

**MAT 733 — COMMUTATIVE ALGEBRA  
SPRING 2014**

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Lecture: MW 12:45–2:05, Carnegie 124  
Office hours: MW 11:00–12:00, TR 2:00–3:00, by appt, and any time my door is open  
Text: Most of the material will be drawn from Matsumura, *Commutative Ring Theory*. Other sources include *Introduction to Commutative Algebra* by Atiyah and Macdonald, and *Commutative Algebra with a View Toward Algebraic Geometry* by Eisenbud. However, your primary resource will be your class notes.

**Prerequisites:** MAT 731.

**Course Description:** Commutative algebra is a central field in modern algebra, with applications to algebraic geometry, algebraic number theory, and combinatorics, among other fields.

We will begin with a quick review of localization, and continue on to the theory of primary decomposition. Then we will cover the basics of dimension theory, emphasizing connections with algebraic geometry via the ideal/variety correspondence and the Nullstellensatz. Then comes the Artin-Rees lemma and completion, as well as integral and flat extensions. At the end of the course we will consider the Koszul complex, and the Cohen-Macaulay and regularity properties.

All of this is covered in sections 2–20 of Matsumura (omitting sections 3, 10, 12, and 18), though not always in the same order.

**Learning outcomes:** The goal for the course is to acquire the background in commutative algebra necessary for research in commutative algebra, non-commutative algebra, algebraic geometry, combinatorics, and number theory.

**Homework:** Homework will be assigned, roughly every two to three weeks. Each assignment will consist of a small number of questions, to be answered carefully.

**Exams:** There will be no exams.

**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 303 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 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.

**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>.

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