

## Math 171 Calculus I, Section 80: Autumn '16

**Catalog Description for Math 171** Offered autumn and spring. Prereq., M 122 or 151 (MATH 112 or 121) or ALEKS placement  $\geq 5$ . Differential calculus, including limits, continuous functions, Intermediate Value Theorem, tangents, linear approximation, inverse functions, implicit differentiation, extreme values and the Mean Value Theorem. Integral Calculus including antiderivatives, definite integrals, and the Fundamental Theorem of Calculus.

### Learning Outcomes:

Upon completion of this course, a student will be able to:

1. Explain the  $\epsilon$ - $\delta$  definition of limit, how to compute it in elementary cases, and how to determine the limits of transcendental, rational and piecewise defined functions;
2. Define infinite limits, limits at infinity, asymptotes, indeterminate forms and how to use L'Hôpital's Rule;
3. Explain the limit definition of continuity;
4. Explain the limit definition of the derivative of a function, how it relates to the function itself, and how to use it to compute derivatives;
5. Use derivatives to find tangent lines to curves and velocity for particle motion;
6. Apply the power, sum, product, and quotient rules of differentiation;
7. Use the derivatives of exponential, logarithmic, trigonometric and hyperbolic functions;
8. Explain implicit and logarithmic differentiation;
9. Apply the Intermediate and Mean Value Theorems;
10. Graphically analyze functions including using continuity and differentiation to determine local and global extrema, concavity, and inflection points;
11. Use the derivative to solve challenging related rate and optimization word problems;
12. Explain Newton's Method for estimating zeros of a functions;
13. Explain the Riemann integral, areas under graphs, antiderivatives and the Fundamental Theorem of Calculus;
14. Apply integration using the method of substitution.

**Teacher:** Greg St. George

Office: Math 313 (Third floor, in the elevator wing). Office phone: 243-4146  
e-mail: [gregory.stgeorge@umontana.edu](mailto:gregory.stgeorge@umontana.edu)

**Office hours:** To be announced.

**Text:** Hughes-Hallet, D. et al. (2009). Calculus, Single variable (6<sup>th</sup> ed.). Danvers, MA: John Wiley and Sons, Inc. We will also make use of other sources; I have an applied calculus

text of my own that I will put on reserve, and I will make an older, more rigorous book by Robert Adams available to the class by putting it on reserve at the library. (I will also have copies to lend.)

**Website:** Resources will be made available on Moodle.

**Evaluation:** The plan at this point is to have three tests and a final. There will be announced quizzes. There may be some turn-in problem sets, depending on the resources available to the instructor. The final grade is based on the numerical average of these scores. The score of the lowest test will be dropped, if this helps your average. However, we may have more or fewer tests based on how things go, and the class's desires.

Note that although attendance (& the daily homework assignments) play no role in your average and hence in your grade, the tests are based on everything that is done in class, and not just what is available in the text, which will mostly be used for homework assignments. The course as presented in class may and probably will vary considerably from the generic version which is presented in the text.

Note that because this is an honors course, we do not have to opt for the common final which the other sections are taking Friday evening of finals week. We also have the option of taking a final given according to the University's final schedule (usually available at the Provost's website). Extraordinary performance on the final may, at the instructor's discretion, be the basis for raising a grade. We will vote in class on our preference.

**Accommodation.** The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors and Disability Services for Students (DSS). If you think that you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommassen 154. I will work with you and DSS to provide an appropriate accommodation.

**Software and Calculators:** No calculators will be allowed on tests.

**Grading Scale:** The cutoffs for A is 0.9, for B: 0.8, for C 0.65, for D: 0.55. Pluses and minuses will be used, the increment is usually about 3 points. (e.g. to get a B+ the cutoff will be around 0.87.)

**Topics.** Although Calculus 1 is a fairly well-defined course, we may do a good deal of other material, including

**Academic Honesty:** All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.

**Student Conduct Code:** All students need to be familiar with the Student Conduct Code. You can find it on the "A to Z Index" link on the UM home page.