# MA 764-001 Selected Topics in Algebra

Classroom and time: 1200-1250 FB 213
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Office hours: 200-300 MWF, but I will be available most of TR's

This is a topics course in homological algebra. Classical homological algebra associated a complex of modules with a given module and then used properties of the complex to study the module. As an example, modules have projective resolutions (a special kind of complex). These can be used to answer many questions about the module. More recently the procedure is to start with a complex (instead of just a module) and associate another complex with it. This new complex is often called a resolution of the given complex. So in this class we will emphasize complexes and their various resolutions. Precovers and preenvelopes of modules can be used to construct these resolutions. So we will consider these notions both for modules and complexes of modules.
There will be homework assignments about every two weeks. Your grade will be based on these assignments and on class participation.

Some texts in homological algebra

1. Homological algebra by Cartan and Eilenberg. This was the original text in the area. It is still worthwhile reading. You might want to skip the chapter on Satellites.

2. Homology by MacLane. MacLane was also one of the founders of the subject.

3. Elementary approach to homological algebra by Vermani. Students in the past have told me they found this the best introduction to the subject.

4. Basic homological algebra by Osborne. This text has also been highly recommended.

5. Homological algebra and ring theory by Jans. This text is well-written and easy to read.

6. Homological algebra by Gelfand and Manin. This book gives the Russian approach to the subject.

7. Algèbre homologique by Bourbaki (this is Chapitre 10 of their Algèbre and is an excellent text with great exercises).