

Time & Location	MTWF, 8:35-9:25 AM in WEB (Warnock Engineering Building) L110
Instructor	Chris Miles
Contact	Office hours: T 2-3 PM, W 9:30-10:30 AM (after class) or always available by appointment Office location: LCB (LeRoy Cowles building) 326 Email: miles@math.utah.edu Website: www.math.utah.edu/~miles
Lab information	Instructor: Matthew Smith (msmith@math.utah.edu) Section 11: Th 7:30-8:20 AM in JWB (John Widtsoe building) 208 Section 12: Th 8:35-9:25 AM in LCB 323
Textbook	<i>Calculus: Concepts and Contexts</i> , 4 th edition by James Stewart, ISBN: 9780495557425. (required) <i>Student solutions manual for Stewart's Calculus</i> (chapters 8-13), ISBN: 9780495560555. (optional)
Course website	Canvas will be used regularly for this course. It can be access via my website or at: utah.instructure.com .
Grading	The grade for each student will be calculated by the following breakdown: homework (10%) + lab (15+5=20%) + quizzes (15%) + 2 exams (2x15=30%) + final (25%). Attendance to the lab section is required , and will count for 5% of a student's total grade. The remaining 15% of the lab grade will be determined by the lab submissions that will be graded. The policies, grading criteria, and expectations of the lab will be communicated by the lab instructor the first week. Questions about the content or grading of the lab should be directed toward the lab instructor. Homework assignments will be given either at the end of class or on Canvas. A subset of the problems will be selected to be turned in weekly (likely every Wednesdays) and will be graded for both completeness and correctness , but all of the problems assigned are recommended to the student to attempt and are considered "fair game" for material on exams and quizzes. Questions about homework can be asked in lecture <i>prior</i> to the homework being due. Late homework will not be accepted. Quizzes will be every Friday unless noted otherwise. They will be approximately 15-20 minutes in length and given at the beginning of class. They will cover the material discussed in class since the previous quiz. Missing a quiz results in 0 for that quiz and there will be no make-ups, but the lowest quiz grade will be dropped from every student's score. There will be two in-class mid-term exams. They are tentatively scheduled for the weeks of February 23rd and April 6th . Exact dates will be announced closer to the exam and will be determined based on the pace of the course.
Final exam	All students are expected to take the comprehensive final exam and cannot pass the course without taking it. The room will be announced during the last week of classes. All students are expected to arrange their personal schedule to allow them to take the exam at this time. Students with conflicts should speak to the instructor as soon as possible but unless it is an absolute emergency no student will be allowed to take the final exam early. Note the time: FINAL EXAM: THURSDAY, APRIL 30, 2015 8:00 – 10:00 AM
Resources	The math department offers free drop-in tutoring for students. The center is located underneath the walkway between LCB and JWB and can be accessed by entering either building. They are open M-Th 8:00 AM-8:00 PM and F 8:00 AM-6:00 PM.
Cheating	If a student is caught cheating on any homework, quiz, or exam, they will automatically receive a 0 for that assignment. Depending on the severity of the cheating, they may fail the class.
Course objectives	The goal of 1320 is to continue to master the basic tools for the study of functions $f(x) = y$, termed the <i>calculus</i> , and use these tools for solving problems in science and engineering. These basic tools and problem solving skills are described below. 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 also be able to utilize physical laws to formulate differential equations that solve for the motion of masses by forces of gravitation, friction, electrostatics, to name a few. Students will also become familiar with the phenomenon of exponential growth and decay in science and engineering contexts.

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 also 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.

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.

ADA statement

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.

Schedule

Week 1: §6.1-6.4 — Volumes by Disks, Washers, Shells, Arc Length

Week 2: §6.5-6.6, §7.1 — Average Values, Applications to Engineering, Modeling with Differential Equations

Week 3: §7.2-7.4 — Direction fields, Separable Equations, Exponential Growth and Decay

Week 4: §8.1-8.3 — Sequences, Series, Convergence tests

Week 5: §8.4-8.6 — Sums, Power Series, Representing Functions with Power Series

Week 6: §8.7-8.8 — Taylor and Maclaurin Series, Applications of Taylor Polynomials

Week 7: §9.1-9.3 — Three Dimensional Coordinates, Vectors, Dot Product, **Midterm Exam 1 on weeks 1-6**

Week 8: §9.4-9.5 — Cross Product, Equations of Lines and Planes

Week 9: §9.6-10.1 — Functions and Surfaces, Vector Functions, Space Curves

Week 10: §10.2-10.3 — Derivatives and Integrals of Vector Functions, Arc Length, Curvature

Week 11: §10.4-10.5 — Velocity, Acceleration, Parametric Surfaces

Week 12: §11.1-11.3 — Functions of Several Variables, Partial Derivatives, **Midterm Exam 2 on weeks 7-11**

Week 13: §11.4-11.5 — Tangent Planes, Linear Approximation, Chain Rule

Week 14: §11.6-11.7 — Directional Derivative, Gradient Vector, Maximum and Minimum Values

Week 15: §11.8 — Lagrange Multipliers, Review

Week 16: Finals Week: Comprehensive Final Exam

Note: This syllabus is **not** a binding legal contract. It may be modified by the instructor when the student is given reasonable notice of the modification.