

MAT 733, Commutative Algebra, Fall 2017

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Lecture: Tue, Thu 12:30–1:50 pm, Carnegie 120

Office Hours: Tue, Thu 3:00–4:30 pm

Text: Your notes from class will be your main resource. They can be supplemented by:

Matsumura, *Commutative Ring Theory*, 2nd edition

Atiyah and Macdonald, *Introduction to Commutative Algebra*

Eisenbud, *Commutative Algebra with a View Toward Algebraic Geometry*

These will be on reserve in the library. They may also be available online there.

Prerequisite: MAT 731

Course Description: Commutative algebra grew from and is part of the foundations of various fields of modern algebra, most notably algebraic geometry, algebraic number theory, algebraic topology, and parts of algebraic combinatorics. We intend to cover roughly the following topics, time permitting. These topics are covered in the book by Matsumura in Sections 2–20, omitting Sections 3, 10, 12, and 18.

1. Localization and Spectrum of a Ring
2. Nullstellensatz and Algebraic Geometry
3. Primary Decomposition
4. Dimension Theory
5. Artin-Rees Lemma and Completion
6. Integral and Flat Extensions
7. Regular Rings
8. Depth, Koszul Complex, Cohen-Macaulay Rings

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

Homework and Grades: Your grade will be based on the regular homework sets. At any stage, you are welcome to come to me for help!

Expectation:

- (a) First, try the problems yourself. You internalize the information in the notes and learn more that way.
- (b) Then, you may work together on problems, but not split up the work. That is, you may work together only if you are all making contributions in your discussions.
- (c) You must write up the homework problems in your own words and not copy each other.
- (d) You may read other sources. *However, you may not look up answers to problems in books or on the internet as this will be considered cheating.* If you cannot do a problem, then don't turn in an answer.

Students with disabilities: If you believe that you need academic adjustments (accommodations) for a disability, please contact the Office of Disability Services (ODS), visit the ODS website <http://disabilityservices.syr.edu>, located in Room 309 of 804 University Avenue, or call (315) 443-4498 or TDD: (315) 443-1371 for an appointment to discuss your needs and the process for requesting academic adjustments. ODS is responsible for coordinating disability-related academic adjustments and will issue students with documented Disabilities Accommodation Authorization Letters, as appropriate. Since academic adjustments may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

Religious Observances Policy: SU religious observances policy recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays 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. 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.

Academic integrity: Syracuse University's Academic Integrity Policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the policy, students found in violation are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered as described in the Violation and Sanction Classification Rubric. SU students are required to read an online summary of the University's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice.

The Violation and Sanction Classification Rubric establishes recommended guidelines for the determination of grade penalties by faculty and instructors, while also giving them discretion to select the grade penalty they believe most suitable, including course failure, regardless of violation level. Any established violation in this course may result in course failure regardless of violation level. For more information and the complete policy, see <http://class.syr.edu/academic-integrity/>.