

MAT 732, Homological Algebra, Spring 2015

Professor: Claudia Miller

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Course Web Page: <http://www.phy.syr.edu/~clamille/732.html>

Office Hours: By appointment, or whenever you can find me and I'm not busy.

Text: Your notes from lecture will be the main source. They can be supplemented by:

- Rotman, *An Introduction to Homological Algebra*, 2nd edition
- Weibel, *An Introduction to Homological Algebra*
- Gelfand and Manin, *Methods of Homological Algebra*

which will be on reserve in the library. There are many other classic homological algebra books which are also excellent.

Prerequisites: MAT 631, 632, 731

Course Topics: We intend to cover at least the following topics, time permitting:

1. basic category theory
2. quick review of properties of homological topics from 731
3. flatness
4. limits
5. chain complexes, homology and homotopy
6. projective and injective resolutions
7. derived functors
8. Tor and Ext
9. bicomplexes (aka, double complexes)
10. derived categories
11. triangulated categories
12. spectral sequences

Final: There will be no formal final exam, but we may use some of that time to make up the required hours.

Homework and Grades: Your grade will be based on the regular homework sets. You may work together, but you may find that you mature the most mathematically by doing as much as possible by yourself. You must write up the homework problems in your own words and not copy each other or a common source. You may read other sources. *However, you may not look up answers to problems on the internet or in books as this will be considered cheating.* If you cannot do a problem, then just don't turn in an answer. To get a Ph.D. you must train your mind to think and for many fields a knowledge in modern homological algebra is essential. You are always welcome to come to me for help!

You should inform me **in the first two weeks of class** if

- (1) you have any disabilities for which special considerations are necessary, or
 - (2) you have any religious or sports commitments which may affect your attendance on any days of the semester.
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Students with disabilities: If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), <http://disabilityservices.syr.edu>, located in Room 309 of 804 University Avenue, or call (315) 443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented disabilities Accommodation Authorization Letters, as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible. You are also welcome to contact me privately to discuss your academic needs although I cannot arrange for disability-related accommodations. Making arrangements with ODS takes time. Do not wait until just before the first test.

Academic integrity: The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the Policy and know that it is their responsibility to learn about instructor and general academic expectations with regard to proper citation of sources in written work. The policy also governs the integrity of work submitted in exams and assignments as well as the veracity of signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort. For more information and the complete policy, see <http://academicintegrity.syr.edu>

Complete academic honesty is expected of all students. Any incidence of academic dishonesty, as defined by the SU Academic Integrity Policy, will result in both course sanctions and formal notification of the College of Arts & Sciences.

Religious Observances Policy: Syracuse University's religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class.