MAS 6333: COMMUTATIVE ALGEBRA

Department of Mathematical Sciences
Fall 2021
Credit Hours: 3

CRN: 20581
Lecture Times: TR 11:00 AM – 12:20 PM
Location: Phil Smith Hall (BU) 112

Prerequisites: Graduate standing, MAS 5311 and MAS 5312, or permission of instructor.

CONTACT INFORMATION

Instructor: Dr. Zvi Rosen
Office Location: SE 224
Office Hours: Tuesday 2:00 PM – 4:00 PM
Email: rosenz@fau.edu
Zoom Office Hours Link: https://fau-edu.zoom.us/my/rosenz

COURSE DESCRIPTION

Commutative Algebra, the study of commutative rings, is a bit of an unsung hero in modern mathematics. It has been a major engine of progress in algebraic geometry, where coordinate rings describe algebraic varieties, and number theory, where many results emerge from studying extensions of the ring of integers.

This course will introduce you to the basic players of commutative algebra: rings, ideals, modules, and sequences. We will also prove and apply some important basic results including Nakayama's Lemma, the Nullstellensatz, and the Hilbert Basis Theorem.

From the FAU Catalog: An introduction to commutative rings. Topics include ideals, modules, rings and modules of fractions, integral dependence and valuations and chain conditions (Noetherian and Artinian rings).

COURSE OBJECTIVES

Upon successful completion of this course, students will be able to:

1. Communicate mathematical arguments clearly and persuasively.
2. Critically read and digest mathematical writing.
3. Explain definitions and prove theorems from commutative algebra.
4. Build a database of examples and counter-examples for intuition.

COURSE DELIVERY MODE

This is an **in-person** course taught in the "flipped classroom" model. Video lectures will be made accessible on Canvas prior to each class. Class time will be spent addressing any questions about the last video, and working through problems related to the covered material.

The Canvas site is organized into modules by week. The course begins with the Start Here module, which will familiarize you with the organization and navigation of the course. The weekly module will include instructions on readings & video lectures to prepare for each live meeting.

TIME COMMITMENT PER CREDIT HOUR

This course has three (3) credit hours. For traditionally delivered courses, not less than one (1) hour of classroom or direct faculty instruction each week for fifteen (15) weeks per Fall or Spring semester, and a minimum of two (2) hours of out-of-class student work for each credit hour. Equivalent time and effort are required for Summer Semesters, which usually have a shortened timeframe. Fully Online courses, hybrid, shortened, intensive format courses, and other non-traditional modes of delivery will demonstrate equivalent time and effort.

REQUIRED TEXT

In this course, you will need the textbook *Introduction to Commutative Algebra* by M.F. Atiyah and I.G. MacDonald. We will aim to cover Chapters 1-9 and 11. (Versions of the text are available online.)

A useful supplement is *Commutative Algebra with a View Toward Algebraic Geometry* by David Eisenbud, but it is not required.

COURSE ASSESSMENTS, ASSIGNMENTS & GRADING POLICY

GRADING CRITERIA

Video Response (total 15%, assigned twice weekly)

There is a video lecture posted on YouTube that you are assigned to watch in preparation for each meeting. As part of this viewing, you will be expected to reply with a question or comment reflecting some technical aspect of the material presented.

Bad Example: "Great video. Loved the math."

Good Example 1: "I'm not sure I understood how the example at [timestamp] 3:14 supported the idea?"

Good Example 2: "This definition reminds me of matrix rank in linear algebra."

Indicate to the instructor at the start of the semester what username you will use to comment. If for any reason you prefer not to comment on YouTube, then simply inform the instructor and you will arrange an alternative setup for your comments.

Participation (total 15%, for lectures twice weekly)

You are expected to attend each class and contribute meaningfully to the group's discussion about the problem sets. Attendance will be taken. If you need to miss class, please submit an explanation to the instructor at least 2 hours before.

Problem Sets (total 30%, assigned every week)

Every week on Tuesday, you will be asked to submit written problems that you worked on in class the previous week. You will work through these problems in collaboration with your peers, but writing will be done on your own. Most of your grade on these assignments will be determined by clarity of presentation and explanation.

Final Presentation (total 40%, for proposal and presentation)

At the end of the semester a number of classes will be devoted to student presentations.
The presentations will last 35-40 minutes (half a class period) and they will be either:
1. Exposition of a topic in commutative algebra not discussed in the semester, or
2. Presentation of a research paper in commutative algebra.
The first part of this assignment is a written proposal, due October 19, giving an outline of what you would like to present. I will return notes and suggested modifications. The presentations themselves will take place on the last n sessions of the semester.

