

HOMOLOGICAL ALGEBRA (MATH 613)

BHARGAV BHATT

Homological algebra began life more than a century ago in the study of combinatorial topology. It has since developed into a mature mathematical subject, with applications to (at least) topology, algebraic geometry, number theory, commutative algebra, representation theory, and group theory. A chunk of this course will introduce the basic objects: abelian categories, derived functors, spectral sequences. The rest of the semester will be spent on applications.

Meeting time and location. 11:30am - 1:00pm on M-W in 1866 EH.

Background. Previous exposure to homological ideas (such as, for example, in the setting of algebraic geometry, algebraic topology, or commutative algebra) will be very useful.

Textbooks. No text is required, but the following are recommended reading:

- (1) *An introduction to homological algebra* by Charles Weibel.
- (2) *Homological algebra* and *Methods of homological algebra* by Gelfand and Manin.
- (3) Grothendieck's *Tohoku* paper.

Homeworks. Regular problem sets will be posted to the course webpage.

Quizzes. There will be occasional short in-class quizzes through the semester.

Final project. An expository paper, approximately 10 to 15 pages in length, will be due on 04/24. A proposal describing your chosen project and the relevant references, approximately one or two paragraphs in length, will be due on 04/03. More information about potential topics will be made available midway through the semester.

Course webpage. <http://www-personal.umich.edu/~bhattb/mat613w15>

Office hours. 2pm - 5pm on Monday