The University of Iowa  
The College of Liberal Arts and Sciences  
Spring 2023

Title of Course: MATH:6010:0001 – Commutative Algebra and Representation Theory  
Course meeting time and place: 11:00-12:15 TuTh 118 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 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: 12:15-1:45PM Tu in person and 7:00-8:30PM We on Zoom, or by appointment. Please send me an email if you cannot make it to my office hours.  
Phone: 319-335-1514  
E-mail: frauke-bleher@uiowa.edu  
DEO: Prof. Ryan Kinser, 14A/25F MLH, ryan-kinser@uiowa.edu

Description of Course  
We will study fundamental notions in commutative algebra and representation theory, including discrete valuation rings, group representations, characters and orthogonality relations.

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 a thorough introduction to group representations and characters in characteristic zero. The second goal is to discuss discrete valuation rings, their completions and p-modular systems. The third goal is to give an introduction to group representation theory in positive characteristic using Brauer theory.

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  
- David Dummit and Richard Foote: Abstract Algebra  
- Charles Curtis and Irving Reiner: Methods of Representation Theory, volume I

Other useful texts:  
- Jon Alperin: Local Representation Theory  
- Bertram Huppert: Endliche Gruppen I
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 +/-
Grades, including plus/minus grades, will be assigned on a curve that depends on the class. The grade of A+ will only be used in exceptional circumstances.

Course Grades
Final course grades will be assessed based on your performance in the following activities:

Class participation: You can choose whether you attend the lectures 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.
**Exams:** There will be no midterm exams. The final exam will consist of a short essay each student will write and which will be due on ICON by the end of the final exam period set by the Registrar. Details about this essay will be announced later during the semester. If you prefer, you can request an oral discussion during the final exam period in lieu of writing the essay.

**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.

**College of Liberal Arts and Sciences (CLAS) Course Policies**

**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).

Here is the general UI policy on absences: University regulations require that students be allowed to make up examinations which have been missed due to illness or other unavoidable circumstances. Students with mandatory religious obligations or UI authorized activities must discuss their absences with me as soon as possible. Religious obligations must be communicated within the first three weeks of classes.

**Exam Policies**
There are no midterm exams in this course. As discussed above, the final exam will consist of a short essay each student will write and which will be due by the end of the final exam period. If you prefer, you can request an oral discussion during the final exam period in lieu of writing the essay. If you cannot submit your essay on time or if you request an oral discussion but cannot do so during the final exam period, please let me know as soon as possible, so we can make a different arrangement.
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.

Where to Get Help
You are welcome to come to my 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.

University Policies
Accommodations for Students with Disabilities
Basic Needs and Support for Students
Classroom Expectations
Exam Make-up Owing to Absence
Free Speech and Expression
Mental Health
Military Service Obligations
Non-discrimination
Religious Holy Days
Sexual Harassment/Misconduct and Supportive Measures
Sharing of Class Recordings