Assessment	Percentage (%)
Video Responses	15%
Participation	15%
Problem Sets	30%
Final Presentation	40%
TOTAL:	**100%**

GRADE SCALE

Grade	Percentage (%)
A	93 – 100%
A-	90 – 92%
B+	87 – 89%
B	83 – 86%
B-	80 – 82%
C+	77 – 79%

Grade	Percentage (%)
C	73 – 76%
C-	70 – 72%
D+	67 – 69%
D	63 – 66%
D-	60 – 62%
F	0 – 59%

LATE ASSIGNMENTS POLICY

If you expect to be late on an assignment for an excusable reason, please notify the instructor well in advance, and he may afford an opportunity for partial credit.

INCOMPLETE GRADE POLICY

The University policy states that a student who is passing a course but has not completed all work due to exceptional circumstances, may, with consent of the instructor, temporarily receive a grade of incomplete ("I"). The assignment of the "I" grade is at the discretion of the instructor but is allowed only if the student is passing the course.

TENTATIVE COURSE PACING SCHEDULE

The page numbers below refer to *Introduction to Commutative Algebra* by Atiyah & MacDonald (the course textbook).

Week of	Tuesday	Thursday
August 22	Intro	1-3
August 29	3-6	6-10
September 5	Handout	17-20
September 12	21-22	22-24
September 19	24-28	Handout
September 26	28-31	36-43
October 3	50-54	Handout

October 10	59-61	61-64
October 17	65-67	Handout
October 24	Handout	74-78
October 31	80-82	82-84
November 7	89-91	*Veteran's Day*
November 14	93-95	95-98
November 21	*Student*	*Thanksgiving*
November 28	*Pres-*	*entations*

COVID-19 STATEMENT

Due to the surge in COVID-19 cases and the delta variant, all students regardless of vaccination status are expected to wear masks while indoors in any FAU facilities, including classrooms and laboratories. Students experiencing flu-like symptoms (fever, cough, shortness of breath), or students who have come in contact with confirmed positive cases of COVID-19, should immediately contact FAU Student Health Services (561-297-3512). Symptomatic students will be asked to leave the classroom to support the safety and protection of the university community. For additional information visit https://www.fau.edu/coronavirus/. In classes with face-to-face components, quarantined or isolated students should notify me immediately as you will not be able to attend class. I will not be able to offer an online version of the class but will make reasonable efforts to assist students in making up the work. Vaccinated students have much lower chances of needing to quarantine and a much lower chance of missing class time.

COURSE POLICIES

CODE OF ACADEMIC INTEGRITY POLICY STATEMENT

Students at Florida Atlantic University should endeavor to maintain the highest ethical standards. Academic dishonesty is a serious breach of these ethical standards because it interferes with the University mission to provide a high-quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive to the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

PLAGIARISM

Plagiarism is unacceptable in the University community. Academic work must be an original work of your own thought, research, or self-expression. When students borrow ideas, wording, or organization from another source, they must acknowledge that fact in an appropriate manner. Plagiarism is the deliberate use and appropriation of another's work without identifying the source and trying to pass off such work as one's own. Any student who fails to give full credit for ideas or materials taken from another has plagiarized. This includes all discussion board posts, journal entries, wikis, and other written and oral presentation assignments. If in doubt, cite your source.

ONLINE ATTENDANCE POLICY

Since the course is **online live-lecture**, you are expected to attend the Zoom lectures on Monday and Wednesday. Furthermore, you should access the course website at least **three times a week** to ensure you do not miss pertinent postings, messages, or announcements. It is imperative that you meet course deadlines and stay active in discussion boards, group projects, etc. If you are experiencing major illness, absences due to University duties, or other large-scale issues, contact the instructor immediately to formulate a resolution.

CLASSROOM ETIQUETTE/DISRUPTIVE BEHAVIOR POLICY STATEMENT

Disruptive behavior is defined in the FAU Student Code of Conduct as "… activities which interfere with the educational mission within classroom." Students who disrupt the educational experiences of other students and/or the instructor's course objectives in a face-to-face or online course are subject to disciplinary action. Such behavior impedes students' ability to learn or an instructor's ability to teach. Disruptive behavior may include but is not limited to non-approved use of electronic devices (including cellular telephones); cursing or shouting at others in such a way as to be disruptive; or, other violations of an instructor's expectations for classroom conduct.

For more information, please see the FAU Office of Student Conduct.

COMMUNICATION POLICY

EXPECTATIONS FOR STUDENTS

Announcements

You are responsible for reading all announcements posted by the instructor. Check the course announcements each time you log in.

