MATH 4907/5900
Topological Dynamical Systems
Winter 2022, Carleton University

Professor: Charles Starling
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Office Hours: To be determined.

Prerequisite: MATH 3001 or equivalent.

For this course, I assume you have a good background in the theory of metric spaces. Knowing some topology is an asset, although every space we deal with will be a metric space. If you have any doubts, please contact me.

Lectures: Tuesdays and Thursdays, 11:35 – 12:55 on Zoom.

Evaluation: Your grade in this course will be determined by graded assignments only. I aim to give an assignment every two weeks. There is no final exam or midterm exam.

For undergraduates, the best $n-1$ assignment questions will be counted towards your grade (where n is the number of questions on the assignment, and is probably 6).

Text: *Introduction to Dynamical Systems*, M. Brin and G. Stuck, Cambridge University Press, 2002.

We will also use some parts of the following notes towards the end of the course: *Lecture Notes on Smale Spaces*, I. F. Putnam, 2015.

Additional reading (not required): *An introduction to symbolic dynamics and coding,* D. Lind and B. Marcus, Cambridge University Press, 1995.

Approximate course content:

Definition of an abstract dynamical system. Orbits, minimality, recurrence, transitivity, entropy, and hyperbolicity. Symbolic dynamics, codes, Markov chains, substitutions. Focus on examples, including circle actions, solenoids, Smale's horseshoe, odometers, hyperbolic toral automorphisms, and subshifts.

The goal is to cover Chapters 1–3 from the textbook, and possibly more if time permits.

Further topics could include Smale spaces, one-dimensional dynamics (i.e. material from Chapter 7), Cantor minimal systems, or étale groupoids.

Academic Accommodation: Students with disabilities requiring academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs. Students must confirm their need for accommodation with the Instructor no later than one week before the first quiz. If students require special arrangements to meet their academic obligations, please review the course outline and write me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.

Pregnancy or Religious Obligation: Please email me requests for academic accommodation as soon as possible after the need for accommodation is known to exist. For more details, see the Student Guide.