Current Topology and Geometry II – MATH 7450
Spring 2023

Lectures:
11:30-12:20P, MWF, 218 MLH

Contact Information

- **Instructor**: Benjamin Cooper
  - Office Location: 25L MLH (or by appt in 983-968-6750)
  - Office Hours: 12:30-1:20 MWF
  - Email: ben-cooper@uiowa.edu

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

- All announcements and assignments for this course will appear on ICON.
  http://icon.uiowa.edu/

Goals and Objectives

Our main textbook will be Kashiwara and Shapira “Sheaves on Manifolds” which I will refer to as KS below.

- Our course will discuss three main topics
  - Homological algebra and category theory. Our first month or so will follow the first chapter of KS, resulting in a fairly rapid review of homological algebra of abelian categories, category theory: derived and triangulated categories.
  - Sheaves on manifolds. Our second month or so will follow KS chapters II and III. We introduce the abelian category of sheaves, it’s derived category, the six functor formalism and Fourier transforms.
  - Microlocal theory. For the third month we will follow KS chapters IV, V and VI. Our goal is to introduce a spaces associated to sheaves called microlocal support. This may require that we review a bit of symplectic geometry from the appendix of KS.
– Microlocal theory subordinate to a Legendrian knot. In the remainder of the semester we will follow parts of arXiv:1402.0490v2. Shende, Treumann and Zaslow STZ introduced a relative version of the microlocal theory, there is now a boundary condition given by a Legendrian knot. This work is an important starting point in the current literature, it will be understood in terms of our earlier investigations.

The goal of these lectures is to show students some recent aspects of the literature. There will be many questions and examples. Although we will follow KS, later STZ, we will give references to other sources for many topics and variations to enhance the breadth of the course.

Homework and Participation

• Problems which accumulate during lecture will be restated in a homework file.

• Students are expected to attend all lectures and work on course material regularly. The participation score will reflect student attendance.

• Important announcements about changes (if necessary) to the syllabus, homework, exams, etc. will be done in the lectures or on ICON.

Student Collaboration

Students are encouraged to collaborate on homework assignments. Any tests, quizzes or other materials should be completed without collaboration unless otherwise specified.

Quizzes and Exams

• Lecture notes will be uploaded when the iPad is used.

• In the event that I get sick we will switch to an online format until I am no longer infectious.

• In the event that you get sick, please let me know by email immediately. A positive COVID test from Urgent Care represents a valid excuse for missing class time. You will be expected to make up missed assignments.

Grading

A grade will be assigned to each class participant using their scores in the following proportions:

• 20% Homework, assigned once per week.
• 80% Participation, based attendance.

Grades will be based on S/U scale, which is different from ABCDF.

**Academic Honesty**

There will be serious consequences for anyone caught cheating in any way. Cheaters will be punished according to the standards and practices of the University of Iowa. This may include being reported to CLAS and receiving an ”U” on any fraudulent tests or quizzes.

**Other Policies**

• 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.

**Important Dates**

• 1/17/2020: First day of class

• 1/30/2020: Add-drop deadline

• 3/13/2023-3/17/2023: Spring break

• 4/17/2023: Last day to drop

• 5/5/2023: Last day of class

• 5/8/2023-5/12/2023: Final exam week
CLAS Insert

Attendance and classroom expectations

Students are responsible for attending class and for knowing an instructor’s attendance policies, which vary by course and content area. All students are expected to attend class and to contribute to its learning environment in part by complying with University policies and directives regarding appropriate classroom behavior or other matters.

Absences

Students are responsible for communicating with instructors as soon they know that an absence might occur or as soon as possible in the case of an illness or an unavoidable circumstance. Students can use the CLAS absence form to help communicate with instructors who will decide if the absence is excused or unexcused; the form is located on ICON within the top banner under “Student Tools.” Delays by students in communication with an instructor could result in a forfeit of what otherwise might be an excused absence (https://clas.uiowa.edu/students/handbook/attendance-absences).

Absences: illness, unavoidable circumstances and university sponsored activities

Students who are ill, in an unavoidable circumstance affecting academic work, or who miss class because of a University sponsored activity are allowed by UI policy to make up a missed exam. Documentation is required by the instructor except in the case of a brief illness. Students are responsible for communicating with instructors as soon as the absence is known (https://opmanual.uiowa.edu/students/absences-class#8.1).

Absences: Holy days

Reasonable accommodations are allowed for students whose religious holy days coincide with their classroom assignments, tests, and attendance if the student notifies the instructor in writing of any such religious Holy Day conflicts within the first days of the semester and no later than the third week. (See the UI Operations Manual, https://opsmanual.uiowa.edu/students/absences-class#8.2).

