Course Syllabus: Math 3850A
Calculus on Manifolds
Department of Mathematics and Computer Science
University of Lethbridge, Spring 2017

Course instructor:	Sean Fitzpatrick	**Email address:**	sean.fitzpatrick@uleth.ca
Office:	UHall C540	**Course website:**	via moodle.uleth.ca
Office hours:	MWF 10:30 - 11:30 am, and 12:45 - 2:15 pm, or by appointment.		
Lectures:	TR 9:25 - 10:40 am in C630		

Course Description

This is a course in advanced calculus using the language of differential forms. This modern approach to calculus has several advantages: it makes sense in any dimension (while classical vector calculus is restricted to $\mathbb{R}^3$), and it is "coordinate independent," in the sense that the equations look the same in any coordinate system. This latter feature allows us to transport the machinery of calculus from "Euclidean" space ($\mathbb{R}^n$) to more general (possibly "curved") spaces.

The first part of the course will consist of developing the machinery of differential forms and seeing how we can re-write vector calculus in this language. We will then use this work as a concrete introduction to the idea of a *smooth manifold* – a generalization of the curves and surfaces encountered in a standard course in vector calculus. Time permitting, we will investigate several geometric stuctures that have applications to Physics.

Required Textbook:

The course textbook is *A Geometric Approach to Differential Forms*, 2nd ed., by David Bachman (Birkhäuser, 2012). The first edition of this text can be downloaded for free via the Library's e-books collection. In the second edition, the author removed some of the review material (on partial derivatives, etc.) and added more advanced material, including a number of introductory topics from Differential Geometry.

There are several other good references for this subject matter. I'll list some of these on Moodle.

Evaluation

Your grade will be determined according to the following table:

Component	Written Assignments	Midterm	Project	Final
Weight	30	20	10	40

Assignments:

There will be weekly written assignments. I'll aim for 11 assignments in total, and count your best 10 towards your grade. Each assignment will be relatively short (3 or 4 problems), but you can expect a difficulty level appropriate to a 3000-level course. You are allowed to ask me for help, either in person or online, and working together is perfectly acceptable, keeping in mind that – as usual – copying is unacceptable. The purpose of the assignments is to help you learn the course material. If you regularly borrow solutions from a classmate instead of figuring things out on your own, it will be reflected on your exam scores.

Project:

The project will consist of researching a topic related to the course material, and presenting your findings. You will have the option of doing either a written (essay) or oral presentation. Projects will be due in the last week of March, and you will have to meet with me before the end of February to discuss your choice of topic.

Exams:

The midterm exam will take place in class on Thursday, March 2nd. According to the generic exam schedule on the Registrar's Office website, our final exam is scheduled for Friday, April 21st, from 2 - 5 pm. The material covered on each exam will be announced at least one week prior to the exam.

Letter grade conversions:

The percentage grades earned in this class will be converted to letter grades according to the following table:

Letter grade:	A$^+$	A	A$^-$	B$^+$	B	B$^-$	C$^+$	C	C$^-$	D$^+$	D	F
Minimum % required:	95	85	80	77	73	70	67	63	60	55	50	0

Special arrangements:

If you are a student who has registered for accommodations with the Accommodated Learning Centre, please ensure that I am informed of the necessary arrangements as soon as possible, and please feel free to meet with me if there are any adjustments I can make to improve your learning experience.

Academic honesty:

Students are expected to be familiar with, and abide by, the rules laid out in the Academic Calendar regarding academic honesty, cheating, etc. and the penalties assessed for disregarding those rules.