

Math 619X: Commutative Algebra

Fall 2019 – 3 credits

MWF 3:10pm – 4:00pm

Carver 128

Instructor	Jason McCullough 452 Carver Hall 4-8150 jmccullo@iastate.edu
Office Hours	MF 11:10pm-12:00pm, Tu 2:10pm-3:00pm or by appointment
Textbook	I will be posting pdfs of my personal notes on Canvas. An older version, which I am in the process of updating, is available on my webpage. Suggested other texts by: Matsumura, Eisenbud, Serre, and Atiyah-Macdonald

Content

In this class we will cover the theory of commutative rings, primarily focusing on Noetherian and local rings and their applications to algebraic geometry.

Referring to the notes, we will cover most of Chapters 0-5. The major topics:

0. Basics
1. Primary Decomposition
2. Completions and Filtrations
3. Dimension Theory
4. Integral Extensions
5. Homological Algebra

Assessment

There will be 5 homework assignments. While you are encouraged to work with the other students, it is important that you **write up your own solutions independently**. I don't want to see multiple papers that are carbon copies of each other. Duplicate solutions will be penalized. It is very important that you do the homework conscientiously and consistently.

To get an A in the course you should give fully correct solutions to at least half of the assigned problems.

There will also be a final project and presentation, see below.

Project

Each student will be required to research an advanced topic in commutative algebra. Topic choices must be approved by me in advance. I will put a number of suggestions on Canvas but you are welcome to propose alternatives that fit your interests. You will write (in LaTeX) a 2-3 page summary of your topic. It must include at least one definition, one example and one proof. (References should be included and don't count toward the 2-3 pages.). Each student will give a 10-to-15-minute presentation at the end of the semester on their chosen topic. Here are the relevant deadlines:

October 15 – Get topic approved by instructor.

November 15 – Submit rough draft of your write-up

November 22 – Comments on first draft back from instructor

December 11 – Final drafts due

December 13 or December 18 (12pm-2pm) – Oral presentations

Course Websites

Grades and homework will be available via Canvas. There is a tentative schedule below.

Grading scheme

Homework	60%
Written paper	20%
Oral Presentation	20%

Accessibility Statement

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.

Tentative Schedule

Week (week of)	Monday	Wednesday	Friday
1 (August 26)	Chap 0	Chap 0	Chap 0
2 (September 2)	Labor Day	Chap 1	Chap 1
3 (September 9)	Chap 1	Chap 1	Chap 1
4 (September 16)	Chap 1	Chap 2	Chap 2
5 (September 23)	Chap 2	Chap 2	Chap 2
6 (September 30)	Chap 2	Chap 2	Chap 3
7 (October 7)	Chap 3	Chap 3	Chap 3
8 (October 14)	Chap 3	Chap 3	Chap 3
9 (October 21)	Chap 4	Chap 4	Chap 4
10 (October 28)	Chap 4	Chap 4	Chap 4
11 (November 4)	Chap 4	Chap 5	Chap 5
12 (November 11)	Chap 5	Chap 5	Chap 5
13 (November 18)	Chap 5	Chap 5	Chap 5
14 (November 25)	Thanksgiving	Holiday	Break
15 (December 2)	Chap 5	Chap 5	Chap 5
16 (December 9)	Chap 5	Chap 5	Presentations
17 (December 16)	Final	Exam	Week