Dave Goulet (`goulet@`)
Office: D-221
Course Web Page: http://www.davegoulet.com/classes/ma431/2017_spring
Textbooks: *Calculus of Variations* by MacCleur and *Calculus of Variations* by Gelfand and Fomin.
Office hours will be posted outside of my office door and on my webpage later this week.

Overview   In a standard Calculus course, we're introduced to techniques which help minimize functions of real numbers. In this course, we introduce techniques to minimize functionals of real functions. This enables us to find paths which minimize work or duration, shapes which minimize surface energy, and paths followed by light through inhomogeneous materials. Within the framework of the Calculus of Variations, we can reformulate many physical laws in terms of the principle of least action or stationarity. We can also find ways to control complex systems without feedback. Although created by Newton at the same time as standard Calculus, this topic is rich with modern mathematical ideas, especially those relevant to the study of partial differential equations, symmetry groups, and differential geometry.

Homework   We'll have roughly one homework assignment per week. I'll assign homework about one week in advance of the due date. Homework will usually be due on Tuesday. Homework will be graded for completeness as follows:

- 100%: All problems completed and done mostly correctly.

- 80%: Some problems incomplete or poorly attempted.

- 60% or lower: Many problems incomplete or poorly attempted.

Quizzes   We'll have a quiz each time homework is due. Quizzes will be comprised entirely of problems related to homework assignments. Make sure you know how to do ALL of the homework problems before the quiz. Quizzes will usually occur on Tuesday.

Other Details

- Late work will not be accepted, except for good reasons. Good reasons include illness, job interviews, and also other reasons pre-approved by me.

- Attendance will effect your class participation grade.

- You're encouraged to cooperate and work together on homework, but simply copying is not acceptable. When you've finished working with someone else, you should be capable of writing up your solutions by yourself.

- Before you turn in your homework, you should be able to solve every problem. If not, get help from me during office hours.

- Bring your laptop to class. You will use it for in class assignments and for some quizzes.

- Grading will be weighted as follows: 30% homework, 30% quizzes, 20% class participation, and 20% for the final exam or project.

Grading   When grading quizzes, I will check that you have shown your work, used a valid method, and explained your ideas well using clearly written short sentences and equations. The majority of the points will be assigned based on how well you've explained things. Plugging into formulae without explaining your reasoning will result in a poor score. From a holistic point of view, I want to see that you understand the big ideas. I'm not looking for lengthy explanations, just a few concise and insightful words and sentences to accompany your mathematical work.