

Commutative Algebra
MATH 724, Spring 2021
MW1:30-2:45pm, Zoom

Instructor: Dr. Rebecca R.G., email address: rrebhuhn@gmu.edu

Office Hours: TBD via Zoom, or email me to meet at another time.

Textbook: Atiyah and MacDonald, *Introduction to Commutative Algebra*.

Informal list of errata here:

<https://mathoverflow.net/questions/42241/errata-for-atiyah-macdonald>

Prerequisites: Algebra I (Math 621) or equivalent.

Course Content: This course focuses on the structure of commutative rings and modules over those rings. Major themes include localization and completion.

After this course, students should understand enough commutative algebra to read more advanced texts in the field, such as Bruns-Herzog or Eisenbud.

Technology: You will need a computer, tablet, or other device that can access Zoom, with a speaker and microphone so you can speak during class. You will need to participate in class using shared whiteboard software, so you may find it easier to have a device with a touch screen available to you. You will need to present your work during class, so you will need to be able to share your screen or hold up written work so it can be seen through Zoom (I recommend you write in marker if you are sharing this way).

Expectations: You will be expected to read the textbook in preparation for class, and to solve problems from the book alone and with others. During class, you will take turns presenting problems, writing up the presented problems (using LaTeX to type them into a shared Overleaf), and helping the presenter improve their solution. You are expected to try the problems to be presented ahead of each class period, but are not required to prepare full write-ups of all problems. I recommend attempting all problems and choosing 2-3 each week that you will volunteer to present. Presenters will be chosen by reverse seniority where possible, i.e., whoever has presented the least so far will get priority.

Structure of Class: I expect to have students present 4-6 problems per week. The rest of class time will be used to have me answer your questions about the reading, give you time to work on upcoming problems alone or in groups, and give upcoming presenters time to work with me on aspects of their presentations they are nervous about.

Grading: Your grade is based on your participation in class as a presenter, note-taker, and contributor.

When you present, you should present enough of a solution to get the class discussion started and then lead the class in getting to a complete solution. Your initial solution does not need to be fully correct for you to receive credit.

When you are the note-taker, it is your responsibility to put a write-up of the problems presented into the class Overleaf. You may ask the presenter for their notes if they have them, but it is your responsibility to make sure a correct version is available in the shared Overleaf.

When you are not presenting, it is your job to make suggestions to the presenter on what parts of their proof they can clarify or change to come to a correct, understandable solution. Be constructive! I recommend phrasing comments as “in line 5, you could change xxxxx to yyyy” or “I don’t understand what’s happening in equation zzzzz, can you expand on it?”

Expectations:

- Come to class and present, take notes, and contribute to the class discussion and shared Overleaf. Make contributions to both the mathematics and the group dynamic.
- Do the reading and assigned problems.
- Ask lots of questions of both me and your peers, make constructive suggestions, and share your ideas.

Collaboration: Please work together, both in and out of class! It’s hard to survive grad school alone. You can also ask me for help on problems either before or after they are presented. The presentations and shared Overleaf will be a group effort.

Academic Integrity: In this course, most work is collaborative with an individual taking the lead on each presentation and write-up. The main academic integrity issue I see coming up is using the internet. Before using the internet, talk to classmates and to me to get help on the reading and problems. You may use the internet to look up definitions, but you should not be using the internet to solve problems. In particular, you may not look up solutions to assigned problems or use others’ solutions in your presentations or write-ups. If you would like further clarification on when you can use internet sources, please ask me.

Accommodations for disabilities: Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit <http://dsgmu.wpengiengine.com/> for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu — Phone: (703) 993-2474

Beyond this, if there is an accommodation that would help you succeed in this class, let me know and we can talk about it.