CSCI 491/591: 
Computational (Geometry and) Topology 

TH, 13:40 - 14:55, GH043 
Spring 2016

1 Course Instructors and Assistants

Instructor: Brittany Terese Fasy
Office Hours: T 10:10 - 11:50; F 08:00 - 09:00
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2 Course Description

Suggested (UG) Prerequisites: CSCI 232 (Data Structures and Algorithms), CSCI 246 (Discrete Structures), and CSCI 338 (CS Theory). This course assumes that you are familiar with the following Topics: set theory, running time analysis, and some knowledge of vector spaces.

In this course, we explore the field of computational topology and topological data analysis. Topics we will cover include graph theory and simplicial complexes, persistent homology, and select topics from computational geometry.

3 Course Outcomes and Objectives

The objective of this course By the end of this course, a student:

• will be able to articulate, both orally and in writing, mathematical proofs.

• will demonstrate teamwork skills.
• will demonstrate ability to present and to critique applications of research in TDA.
• will recognize potential applications of TDA.

4 Collaboration Policy
Collaboration is encouraged on all aspects of the class, except where explicitly forbidden. Note:
• All collaboration (who and what) must be clearly indicated in writing on anything turned in. Please state who the collaborators are and a brief description of the collaboration at the beginning of each problem. For example, John and I worked on this problem together or Clem helped me with this problem by suggesting I re-read the definition of X or I helped Mike figure out the proof of Theorem Y.
• Homeworks may be solved collaboratively except as explicitly forbidden, but solutions must be written up independently. This is best done by writing your solutions when not in a group setting. Groups should be small enough that each member plays a significant role.
• For the project, every collaborator must contribute significantly. How the work is divided is at the discretion of the group.

5 Grading
Your grade for this class will be determined by:
• 45% Group Project
• 45% Homework*
• 10% Resubmissions (and maybe Quizzes)

A grade above an 85 will earn at least an A-, above a 70 will earn at least a B-, and at least 50 is needed to pass.

Ample opportunity for extra credit will be made available throughout the semester.

*Graduate students (those enrolled in 591) will be held to a higher standard in the written homework than those enrolled in 491. In addition, 5% of a graduate student’s grade will be obtained from an oral proof of his/her choice (chosen from a list of proofs). This can be scheduled at any time during the semester.
6 Extra Credit

Opportunities to earn extra credit by attending colloquia will be announced in class and posted on the course website. To earn the extra credit (5 points towards homework), you must attend the entire presentation and write a 1-2 page summary and reflection on the presentation(s). This must be handed in within one week of the presentation.

Another option for earning extra credit will be to neatly type (in LaTex) the lecture notes from one class. You may work alone or with a partner. You may choose one class (or two if you work in partners) for which you wish to be the scribe, and let me know BEFORE the class so that there is at most one scribe / pair of scribes for each class. If you work in partners, you will split the points. The notes will be due one week after the lecture. The notes will be worth 15 points towards homework, and must be handed in within one week of the lecture.

7 Homework Policy

You are encouraged to typeset your homework in LaTex. Word documents will not be accepted. If you choose to use Word to write your assignment, you must convert it to PDF before handing it in. Homework is due at 23:59 on the due date. Late homework handed in within 24 hours of the due date will be penalized 25%; within 48 hours will be penalized 50%. Homework will not be accepted past 48 hours.

8 Withdrawing

If you are considering withdrawing from this class, discussing this with me as early as possible is advised. Since this class involves a project, the decision to withdraw must be discussed with me, and with your group.