Absences: Military service obligations

Students absent from class due to U.S. veteran or U.S. military service obligations (including military service-related medical appointments, military orders, and National Guard Service obligations) must be excused without penalty. Instructors must make reasonable accommodations to allow students to make-up exams or other work. Students must communicate with their instructors about the expected possibility of missing class as soon as possible. (For more information, see https://opmanual.uiowa.edu/iv-8-absences-class%2C%20Military%20service).

Academic Misconduct

All undergraduates enrolled in courses offered by CLAS have in essence agreed to the College’s Code of Academic Honesty. Academic misconduct affects a student’s grade and is reported to the College which applies an additional sanction, such as suspension. Outcomes about misconduct are communicated through UI email (https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code).

Academic accommodations for students with disabilities

UI is committed to providing an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as a mental health, attention, learning, vision, and a physical or health-related condition) through the Student Disability Services (SDS) office. The student is responsible for discussing specific accommodations with the instructor. Note that accommodations are not granted retroactively but from the time of the student’s request to the instructor onward; additionally, accommodations must be requested at least two weeks in advance of the related assignment or exam (https://sds.studentlife.uiowa.edu/).

Class recordings: privacy and sharing

Course lectures and discussions are sometimes recorded or live-streamed. These are only available to students registered for the course and the intellectual property of the faculty member. These materials may not be shared or reproduced without the explicit written consent of the instructors. Students may not share these recordings with those who are not enrolled in the course; likewise, students may not upload recordings to any other online environment. Doing so is a breach of the Code of Student Conduct and could be a violation of the Federal Education Rights and Privacy Act (FERPA); also see https://dos.uiowa.edu/policies/code-of-student-life/.

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 (Operations Manual, III.15.2). Emails should be respectful and brief, with complex matters addressed during the instructor’s drop-in hours, for example. Faculty are not expected to answer email after business hours or during the weekends.

Complaints about academic matters

Students with a complaint about a grade or a related academic issue should first visit with the instructor and then with the course supervisor (if one is assigned), and next with the Chair of the department or program offering the course. If not resolved, students may bring their concerns to the College of Liberal Arts and Sciences: https://clas.uiowa.edu/students/handbook/student-rights-responsibilities.

Final examination policies

The final exam schedule is published during the fifth week of the fall and spring semesters or on the first day of summer classes; students are responsible for knowing the date, time, and place of their final exams. Students should not make travel plans until knowing this information. A student with exams scheduled on the same day and time or who have more than two final exams on the same day should visit this page for how to resolve these problems by the given deadline: https://registrar.uiowa.edu/makeup-final-examination-policies. No exams may be scheduled the week before finals; some exception, however, have been made for labs, language courses, and off-cycle courses (https://registrar.uiowa.edu/final-examination-scheduling-policies).
Free speech and expression
The University of Iowa supports and upholds the First Amendment protection of freedom of speech and the principles of academic and artistic freedom. We are committed to open inquiry, vigorous debate, and creative expression inside and outside of the classroom. Visit Free Speech at Iowa for more information on the University’s policies on free speech and academic freedom (https://freespeech.uiowa.edu/).

Home of the course
The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the course’s add and drop deadlines, the “second-grade only” option (SG0), and other undergraduate policies and procedures. Different UI colleges may have other policies or deadlines. See https://clas.uiowa.edu/students/handbook. Questions? Contact CLAS at clasps@uiowa.edu or 319-335-2633.

Mental health
Students are encouraged to seek help as a preventive measure or if feeling stressed or overwhelmed. Students should talk to their instructors for guidance with specific class-related concerns and are encouraged to contact University Counseling Service (UCS) at 319-335-7294 during regular business hours to schedule an appointment. USC offers group and individual therapy as well as counseling for couples about relationships while making referrals to other resources (https://counseling.uiowa.edu/). Student Health can also address related concerns (https://studenthealth.uiowa.edu/). These visits are free to students. After hours, students are encouraged to call the Johnson County Community Crisis Line at (319) 351-0140 or dial 911 in an emergency.

Nondiscrimination in the classroom
The University of Iowa is committed to making the classroom a respectful and inclusive space for people of all gender, sexual, racial, religious, and other identities. Toward this goal, students are invited in MyUI to optionally share the names and pronouns they would like their instructors and advisors to use to address them. The University of Iowa prohibits discrimination and harassment against individuals based on race, class, gender, sexual orientation, national origin, and other identity categories indicated by the University’s Human Rights policy. Contact the Office of Equal Opportunity and Diversity at https://diversity.uiowa.edu/division/office-equal-opportunity-and-diversity-eod.

Sexual harassment
Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff; all members of the UI community are expected to conduct themselves in a manner that maintains an environment free from sexual harassment and sexual misconduct. Those experiencing sexual harassment are strongly encouraged to report the incidents and to seek help (https://osmrc.uiowa.edu/).