

MAT 731 - Rings and Modules Fall 2016

Instructor: Professor Dan Zacharia

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Lecture: MW 8:00–9:20, Carnegie 115.

Office hours: MW 10:00–11:30. Also by appointment, and any time my door is open.

Text: We will not follow very closely any particular textbook so the class notes will be the main source. They can be supplemented by reading for instance *Abstract Modern Algebra* by Rotman, which will be on reserve in the library, although the order of the material is slightly different there.

Prerequisites: MAT 631 and MAT 632.

Course description: The plan is to cover the following topics:

- ✓ **Set-up:** Modules and homomorphisms. Direct sums and products. Free modules. Universal properties. Exact sequences. Diagram chasing. Hom and Tensor. Composition series. Noetherian and Artinian rings and modules.
- ✓ **Noncommutative Ring Theory:** Semisimple rings and modules. Artin-Wedderburn Theorem. Jacobson radical. Nakayama's lemma.
- ✓ **Special Modules:** Projective, Injective and flat modules.
- ✓ **Commutative topic:** Localization

Homework and grades: Homework will be assigned in class and it will count as 40% of your final grade. You may work together on the homework, but you may find that you mature the most mathematically by doing *as much as possible by yourself*. You are always welcome to come to me for help. In addition we will have two term exams (dates to be announced in class) and each will count 30%.

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>.

Students with Disabilities: If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS) at,

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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 your instructor 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.

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.