Math 146 Syllabus

Winter 2018

Instructor: Laura Starkston

TA: Francois-Simon Fauteux-Chapleau

Description: This course is about how to integrate on manifolds—curved spaces in any dimension.

Recommended Textbooks: *Calculus on Manifolds* by Spivak (Chapters 1, 2, 4, 5) and *Differential Topology* by Guillemin and Pollack 1.1-1.4 and 4.1-4.7

There will also be course notes to supplement the texts.

The course is roughly divided into two parts:

**Part 1: Derivatives on manifolds**

1. Continuity and derivatives in Euclidean space, linear maps, partial derivatives, chain rule
2. Manifolds, atlas of charts, tangent bundle, derivatives on manifolds
3. Inverse function theorem, immersions, and embeddings
4. Implicit function theorem, submersions, regular value theorem

**Part 2: Integration on manifolds**

1. Change of variables for integration in $\mathbb{R}^n$
2. Differential forms, alternating tensors
3. Integrating differential forms on manifolds
4. Stokes’ theorem
5. deRham cohomology

Midterm: There will be take-home midterm exam in week 5.

Final: There will be a take-home final exam after the last lecture.

Grades:

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

Students with documented disabilities:

Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is made. Students should contact the OAE
as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 723-1066, URL: studentaffairs.stanford.edu).

**Affordability of Course Materials** Stanford University and its instructors are committed to ensuring that all courses are financially accessible to all students. If you are an undergraduate who needs assistance with the cost of course textbooks, supplies, materials and/or fees, you are welcome to approach me directly. If you would prefer not to approach me directly, please note that you can ask the Diversity & First-Gen Office for assistance by completing their questionnaire on course textbooks & supplies: http://tinyurl.com/jpqbarn or by contacting Joseph Brown, the Associate Director of the Diversity and First-Gen Office (jlbrown@stanford.edu; Old Union Room 207). Dr. Brown is available to connect you with resources and support while ensuring your privacy.