**Mathematics 1210, Sections 4 and 10 Calculus I Fall 2018**

**Class Times and Place:**
1210−004, MTWF, 9:40−10:30, JWB 335
1210−010, MTWF, 10:45−11:35, JWB 335

**Instructor:** Ken Golden, Distinguished Professor of Mathematics
LCB 328, 801-581-6176 (office), 801-750-8555 (mobile)
kenatmath@gmail.com, golden@math.utah.edu
website: www.math.utah.edu/∼golden

**Office Hours:** Mondays 11:45 AM – 12:45 PM, by appointment, or most days after class.

**Text:** *Calculus with Differential Equations, 9th Edition*, Varberg, Purcell and Rigdon

**Course Materials:** Practice exams, the syllabus, help schedules, etc. can be obtained at www.math.utah.edu/∼golden.

**Course Description:** Mathematics 1210 is an introduction to differential and integral calculus. Limits, derivatives, and integrals are developed as tools to analyze the properties of functions. Applications include motion and rates of change, optimization and approximation methods, differential equations, and the calculation of areas, volumes, and lengths.

**Teaching Assistants (TA's):**
Eli Clark, clark@math.utah.edu, 801-581-7653, LCB Loft.
Kanyarat (Kate) Jitmana, jitmana@math.utah.edu, 801-581-7653, LCB Loft.

**Learning Assistants (LA's):**
**Section 4.** Ruby Bowers, u1026909@utah.edu, Spencer Eiting, u0720369@utah.edu, Yinke Cheng, u1170587@utah.edu.
**Section 10.** Emma Fine, u0948902@utah.edu, Konrad Serbinowski, u0980975@utah.edu.

**Discussion Hours:** There will be optional discussion sessions conducted by the TA's. During these sessions you can get help with webwork problems, exams, etc. Schedule of time and place will be posted.

**Labs:** Every Thursday Learning Assistant (LA) – directed lab sections will be held. These lab sections are **required**, they will have much smaller class sizes, and you will work on lab worksheets in groups. The LA will be there to help guide students through the problems. The worksheets will typically be due at the end of the lab period. The lowest lab score will be dropped.

## Getting Help:

- **Using WeBWorK:** You will access the webwork system through your Canvas login. In class we will briefly go over how the webwork system works. If you encounter any problems, please contact TA Eli Clark, and give your full name, course number and section, and student ID number.
- **Webwork feedback button:** When you use the feedback button within an exercise, state your question clearly. All relevant data about your question and answers is sent to your TA. Please don't over-use this option, the TA's will be getting lots of emails.

- **Tutoring Center & Computer Lab:** There is free tutoring in the T. Benny Rushing Mathematics Student Center (Room 155, the lower level between JWB and LCB), as well as a computer lab. For more information see http://www.math.utah.edu/undergrad/mathcenter.php
- **Private Tutoring:** University Tutoring Services, 330 SSB. There is also a list of tutors at the math department office JWB 233.
- **Departmental Videos:** The math department has a full set of lecture videos which you are welcome to use to supplement our course material. These can be found at http://www.math.utah.edu/lectures/

### Grades and Exams:

- (50%) Your two best scores on three in-class exams. The lowest of your three exam scores is dropped automatically in calculating the final grades. There are NO MAKE-UP EXAMS. You may bring one sheet of paper and a calculator to any exam, but NO laptops or wireless devices. Please bring University ID to all exams.
- (25%) Final exam.
- (15%) WeBWorK assignments.
- (10%) Lab participation and worksheets.

### Course Outline:

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|---|---|---|---|---|
| August | 20-24 | 0.1-0.7, 1.1 | Real Numbers, Functions, Limits | |
| | 27-31 | 1.3-1.5 | Limit Theorems | |
| September | 4-7 | 1.6, 2.1-2.2 | Continuity, The Derivative | |
| | 10-14 | 2.3-2.4 | Finding Derivatives | EXAM I (Sept. 14) |
| | 17-21 | 2.5-2.6 | Chain Rule; Motion | |
| | 24-28 | 2.7-2.9 | Applications of Derivatives | |
| October | 1-5 | 3.1-3.3 | Maxima and Minima | |
| | 8-12 | | FALL BREAK | |
| | 15-19 | 3.4 | Practical Optimization Problems | EXAM II (Oct. 19) |
| | 22-26 | 3.5-3.7 | Graphing, Mean Value Theorem | |
| November | 29-2 | 3.8-3.9 | Antiderivatives; Differential Equations | |
| | 5-9 | 4.1-4.2 | Area, Riemann Sums and Integrals | |
| | 12-16 | 4.3-4.5 | Fundamental Theorem of Calculus | EXAM III (Nov. 16) |
| | 19-21 | 4.6, 5.1-5.2 | Applications of Integrals | |
| | 26-30 | 5.3-5.4 | Volumes, Arc Length | |
| December | 3-7 | 5.5-5.7 | Work, Moments, Probability | |
| | 10-14 | | | FINAL EXAMS |

**FINAL EXAM SCHEDULE**
1210-004: Wednesday, December 12, 8:00 AM - 10:00 AM, JWB 335
1210-010: Friday, December 14, 10:30 AM - 12:30 PM, JWB 335

**Expected Learning Outcomes**
Upon successful completion of this course, a student should be able to:

1. Take limits of algebraic and trigonometric functions, including expressions of the form $0/0$ and a non-zero number over 0; be able to explain why certain limits exist and others do not.

2. Understand the limit definition of the derivative; be able to use the limit definition to find the derivatives of polynomial, rational and some trigonometric functions; understand the definition of continuity and its consequences.

3. Differentiate all polynomial, rational, radical, and trigonometric functions and compositions of those functions; perform implicit differentiation and compute higher order derivatives. Understand that in the context of one dimensional motion the time derivative of the position is the velocity and its second derivative is acceleration.

4. Understand that Newton's famous second law of motion $F = ma$, as well as many other fundamental laws in science and engineering, are differential equations; in the case of a falling object know how to solve Newton's law for the position and velocity of the object and find the basic parameters of the motion.

5. Be able to find and use the following information to sketch the graph of a given function: use differentiation to find critical points, inflection points, and the signs of the first and second derivatives; use domain and limit information to determine vertical and horizontal asymptotes.

6. Apply differentiation to optimization, related rates, linear approximation, and problems involving differentials.

7. Compute indefinite integrals and find antiderivatives, including finding constants of integration given initial conditions.

8. Compute definite integrals using the definition for simple polynomial functions. Compute definite integrals using the power rule, basic substitution, and the Fundamental Theorems of Calculus.

9. Apply the definite integral to compute area between two curves, volumes of solids of revolution, arc length, surface area for surfaces of revolution, and work problems.