions (cover lightly)
- 11.3: Partial derivatives
- 11.4: Tangent planes and linear approximation
- 11.5: Chain rule

**Week 11:** Directional derivatives and gradient vector, optimization.

- 11.6: Directional derivatives and gradient vector
- 11.7: Maximum and minimum values
- 11.8: Lagrange multipliers

**Week 12:** Lagrange, Multivariate integration.

- 12.1: Double integrals
- 12.2: Iterated integrals
- **Midterm 2**

**Week 13:** Polar coordinates and applications

- 12.3: Integration on general regions
- 12.4: Polar coordinates

**Week 14:** Polar coordinates and applications

- 12.5: Probability and center-of-mass
- Review

**Week 15:** review and final exam

**Final exam:** 5/3 at 8 am in the usual zoom meeting room.