Instructor:
Prof. Jo Nelson
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Office: 402 Hermann Brown Hall (HBH)
Office hours: 3-4pm Monday, 12-1pm Wednesday

http://www.math.rice.edu/~jkn3/cursur.html

Dates and Locations:
Lectures: 2-2.50pm MWF
Midterm: take home, due 10/7
Final Exam: take home, due 12/13

Textbook:
S. Montiel and A. Ros, *Curves and Surfaces* Second Edition, GSM, Vol. 69

Workload and Pre-requisites:
This course is about the geometry of curves and surfaces in three-dimensional space. We will also study the "intrinsic" geometry of surfaces: that is, geometric notions which are described just in terms of the surface and not in terms of an embedding into higher dimensional euclidean space. A central theme of this course will be to study different kinds of curvature - defined locally on a curve (in chapter 1 of the book) or surface (in chapter 3) - and how curvature relates to global properties of the curve or surface (in chapters 4, 6, and 7). One of the main results in this direction which we will prove near the end of the course is the Gauss-Bonnet theorem (chapter 8).

We will follow the modern point of view on differential geometry by emphasizing global aspects of the subject whenever possible. In order to do this, we will introduce the concept of Lebesgue measure and Lebesgue integrals and revisit multivariable calculus from this perspective (chapter 5). Time does not permit us to rigorously develop all these foundations, which are treated in Math 425/515 (not a pre-requisite).

This course is intended to be a precursor to graduate courses in differential geometry and topology. Thus more emphasis is placed on self-learning and **lemmas and theorems will not typically be worked out in detail in lectures.** I will state key lemmas and theorems and summarize the main points. The TA will have a one hour review session each week discussing examples, which you will also be expected to attend, in addition to the weekly homework assignments. The first problem set is intended to be diagnostic in nature and intended to help you determine if you should stay in this course. **You should expect to spend 4-5 hours a week on homework and 1-2 hours a week reading the textbook each week.**

To succeed in this course you should be excited to learn more about the geometry of curves and surfaces, which were first introduced in multivariable calcuus. Mathematically you are expected to be comfortable with the basics of linear algebra, especially as it pertains to coordinate transformations, ordinary differential equations, and have some ease with the topology of Euclidean space. You will also need to comfortable with computations of line and surface integrals and other aspects of multivariable calculus and much of analysis in $\mathbb{R}^n$. Specifically assumed material includes open and closed sets, continuous maps, (local) compactness, (local and path) connectedness, partitions of unity, rank-nullity theorems, determinants, linear functionals, change of variables, inverse and implicit function theorems in $\mathbb{R}^n$, differentiability in several variables.

Grading Policy:
Attendance is mandatory and cell phones are prohibited without prior authorization. Multiple absences and repeated use of electronic devices may result in a full letter grade lowering at the end of the term.

There will also be weekly homework assignments. The lowest homework grade will be dropped. There will be one take home midterm and one take home final.

The exams are pledged take home exams. In particular, you are not permitted to work with other students and you are not permitted to consult the internet beyond the course Piazza page or other books when working on the exams. You are allowed to refer to the course textbook.

The grade breakdown will be:

- Homework: 30%
- Midterm: 30%
- Final: 40 %

Homework: *All homework questions should be posted to Piazza.* Written homework assignments are to be scanned and uploaded to http://gradescope.com on **Wednesdays** by 5pm. The homework is not pledged and you are encouraged to work together with your classmates on the assignments. However, you must write up your solutions individually. You are not allowed to look up solutions in any written form; in particular, you are not allowed to look up solutions online. Students caught violating this rule will be reported to the Honor Council. **Late homework will not be accepted, barring documented illnesses and emergencies.** Your lowest homework score will be dropped.

Exam Conflicts and Make-ups:
In the event of illness or family emergency I must be notified 12-24 hours in advance and documentation from the dean/magister must be provided to me.

Disability-related Academic Accomodations:
In order to receive disability-related academic accommodations, students must first be registered with the Disability Resource Center (DRC). Students who may need accomodations in this course should give me a written letter from the DRC within the first two weeks. More information on the DRC registration process is available online at https://drc.rice.edu/. Registered students must present an accommodation letter to the professor before exams or other accommodations can be provided. Students who have, or think they may have, a disability are invited to contact DRC for a confidential discussion.