Math 440: The Lab of Geometry at Michigan
Winter 2020

GitLab page: `https://gitlab.eecs.umich.edu/logm/wi20`

Course meeting: Tuesdays 5:30-8:00pm EH B743

Primary instructor:	**Instructional assistance:**
Harry Bray	Samuel Hansen (embedded librarian)
EH 5856, `hbray@umich.edu`	`hansensm@umich.edu`
	Rachel Webb
	`webbra@umich.edu`

Prerequisites:
Math 217 or equivalent is a prerequisite for most projects. Individual projects have prerequisites which vary by semester.

Course topics and goals:

The Lab of Geometry at Michigan (LoGM) presents undergraduates with a unique opportunity to explore at the frontiers of the body of mathematical knowledge. The broad goals of the course are for students to engage in modern mathematics research by working with motivating examples, computations, or visualizations.

The course is project-based; each student in the course works on one project throughout the semester. Students work in small groups, with more independence than a typical course, thereby simulating the mathematics research experience. Each project we offer has its own project mentor(s), separate from the primary instructor. Mentors are faculty and graduate students who are specialists and active researchers in fields relevant to the project topic.

In this course, undergraduates develop many skills which are essential to the mathematics profession and transferrable to many fields of work, such as: independence, resourcefulness, communication skills, programming skills, problem solving, mathematical literacy, technical literacy, and more. These skills are developed in the context of mathematics research in many different mathematics fields.

Historically, we have offered projects in complex analysis, complex dynamics, combinatorics, topology, homology groups, projective geometry, moduli spaces, mathematical games, algebraic geometry, billiard dynamics, origami, mathematical physics, commutative algebra, and more. The projects vary by semester and are viewable on the LoGM program webpage: `https://sites.lsa.umich.edu/logm/projects/`

Structure of the course:

Undergraduates must complete an application to receive enrollment permissions. Not all undergraduates can be admitted to the course – the application process is designed

to match qualified undergraduates with the appropriate project and teammates. Applicants also indicate which projects are most interesting to them during this process. Qualifications can vary significantly by project, and prerequisites are listed in the project descriptions on the LoGM program webpage: `https://sites.lsa.umich.edu/logm/projects/`. Applications are found by following `https://sites.lsa.umich.edu/logm/join-logm/`.

Undergraduate researchers admitted to the LoGM program are assigned to a research team for the duration of the semester. Over the course of the semester, undergraduate researchers enrolled in LoGM will meet weekly with the primary instructor during the scheduled course meeting time. During the course meeting time, researchers will share progress, exchange ideas with other teams, and learn new skills in modular workshops. The course features modules on Git, Unix, LaTeX, Python, mathematical presenting and storytelling, and more.

Undergraduate researchers are also expected to meet weekly or biweekly with their project mentor(s), who are expert in the mathematical content of that teams project. These meetings will occur outside of the scheduled course meeting time.

Assignments:

There are four major assignments during the semester:
- Midterm slides presentation
- Final poster
- Documented code
- Project report

The first three are team assignments. The project report is an individual assignment.

Each team is also expected to regularly give short status presentations on project progress. Team members rotate providing these status presentations.

Grading:

Each of the four major assignments will be given a numerical grade out of 100. The primary instructor assigns grades, with input from Samuel Hansen, Rachel Webb, and the project mentors.

Undergraduate researchers will receive individual grades for the status presentation grades, the midterm presentation grade, and the project report. The midterm presentation grade is a shared assignment by the team, hence some portion of the grade will be uniform for all undergraduate researchers on the same team. Participation in a peer review process and instructional modules may factor into some of these grades.

A uniform team grade on the final poster and documented code will apply to all undergraduate researchers on the same team. Exceptions to the latter policy may be made if some students are not meeting expectations. A students' contributions to GitLab may be considered if exceptions are relevant.

Students will also receive a final participation grade. This grade includes evaluation of student engagement with their project, and interactions with their peers. Peer feedback will be solicited and may contribute to the final participation grade.

Your final numerical grade is then calculated according to the formula below and converted to a final letter grade using the standard conversion[1], except grades of 97.5 or higher will only be converted to an A+ in exceptional circumstances, with extremely enthusiastic recommendation from all faculty supervisors.

> final numerical grade = .05×overall status presentation grade + .10×participation grade + .20×midterm presentation grade + .20×final poster grade + .20×documented code + .25×project report.

