Math 641, Differential Geometry I, Fall 2012

Course Math 641 meets MWF 3:10-4:00 in RH 102
Course web page http://mathcs.slu.edu/~clair/dg

Instructor Dr. Bryan Clair
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Ritter Hall 110, 977-3043

Office M 1-2, Th 10:30-11:30, F 10-11, or by appointment.
Hours Stop by my office anytime, and if I'm around I can usually help you.

Textbook *Manifolds and Differential Geometry*, Jeffrey M. Lee, AMS Graduate Studies in Mathematics, 2009.

Homework There will be regular homework assignments, with flexible due dates.

Exams The midterm exam will happen before Fall break, precise date TBA. The final exam is scheduled for Wednesday, Dec 12, 2:00-3:50

Grading Grading is on a straight scale (uncurved), with 90%,80%,70% guaranteeing at least A,B,C, respectively. Grading is weighted as follows:

> Homework: 40%
> Midterm Exam: 30%
> Final Exam: 30%

Honesty Students are expected to be honest in their academic work, as per the Honesty Policy of the College of Arts & Sciences. Plagiarism, cheating and dishonesty will be reported to the dean and may result in probation, expulsion, or worse.

Topics This semester is part one of a year long course, and covers material which would more traditionally be known as differential topology, with the second semester focusing more on the geometric aspects. Generally, we will cover the first five chapters of Jeff Lee's book. Highlights include:

Review of calculus in $\mathbf{R}^n$: Derivative as a linear transformation, chain rule, inverse and implicit function theorems.

Topological manifolds, issues of point-set topology.

Smooth manifolds and maps: Charts and atlases. Partitions of unity. Manifolds with boundary. Submanifolds and regular values.

Tangent vectors: The tangent space. Bundles. Vector fields.

Immersions, submersions. The Whitney embedding theorem.

Curves and surfaces. Curvature. Parallel transport. The Gauss-Bonnet theorem.

Lie groups. Lie algebras and the exponential map.

Schedule Monday, September 3: No class, Labor Day.

Monday, October 22: No class, Fall break.

Wednesday, November 21 and Friday, November 23: No class, Thanksgiving