

**The University of Iowa**  
**The College of Liberal Arts and Sciences**  
**Spring 2024**

**Title of Course:** MATH:6010:0001 – Commutative Algebra and Representation Theory  
**Course meeting time and place:** 11:00-12:15 TuTh 221 MLH  
Department of Mathematics: <https://math.uiowa.edu>

**Course ICON site:** To access the course site, log into [Iowa Courses Online \(ICON\)](https://icon.uiowa.edu/index.shtml) <https://icon.uiowa.edu/index.shtml> using your Hawk ID and password.

### **Course Home**

The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the policies and procedures for its courses. Graduate students, however, must adhere to the [academic deadlines set by the Graduate College](#).

### **Instructor**

Office location: 225J MLH  
Student drop-in hours: 12:15-12:45PM TuTh in my office in person and 7:00-8:00PM TuWe on Zoom, or by appointment. Please send me an email if you have questions but you cannot make it to my office hours.  
Phone: 319-335-1514  
E-mail: [frauke-bleher@uiowa.edu](mailto:frauke-bleher@uiowa.edu)  
DEO: Prof. Ryan Kinser, 14A/25F MLH, [ryan-kinser@uiowa.edu](mailto:ryan-kinser@uiowa.edu)

### **Description of Course**

We will study selected topics in group representation theory, the localization of rings and modules, and selected topics in algebraic geometry.

### **Learning Objectives**

The main goal is to obtain general knowledge of abstract algebra needed for research specialization in algebra or for applications in other areas. The first goal is to give an introduction to the representation theory of finite groups over the complex numbers. The second goal is to discuss the localization of rings and modules. The third goal is to give an introduction to algebraic geometry, with an emphasis on affine varieties and the prime spectrum of a commutative ring.

### **Textbook/Materials**

No textbook is required. Selected materials from the books below will be used in this course. These books have been put on course reserve and you can access this list on ICON by clicking on “Course Materials+”

- Jean-Pierre Serre: Linear Representations of Finite Groups
- Charles Curtis and Irving Reiner: Methods of Representation Theory, volume I
- David Dummit and Richard Foote: Abstract Algebra
- Robin Hartshorne: Algebraic Geometry
- Hideyuki Matsumura: Commutative Ring Theory

### Academic Honesty and Misconduct

All students in CLAS courses are expected to abide by the [CLAS Code of Academic Honesty](#). Undergraduate academic misconduct must be reported by instructors to CLAS according to [these procedures](#). Graduate academic misconduct must be reported to the Graduate College according to Section F of the [Graduate College Manual](#).

### Student Complaints

Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the Director or Chair of the school, department, or program offering the course.

Undergraduate students should contact [CLAS Undergraduate Programs](#) for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS [Associate Dean for Graduate Education](#) and Outreach and Engagement when additional support is needed.

### Drop Deadline for this Course

You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the [drop deadline for this course](#) here. When you drop a course, a “W” will appear on your transcript. The mark of “W” is a neutral mark that does not affect your GPA. Directions for adding or dropping a course and other registration changes can be found on the [Registrar’s website](#). Undergraduate students can find policies on dropping and withdrawing [here](#). Graduate students should adhere to the [academic deadlines](#) and policies set by the Graduate College.

### Grading System and the Use of +/-

Final grades will be awarded based on the following ranges:

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
A 85-100 A- 80-84	B+ 75-79 B 70-74 B- 65-69	C+ 60-64 C 55-59 C- 50-54	D < 50

### Course Grades

Final course grades will be assessed based on your performance in the following three activities which will carry equal weight:

**Class participation:** You can choose whether you attend each lecture in person or on Zoom. Class participation can take many forms. The minimal expectation is that you speak up if you have a question. You can also send me an email after class if you have a question about the course material.

**Homework problems and discussion:** I will post homework problems on ICON under Assignments. If you want to submit written solutions to these problems, please do so on ICON by uploading a separate pdf file for each homework. Written submission of solutions is voluntary. Please alert me by email if you submit solutions this way so I can give you feedback. From time to time, we will discuss selected homework problems in class. During these discussions, you should be prepared to actively participate so that we arrive together at the solution of each problem. Written submission to ICON can replace active class participation if you prefer.

**Final Exam:** The final exam will consist of an oral discussion about the topics of this course. The details of this discussion will be announced later during the semester.

### **Date and Time of the Final Exam**

The final examination date and time will be announced by the Registrar generally by the fifth week of classes and it will be announced on the course ICON site once it is known. Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam. According to Registrar's final exam policy, students have a maximum of two weeks after the announced final exam schedule to request a change if an exam conflict exists or if a student has more than two exams in one day (see the [policy](#) here).

### **Calendar of Course Assignments and Exams**

Homework problems will be posted on ICON under Assignments. My plan is that there will be a set of homework problems every 1-2 weeks. There will be no midterm exams. A precise calendar of weekly lecture topics with links to assignments will be posted on ICON in a Module called Calendar.

### **Attendance and Absences**

You can choose to attend lectures in person or on Zoom. The lectures will be recorded on Zoom and lecture notes will be posted on ICON. I expect you to stay home when you are sick and to send me an email when you cannot make it to class in either modality (in person or on Zoom). For the current isolation guidelines of the CDC concerning COVID-19, please see [Isolation and Precautions for People with COVID-19](#). Please also take care of yourself when you have any other illness, respiratory or otherwise.

Here is the general UI policy on absences: [University regulations require that students be allowed to make up examinations](#) that have been missed due to illness, religious holy days, military service obligations (including service-related medical appointments), or other unavoidable circumstances or University-sponsored activities. Students with UI-authorized activities must discuss their absences with the instructor as soon as possible. Religious obligations must be communicated within the first three weeks of classes.

**Communication: UI Email**

Students are responsible for all official correspondences sent to their UI email address (uiowa.edu) and must use this address for any communication with instructors or staff in the UI community. For the privacy and the protection of student records, UI faculty and staff can only correspond with UI email addresses.

**Where to Get Academic Support for This Course**

You are welcome to come to my drop-in office hours if you have questions. If you want to talk but cannot make it to my office hours, please send me an email to make another appointment.

**Mental Health Resources and Student Support**

Students are encouraged to be mindful of their mental health and seek help as a preventive measure or if feeling overwhelmed and/or struggling to meet course expectations. Students are encouraged to talk to their instructor for assistance with specific class-related concerns. For additional support and counseling, students are encouraged to contact University Counseling Service (UCS). Information about UCS, including resources and how to schedule an appointment, can be found at [counseling.uiowa.edu](https://counseling.uiowa.edu). Find out more about UI mental health services at [mentalhealth.uiowa.edu](https://mentalhealth.uiowa.edu).

**Student Care and Assistance** provides assistance to University of Iowa students who are experiencing a variety of crisis and emergency situations, including but not limited to medical issues, family emergencies, unexpected challenges, and sourcing basic needs such as food and shelter. More information on the resources related to basic needs can be found at [basicneeds.uiowa.edu/resources/](https://basicneeds.uiowa.edu/resources/). Students are encouraged to contact Student Care & Assistance in the Office of the Dean of Students (Room 135 IMU, [dos-assistance@uiowa.edu](mailto:dos-assistance@uiowa.edu), or 319-335-1162) for support and assistance with resources.

**University Policies**

The following links explain a series of important university policies.

**[Accommodations for Students with Disabilities](#)****[Classroom Expectations](#)****[Free Speech and Expression](#)****[Non-discrimination](#)****[Absences for Religious Holy Days](#)****[Sexual Harassment/Misconduct and Supportive Measures](#)****[Sharing of Class Recordings](#)**