Email/Video Conferencing

You are responsible for reading all your course email and responding in a timely manner.

Course-Related Questions

Post course-related questions to the FAQ discussion board. This allows other participants with the same question to benefit from the responses. Also, make sure you review this forum prior to posting a question. Someone may have already asked and answered the question in previous posts.

INSTRUCTOR'S PLAN FOR CLASSROOM RESPONSE TIME & FEEDBACK

Email/Video Conferencing Policy

Except for weekends and holidays, the instructor will typically respond to email (Canvas inbox or FAU email) within 48 hours. You should ask course-related questions in the FAQ discussion board. If you have questions of a personal nature, you should email the instructor.

Assignment Feedback Policy

The instructor will provide feedback on submitted assignments within one week of the submission date. Some assignments may require a longer review period, which the instructor will communicate to you.

Course-Related Questions Policy

Except weekends and holidays, the instructor will generally answer questions within 48 hours.

Electronic Communication Policy

In addition to the University's policy, please consider the following:
- Privacy, confidentiality, and security in all electronic communications.
- All electronic communication resources must be used for the course and in alignment with to the University mission.
- Prohibited use of false identity, false identity pseudonyms, or anonymous (sender's name or electronic identification is hidden).
- Access without consent.
- Disruption of services including introducing computer contaminants (viruses).
- Harassment of any kind.

Please see the Office of Information Technology's policies on Cyber Security Awareness.

SUPPORT SERVICES & ONLINE RESOURCES

- Center for eLearning and Student Success
- Counseling and Psychological Service (CAPS)
- FAU Libraries
- Freshmen Academic Advising Services
- Math Learning Center
- Office of Information Technology Helpdesk
- Office of International Programs and Study Abroad
- Office of Undergraduate Research and Inquiry
- Student Accessibility Services
- University Center for Excellence in Writing

CAPS STATEMENT

Life as a university student can be challenging mentally, emotionally, and physically. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services to help improve and maintain well-being. For CAPS services, students need to be currently enrolled, have paid the health fee, be physically located in Florida when services are provided, have phone or videoconferencing capabilities, and have access to a safe/private location for sessions. For those outside of Florida, CAPS will assist students in getting connected to services/providers in your area for ongoing support. For more information, go to http://www.fau.edu/counseling/ or call 561-297-3540.

FACULTY RIGHTS & RESPONSIBILITIES

Florida Atlantic University respects the rights of instructors to teach and students to learn. Maintenance of these rights requires classroom conditions that do not impede their exercise.

To ensure these rights, faculty members have the prerogative to:

- Establish and implement academic standards.
- Establish and enforce reasonable behavior standards in each class.
- Recommend disciplinary action for students whose behavior may be judged as disruptive under the *Student Code of Conduct*.

SELECTED UNIVERSITY & COLLEGE POLICIES

ACCESSIBILITY POLICY STATEMENT

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations to properly execute coursework due to a disability, must register with Student Accessibility Services (SAS) located in the Boca Raton, Davie, and Jupiter campuses and follow all SAS procedures.For additional information, please consult Student Accessibility Services.

Contact

- **Boca Raton:** (561) 297-3880
  Fax: (561) 297-2184, TTY: 711

- **Davie:** (954) 236-1222
  Fax: (954) 236-1123, TTY: 711

- **Jupiter:** (561) 799-8721
  Fax: (561) 799-8721, TTY: 711

GRADE APPEAL PROCESS

You may request a review of the final course grade when you believe that one of the following conditions apply:

- There was a computational or recording error in the grading.
- The grading process used non-academic criteria.
- There was a gross violation of the instructor's own grading system.

Chapter 4 of the University Regulations contains information on the grade appeals process.

RELIGIOUS ACCOMMODATION POLICY STATEMENT

In accordance with rules of the Florida Board of Education and Florida law, students have the right to reasonable accommodations from the University in order to observe religious practices and beliefs regarding admissions, registration, class attendance, and the scheduling of examinations and work assignments. For further information, please see Academic Policies and Regulations.

UNIVERSITY APPROVED ABSENCE POLICY STATEMENT

In accordance with rules of the Florida Atlantic University, students have the right to reasonable accommodations to participate in University approved activities, including athletic or scholastics teams, musical and theatrical performances and debate activities. It is your responsibility to notify the instructor at least one week prior to missing any course assignment.

DROPS/WITHDRAWALS

You are responsible for completing the process of dropping or withdrawing from a course. Please click on the following link for more information on dropping and/or withdrawing from a course. Please consult the [FAU Registrar Office](#) for more information.

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The instructor reserves the right to adjust this syllabus as necessary.