University at Buffalo

MTH 727 Homotopy Theory
Syllabus - Fall 2024

Course Website: mth727.ubmath.info.

Lectures: Tue, Thu 11:00 - 12:20 PM, Math Building 122.

Instructor: Bernard Badzioch
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Office Hours: By appointment.

Prerequisites. A large part of this course will depend only on the material covered in MTH 428/528: CW complexes, the fundamental group, covering spaces. Later, we will also use homology and cohomology groups.

Learning outcomes. The goal of this course is to introduce some standard material in homotopy theory:

- Higher homotopy groups
- Excision and Freudenthal suspension theorem
- Eilenberg-MacLane spaces
- Fibrations and fiber bundles
- Cofibrations
- Weak equivalences
- CW approximation
- Hurewicz theorem
- Serre spectral sequence

Textbook. Thecourse will not follow closely any specific textbook, but there are several good texts that cover this material. For example:

- Allen Hatcher, *Algebraic Topology*, Cambridge University Press 2001.
- Tammo tom Dieck, *Algebraic Topology*, European Mathematical Society 2008

Homework. Optional homework problems will be assigned periodically.

Weekly digest. Each week you will be asked to submit a short (a few sentences long) writeup on your study from the previous week. For example, you can write:

- what topics you have found interesting (or boring)
- what topics you have found difficult (or easy)
- how you feel about the course
- anything else you want to share.

You will be also asked to submit a question (or questions) that you would like to see discussed during a class meeting.