

Course Syllabus
Mathematics 5640 - Differential Geometry
Spring 2009

Instructors:

Eric Moorhouse, 216 Ross Hall, Tel. 766-4394, moorhous@uwyo.edu.

Dan Stanescu, 218 Ross Hall, Tel. 766-4380, stanescu@uwyo.edu.

Class time & room: MW 2:45PM to 4:00PM, RH 247.

Office Hours: TBA.

Required Text: *Differential Geometry: Curves-Surfaces-Manifolds*, W. Kühnel, 2nd Edition, AMS, 2006.

Course Description The course starts with the theory of curves in n -dimensional Euclidean space, then moves on to the theory of surfaces. These will first be regarded as embedded in Euclidean space, i.e. from the point of view of someone looking at them from outside. However, we'll soon discover how to describe their properties intrinsically, as their inhabitants would. This will allow us to proceed to the more general setting of manifolds of arbitrary dimension in both Euclidean spaces which are endowed with a positive definite metric and Minkowski space which doesn't share this property. The latter is important for an understanding of Einstein's relativity theory. Other topics that will be covered are the curvature of space and its description by the curvature tensor, spaces of constant curvature (negative or positive). Time permitting, we'll discuss a number of physical applications of the material towards the end of the semester.

Prerequisites Math 4200 or Math 4400, or permission of the instructors. The lectures will assume you have a firm knowledge of calculus, in particular vector calculus, linear algebra and analysis. Familiarity with basic topological concepts would also be an asset.

GRADING

• **Homework: 65%.** There will be approximately six sets of homework problems assigned during the course. Since there will be many new concepts which take time to grasp, the homework is very important. In general, the solutions will be required within one week from the date you've been assigned the homework. There will definitely be no make-ups for homeworks. As graduate students, you should strive to explain as well as possible your solution in writing, not only put the final result on paper. This will increase your chance of getting the maximum grade, since we can follow your thinking even if the final result is slightly incorrect. It will also greatly improve your writing/presentation skills.

• **Final exam or Final project: 35%.** A project will be assigned during the last week of classes and will be due at the end of the finals week. Working with others for the final project will be considered academic dishonesty. More than the homework, the project will be graded taking into consideration clarity of style and organization of the presentation, as well as technical correctness.

The information contained herein is tentative. If the instructors find that changes are necessary, they will announce them in class at least one week beforehand. If you have a physical, learning, or psychological disability and require accommodations, please let us know as soon as possible. You will need to register with, and provide documentation of your disability to, University Disability Support Services (UDSS) in SEO, room 330 Knight Hall, 766-6189, TTY: 766-3073.