

Course Contract
MAT 6932: Computational Topology

Instructor: Dr. Kevin Knudson
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Office Hours: Tuesdays and Thursdays, 9:30–11:00 am

Text: *Computational Topology: An Introduction*, by H. Edelsbrunner and J. Harer, American Mathematical Society, 2010.

Course content: This course will cover the topological analysis of large data sets. Since discrete sets do not have interesting topology, we must construct interesting spaces that model our data and then use the machinery of algebraic topology to study them. We will therefore begin with simplicial complexes and various constructions related to data. From there we will move on to homology theory, giving a self-contained introduction before passing to the main tool of computational topology: persistent homology. As time allows we may discuss discrete Morse theory and its applications.

As you might imagine, computer software plays a heavy role in topological data analysis. There are many software packages that we will use in this course. You do not need to be an expert in programming (I am certainly not), so do not be concerned if you are not familiar with the programs. Most of what we need is available for free at <http://comptop.stanford.edu/programs/>. Some of these packages are built on well-known programs such as MATLAB or R. If you do not have access to MATLAB (I do not have it on my personal machine), I suggest R, which is available for free download at <http://www.r-project.org>. Processing is another program which can manage persistent homology calculations: <http://processing.org>. There are also standalone versions in C++ and Python, if you are so inclined.

Course requirements and grading: Problem sets will be assigned on a regular basis (every 2-3 weeks). There are no tests and there will not be a final exam.

Attendance policies: Attendance is important, but there are no penalties for missing class.

Academic integrity: Students are expected to act in accordance with the University of Florida policy on academic integrity. For more information, visit <http://www.dso.ufl.edu/judicial/procedures/academicguide.php>. Cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

Accommodations for students with disabilities: If you require classroom accommodation because of a disability, you must first register with the Dean of Students Office (<http://www.dso.ufl.edu/>). The Dean of Students Office will provide documentation to you, which you then give to the instructor when requesting accommodation.