

**The University of Iowa
The College of Liberal Arts and Sciences
Spring 2024**

Title of Course: *Differential Topology (MATH:6410)*

Course meeting time and place: 10:30-11:20pm MWF 105 MLH

Department of Mathematics: <https://math.uiowa.edu/>

Course ICON site: To access the course site, log into [Iowa Courses Online \(ICON\)](#) using your Hawk ID and password.

Course Home

For Undergraduate Courses: The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the add and drop deadlines, the “second-grade only” option (SGO), academic misconduct policies, and other undergraduate policies and procedures. Other UI colleges may have different policies.

For Graduate Courses: The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the policies and procedures for its courses. Graduate students, however, must adhere to the [academic deadlines set by the Graduate College](#).

Instructor Contact Information

Office location: 25M MLH

Student drop-in hours: 2:30-3:20 MWF

Phone: N/A

E-mail: ben-cooper@uiowa.edu

DEO: *Ryan Kinser 14 MLH* ryan-kinser@uiowa.edu

Assistant Contact Information

Name: TBA

Office location: TBA

Office hours: TBA

Email: TBA

Description of Course

After the largely algebraic development of homology by Cartan, Eilenberg, Steenrod and others in the 1950s. In the 1960s these tools were related back to topology and geometry by the likes of Atiyah, Bott, Adams, Thom and many others. Building upon the theory of fibre bundles, Atiyah and Bott defined K-theory (the “geometric version” of homology). We will review many of these developments, with an aim towards applying these tools to important applications to geometry and algebra.

Prerequisites: MATH:6400 with a minimum grade of C-.

Learning Objectives

Our goal is to do Parts I and II of Husemoller's text on "Fibre Bundles". Part I covers fiber bundles, vector bundles, G-bundles. Part II covers Bott periodicity and K-theory. The course should culminate in Adam's approach to the Hopf invariant 1 problem and the problem of counting vector fields on spheres.

Textbook/Materials

Husemoller "Fibre Bundles" 3 Ed.
Google shows a free PDF copy on Andrew Ranick's website.

Academic Honesty and Misconduct

All students in CLAS courses are expected to abide by the [CLAS Code of Academic Honesty](#). Undergraduate academic misconduct must be reported by instructors to CLAS according to [these procedures](#). Graduate academic misconduct must be reported to the Graduate College according to Section F of the [Graduate College Manual](#).

Student Complaints

Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the Director or Chair of the school, department, or program offering the course.

Undergraduate students should contact [CLAS Undergraduate Programs](#) for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS [Associate Dean for Graduate Education and Outreach and Engagement](#) when additional support is needed.

Drop Deadline for this Course

You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the [drop deadline for this course](#) here. When you drop a course, a "W" will appear on your transcript. The mark of "W" is a neutral mark that does not affect your GPA. Directions for adding or dropping a course and other registration changes can be found on the [Registrar's website](#). Undergraduate students can find policies on dropping CLAS courses [here](#). Graduate students should adhere to the [academic deadlines](#) and policies set by the Graduate College.

Grading System and the Use of +/-

Overall numerical grades will be curved so that the class average is approximately B- (or 80%). The standard deviation is not adjusted. Letter grades will be assigned to close numerical scores subject to the constraints:

- Only grades A/A-/B+/B/B-/C+/C/C-/D+/D/D-/F are possible
- Numerical scores between any fixed letter grade are closer to one another than to scores associated to neighboring letter grades

An assessment of class standing or explanation of your grade is available at request.

Course Grades

Final course grades will be assessed based on your performance in the following activities:

- 30% Final exam (Cumulative)
- 20% Homework, assigned aperiodically.
- 50% Participation, based attendance.

The nature of the final exam will be discussed in class. It could be, for example, to write a short essay explaining some independent but related topic. Homework will be assigned inconsistently using ideas which stem from class interaction with course materials, it will be due whenever is appropriate and graded on the attempt students have made to address the course content with mathematical tools in a comprehensive way.

Date and Time of the Final Exam

The [final examination date and time](#) will be announced by the Registrar generally by the fifth week of classes and it will be announced on the course ICON site once it is known. **Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam.** According to Registrar's final exam policy, students **have a maximum of two weeks after the announced final exam schedule** to request a change if an exam conflict exists or if a student has more than two exams in one day (see the [policy](#) here).

Calendar of Course Assignments and Exams

- 1/15/2024: MLK day
- 1/17/2024: First day of class
- 3/11-3/15/2024: Spring Break
- 4/15/2024 Add-drop deadline
- 5/3/2024: Last day of class
- 5/6/2024-5/10/2024: Final exam week

Attendance and Absences

Attendance will be taken on a regular basis. If you are not in the class then you will not receive 10% attendance credit in your final grade.

[University regulations require that students be allowed to make up examinations](#) that have been missed due to illness, religious holy days, military service obligations (including service-related medical appointments), or other unavoidable circumstances or University-sponsored activities. Students with UI-authorized activities must discuss their absences with the instructor as soon as possible. Religious obligations must be communicated within the first three weeks of classes.

Other Expectations of Student Performance

- I will not give an incomplete to someone who is failing the class.
- I reserve the right to modify the course syllabus at any time.
- Students must maintain standards of behavior and basic decorum.
- You may not use any cell phones, computers or calculators on tests. Graphing calculators, cellphones, computers or smart watches are not allowed on tests.

Communication: UI Email

Students are responsible for all official correspondences sent to their UI email address (uiowa.edu) and must use this address for any communication with instructors or staff in the UI community. For the privacy and the protection of student records, UI faculty and staff can only correspond with UI email addresses.

Where to Get Academic Support for this Course

You may attend office hours or talk to older graduate students.

Mental Health Resources and Student Support

Students are encouraged to be mindful of their mental health and seek help as a preventive measure or if feeling overwhelmed and/or struggling to meet course expectations. Students are encouraged to talk to their instructor for assistance with specific class-related concerns. For additional support and counseling, students are encouraged to contact University Counseling Service (UCS). Information about UCS, including resources and how to schedule an appointment, can be found at counseling.uiowa.edu. Find out more about UI mental health services at mentalhealth.uiowa.edu.

[Student Care and Assistance](#) provides assistance to University of Iowa students who are experiencing a variety of crisis and emergency situations, including but not limited to

medical issues, family emergencies, unexpected challenges, and sourcing basic needs such as food and shelter. More information on the resources related to basic needs can be found at basicneeds.uiowa.edu/resources/. Students are encouraged to contact Student Care & Assistance in the Office of the Dean of Students (Room 135 IMU, dos-assistance@uiowa.edu, or 319-335-1162) for support and assistance with resources.

University Policies

Accommodations for Students with Disabilities

The University is committed to providing an educational experience that is accessible to all. If a student has a diagnosed disability or other disabling condition that may impact the student's ability to complete the course requirements as stated in the syllabus, the student may seek accommodations through [Student Disability Services](#) (SDS). SDS is responsible for making Letters of Accommodation (LOA) available. **The student must provide an LOA to the instructor as early in the semester as possible, but requests not made at least two weeks prior to the scheduled activity for which an accommodation is sought may not be accommodated.** The LOA will specify what reasonable course accommodations the student is eligible for and those the instructor should provide. Additional information can be found on the [SDS website](#).

Free Speech and Expression

Absences for Religious Holy Days

Classroom Expectations

Non-discrimination

Sexual Harassment/Misconduct and Supportive Measures

Sharing of Class Recordings (if appropriate)