Undergraduate researchers in LoGM will receive a final status report from their project mentors in collaboration with the primary instructor of either "satisfactory," "unsatisfactory," or "very unsatisfactory." In the event that a student or team receives a final status of unsatisfactory, the student(s) will have 1/3 of a letter grade deducted from their final letter grade. In the event that a student or team receives a final status of "very unsatisfactory," the student(s) will have a minimum of 2/3 of a letter grade deducted from their final letter grade.

Undergraduates will receive midterm and draft feedback for many of these assessments, as well as a midterm status report. Some drafts may receive a "grade." These grades will **not** factor into the final grade. They are to give students an idea of their progress. Submitting complete drafts on time may factor into the final grade.

Important dates:

Assignment	Date	Details
Project report draft zero	Monday 2/3	submit .tex & .pdf & supplementary files via email before 11:59pm
Beamer slides due	Monday 2/24	submit .pdf via email before 11:59pm
Midterm presentations	Tuesday 2/25	5:30pm EH B743
Project report draft	Monday 3/23	submit .tex & .pdf & supplementary files via email before 11:59pm
Poster draft	Monday 4/6	submit .pdf via email before 11:59pm
Final poster	Wednesday 4/15	submit .pdf via email before 11:59pm
Documented code	Monday 4/20	submit via GitLab before 11:59pm
Poster session	Tuesday 4/21	5:30-7:30pm East Hall Atrium
Final project report	Thursday 4/23	submit .tex & .pdf & supplementary files via email before 11:59pm

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Digital project studio (Shapiro 3169):

Our embedded librarian Samuel Hansen and visualization librarian Justin Joque have kindly agreed to invite LoGM teams to work in the digital project studio in the

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[1] 79.5-82.49 = B-, 82.5-87.49 = B, 87.5-89.49 = B+ etc.

Shapiro Library. This space is a shared space with Justin Joque's visualization team and Samuel Hansen. The space is accessible 24 hours a day when the University is open, with key entry check in/out at the library desk. This space is available to you for collaboration and to develop or run code for extended times on the two high-powered computers in the digital project studio. Please reserve meeting times in the digital project studio in advance with the primary instructor.

Please be responsible and respectful of others in the digital project studio.

Student Sexual Misconduct Policy:

Title IX prohibits discrimination on the basis of sex, which includes sexual misconduct including harassment, domestic and dating violence, sexual assault, and stalking. We understand that sexual violence can undermine students academic success and we encourage anyone dealing with sexual misconduct to talk to someone about their experience, so they can get the support they need. Confidential support and academic advocacy can be found with the Sexual Assault Prevention and Awareness Center (SAPAC) on their 24-hour crisis line, 734.936.3333 and at sapac.umich.edu. Alleged violations can be non-confidentially reported to the Office for Institutional Equity (OIE) at institutional.equity@umich.edu

Accomodations Statement:

The University of Michigan is committed to providing equal opportunity for participation in all classes, programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Services for Students with Disabilities (SSD) Office located at G664 Haven Hall. The SSD phone number is 734-763-3000. Once your eligibility for an accommodation has been determined you will be issued a verified individual services accommodation (VISA) form. Please present this form to me at the beginning of the term, or at least two weeks prior to the need for the accommodation (test, project, etc).

Academic Misconduct:

The University of Michigan community functions best when its members treat one another with honesty, fairness, respect, and trust. The college promotes the assumption of personal responsibility and integrity, and prohibits all forms of academic dishonesty and misconduct. All cases of academic misconduct will be referred to the LSA Office of the Assistant Dean for Undergraduate Education. Being found responsible for academic misconduct will usually result in a grade sanction, in addition to any sanction from the college. **Plagiarism** is an example of academic misconduct which is taken very seriously, and is especially relevant to this course. For more information, including other examples of behaviors that are considered academic misconduct and potential sanctions, please see `lsa.umich.edu/lsa/academics/academic-integrity.html`.

Student Mental Health and Wellbeing:

University of Michigan is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services (CAPS) at 734.764.8312 and `caps.umich.edu` during and after hours, on weekends and holidays, or through its counselors physically located in schools on both North and Central Campus. You may also consult University Health Service (UHS) at 734.764.8320 and `https://www.uhs.umich.edu/mentalhealthsvcs`, or for alcohol or drug concerns, see `https://www.uhs.umich.edu/aodresources`. For a listing of other mental health resources available on and off campus, visit `http://umich.edu/~mhealth/`