SPRING 2005

MATH 435

Vector Analysis and Introduction to Differential Geometry

Instructor: Dragomir Dragnev, DRB 248, dragnev@math.usc.edu.

Office Hours: Mondays 10-11, Wednesdays 10-11 in the office, Wednesday 15-16 in Math Center (KAP 116) or by appointment.

Course Description: The course is an introduction to the differential geometry of curves and surfaces in 3-dimensional space.


Prerequisites: Calculus III (Math 226).

Topics Covered (with possible changes as the semester progresses):
- Parametrized curves, arc length.
- Local theory of curves parametrized by arc length; curvature, torsion, Frenet frame.
- Continuity and differentiability of functions of several variables.
- Regular surfaces; basic definitions and constructions.
- Parameter changes; differentiable functions on surfaces.
- Tangent vectors and the differential of a map.
- The first fundamental form; area.
- The Gauss map.
- The second fundamental form.
- Normal curvature, Gauss curvature, mean curvature.
- The Gauss map in local coordinates; Weingarten equations.
- Isometries and conformal maps between surfaces.
- Theorema Egregium.
- Geodesics and geodesic curvature.
- The Gauss-Bonnet theorem.
- Minimal surfaces.

Grading:
- 35% for the Final Examination.
- 20% for each of the midterm exams.
- 25% for the homework.