Course Description

An area of beautiful 19th and 20th century mathematics concerns the interplay of analysis and topology on manifolds. A rigorous study of these topics requires many years of graduate study. In this course, we look at these ideas in the context of two-dimensional manifolds (i.e. surfaces). Many of these ideas are most clearly seen in this context and can be presented without a lot of machinery. We'll study the classification of compact surfaces, elementary aspects of algebraic topology (Betti numbers of surfaces, the Brower fixed point theorem, the Jordan curve theorem), a little Morse theory, Riemanninan metrics and the Gauss-Bonnet theorem, and the Poincaré-Hopf index theorem.

Essential Information

Professor	David Maxwell
Office	Chapman 308C
Email	`damaxwell@alaska.edu`
Phone	474-1196
Web	`http://www.math.uaf.edu/~maxwell`
Required Text	**Lectures on Surfaces: (almost) everything you wanted to know about them**, *A. B. Katok and V. Climenhaga*, AMS Press

Prerequisites:

Graduate standing **or** permission of instructor.

Class Time

There will be three hours of class lecture each week:

Lecture Times	
MWF	1:00–2:00

Office Hours

I will schedule 3 hours a week of formal office hours after consultation with my students.

My office hours will always be posted on my web site and on my office door. I have an open door policy; if I'm in my office and my door is open, please feel free to drop by with questions. You are also welcome to schedule a meeting outside of my formal office hours by sending me an email.

Homework

There will be a homework assignment due roughly every week, on a day we will pick together. Each week's assignment and due date will be announced in class and will be posted on my web page. I expect we will work through a majority of the exercises from the course text.

Regarding late homework, I will accept from each student a single late homework with no questions asked. Simply hand in a note in lieu of your homework on the week you wish to take advantage of the late homework policy. You will then hand in the homework no later than one week after it was due. Subsequent late homeworks will be accepted only under extenuating circumstances to be determined at my discretion.

Homework Solutions

In an exercise in collaborative mathematics, the class will create solutions for each week's homework. The hope here is that the process of creating the solutions will make the solutions themselves more valuable. Here are the ground rules:

1. Students can expect to contribute a solution at a rate of about one a week. I will occasionally write solutions to harder problems.
2. Solutions must be written in LaTeX. Diagrams can be handwritten and scanned or electronically generated.
3. I will assign problems to students in a pseudo-random fashion. That is, I'll try to assign them randomly, but I'll also keep an eye out to ensure that you don't get a hard problem twice in a row.
4. Submit your solutions (by email) to me by the evening before the assignment's due date. I'll review your work and ask for changes if need be.
5. At least once during the semester, your solution must include a (non-handwritten) diagram. The diagram must include both a picture of some kind, as well as mathematical text.
6. Participation in this exercise is included in your homework grade (and is equivalent to another homework assignment).

I reserve the right to adjust these guidelines if I find this exercise can be improved.

Project

Each student will complete a project for the class delving into an aspect of surfaces (or a related area of geometry or topology) either that we have not studied, or to a greater depth than we have studied. The goal of the project is for you to allow you to explore an area of mathematics and report back on it to the class. Your project will consist of a 30 minute oral presentation and a short paper. We'll schedule the presentations for the last week of class. More details on the written component will be made available later in the class.

Midterm

There will be one take-home midterm exam. It is tentatively scheduled to be posted on Friday, October 22 and will be due one week later.

Final Exam

There will be a take-home final exam and an in-class exam. The in class exam will be held on Wednesday, December 15, 1:00-3:00. The take-home exam will be handed out about one week prior to the in-class exam and will be due at the start of the in-class exam. The take-home exam will emphasize problem solving whereas the in-class exam will emphasize familiarity with definitions, theorems, and basic results.

Evaluation

Course grades will be determined as follows:

Homework	40%
Project	10%
Midterm	25%
Final	25%

Letter grades will be assigned according to the following scale. This scale is a guarantee; I also reserve the right to lower the thresholds.

A+	97–100%	C+	77–79%	F	≤ 59
A	93–96%	C	73–76%		
A-	90–92%	C-	70–72%		
B+	87–89%	D+	67–69%		
B	80–86%	D	63–66%		
B-	not given%	D-	60–62%		

Tentative Schedule

The following is a tentative list of the topics to be covered in this class. As we proceed in the course, the course web page will list specific sections to be read for each week.

Week	Topics and Events
9/3	Start Chapter 1
9/6 – 9/10	Chapter 1 Monday: Labor Day
9/13 – 9/17	Chapter 1
9/20 – 9/24	Chapter 2
9/27 – 10/1	Chapter 2
10/4 – 10/8	Chapter 3
10/11 – 10/15	Chapter 3
10/18 – 10/22	Chapter 3 Friday: Take-home midterm posted
10/25 – 10/29	Chapter 4 Friday: Last day to withdraw with a 'W'
11/1 – 11/5	Chpater 4
11/8 – 11/12	Chapter 4
11/15 – 11/19	Chapter 4
11/22 – 11/26	Chapter 5 Thursday: Thanksgiving
11/29 – 12/3	Chapter 5
12/6 – 12/10	Catch-up and presentations Friday: Take-home final posted
12/13	Exam Week Monday: Last day of class

Rules and Policies

Collaboration
You are encouraged to work together in solving homework problems. But each student must write up his or her own solutions independently. If you receive significant help solving a problem, it is customary to make a note in your homework to give the person who helped you credit.

Makeup Exams
You can make up an exam if certain extenuating circumstances prevent you from taking it and if you inform me in advance. Contact me as soon as possible if you are going to miss an exam.

Attendance
Attendance is not included directly as part of your grade.

Cell Phones
Turn off your cell phone before you come to class.

Disabilities Services
I will work with the Office of Disabilities Services (203 Whitaker, 474-7043) to provide reasonable accommodation to students with disabilities.

Incomplete Grade
Incomplete (I) will only be given in Computer Science, Mathematics or Statistics courses in cases where the student has completed the majority (normally all but the last three weeks) of a course with a grade of C or better, but for personal reasons beyond his/her control has been unable to complete the course during the regular term. Negligence or indifference are not acceptable reasons for the granting of an incomplete grade. (Note: this is essentially the old University policy.)

Late Withdrawals
A withdrawal after the university deadline from a Department of Mathematical Sciences course will normally be granted only in cases where the student is performing satisfactorily (i.e., C or better) in a course, but has exceptional reasons, beyond his/her control, for being unable to complete the course. These exceptional reasons should be detailed in writing to the instructor, department head and dean.

Academic Dishonesty
Academic dishonesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.