



College of Natural & Applied Sciences  
Division of Mathematics & Computer Science

## **MA412-01 Introduction to Abstract Algebra II (3 Credits)**

**Spring (FAÑOMNĀKAN) 2025**

**Instructor:** Dr. Hyunju Oh

**Class Meeting:** MW 2:00-3:20pm, SC121

**Office:** ALS Rm316

**Phone:** 671-735-2142

**Email:** ohh@triton.uog.edu

**Office Hours:** (MTWTh) 12:30 – 1:30pm, (MW) 3:30-4:30pm, or by appointment

**Course Code Moodle:** MA-412 SP25 <https://moodle.uog.edu/course/view.php?id=13761>

**Enrollment Key:** ma412stu2025

Please Note: The Enrollment Key is CASE SENSITIVE, and there are NO spaces before and after the enrollment key.

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### **Textbook:**

*A First Course in Abstract Algebra* by John B. Fraleigh, 7 edition.

### **Catalog Course Description:**

This is the second course in a two-semester sequence of introductory courses in abstract algebra. Topics covered include some of field theory, advanced group theory, Galois theory, module and ring theory.

### **Prerequisite:**

Grades of C or better in MA341 and MA411.

### **Rational for the Course:**

The basic content of the course is needed by any student who is planning to continue in mathematics. The ideas introduced here provide a foundation for work in any area of mathematics. More generally, students are presented with an important paradigm as they are exposed to the sustained development of a significant mathematical area defined by axioms using theorems and proofs. In the process, students are encouraged to make their own evaluation of the correctness of mathematical assertions.

### **Skills and Background Required or Expected:**

MA341 and MA411 are prerequisites for this course.

**Tentative Schedule:**

Weeks 1 – 3        Sections 21-23  
Weeks 4 – 7        Sections 26-27, 29-31  
Week 9              Spring Break (March 18-22, 2024)  
Weeks 10 – 13      Sections 33-37  
Weeks 14 – 17      Sections 48-51, 53-54

(This is a tentative schedule, and is subject to change, should a topic require more or less time in class)

**Tentative Quiz/Test Schedule:**

Test 1: Feb. 12 (Wed)  
Test 2: March 12 (Wed)  
Test 3: Apr. 16 (Wed)  
Final Exam: 2:00-3:50pm, May 19 (Monday)

**Evaluation:**

The grade distribution and grading scheme are as follows:

Tests 66%        Final Exam 22%        Presentations 12%

Grading Scale:

98-100%: A+	93-97%: A	90-92%: A-	87-89%: B+	83-86%: B
80-82%: B-	77-79%: C+	70-76%: C	60-69%: D	0-59%: F

Student's work is usually graded on a partial credit basis. **Students' written solutions must include all work needed to solve problems.** Points will be deducted (or given none) for omitting any work even if the answer is correct.

**Homework:**

Homework will be assigned to each class. To be successful, a student must complete all assigned homework even if it is not collected and graded. Keep in mind that quizzes and tests are based on homework problems, so practice, practice, practice!

**Presentation:**

All students will do **two short individual presentations** during the semester. You can either present a couple Homework problems or project on an abstract algebra topic as approved by instructor.

This course will require your active participation in class. Students are often asked to write on the blackboard to explain the content and exercises in front of others. You are encouraged to work together and to see me discussing the content and preparing for the presentation. This will make you learn how to present, discuss, and communicate with others. The oral

presentation could be informal; it could even be sketchy if you succeed in convincing others. However, one of the SLO's of this course is to learn the process of turning informal mathematical ideas into formal narrative proofs. Whenever it is necessary, you will be asked to show the formal proof on board.

**Writing Mathematics:** Continuing from MA411, you will learn how to write proofs in mathematically more meaningful situations, type using LaTeX, and submit your project. Your work will be graded based on mathematical correctness, clarity, grammar, and style. You may work with your classmates, but your final write-up must reflect your own understanding. To check your understanding, I might ask you to reproduce your writing on board without seeing it.

### **Exams/Final Exam:**

There will be **three tests** and a **final exam**. All notes and the textbook are prohibited from use on exams and on the final exam. It is crucial to do well on Tests and Final Exam. Missing any single test or final exam will result in grade F. Very special circumstances will be handled very specially by consultation with the instructor. Except for true emergencies, these special cases are arranged in advance with the instructor.

**Any evidence of cheating will result in a "0" for that test/Final exam and an "F" for the entire course regardless of your total points!!!**

### **Attendance:**

Students are expected to attend every scheduled class. It is the students' responsibility to keep informed of any announcements, syllabus adjustments or policy changes made during scheduled classes. In case you must leave early, you need to inform the instructor in advance about your leaving class early. Please inform the instructor if you will be absent.

**Make-up policy:** There will be no make-up quizzes/tests unless you contact the instructor **IMMEDIATELY** for extenuating circumstances. For example, you must go off-island, you will be hospitalized or under serious medical treatment, deployment, etc.

### **Withdrawal from Class:** [*UOG Student Handbook, p.33-34*]

Students may withdraw from a class or classes during the first week of instruction of a regular semester and the first two days of a summer session without anything being recorded on their transcripts. From the second through the eighth week of instruction of a regular semester and from the third day of classes through the third week of a summer term, students may withdraw by using the Withdrawal feature in their Webadvisor account.

### **Academic Dishonesty:**

All assignments and Quiz/Test/Exam must be your own work. The term plagiarism includes, but is not limited, to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.

Plagiarizing in your essay or **CHEATING on Quiz/Test/Exam will result in Course Grade F regardless of your total points.** If you are not sure what plagiarism is and how to avoid it in using sources for your work, see [www.indiana.edu/~wts/pamphlets/plagiarism.shtml](http://www.indiana.edu/~wts/pamphlets/plagiarism.shtml) but be careful when paraphrasing not to change the meaning of scientific information. Answers you write on Quiz/Test/Exam must come only from in your head or the information supplied in the test papers; anything else is cheating. The term cheating includes, but is not limited to: (1) use of any unauthorized assistance in taking quizzes, tests, or examinations, e.g., looking at other students answers, using crib notes (including electronic), getting information from another person via any kind of communication; (2) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; or (3) the acquisition, without permission, of tests or other academic material belonging to a member of the University faculty or staff. If you need to use an electronic translator, you must discuss this with me in advance.

### Curriculum Mapping:

Course SLOs	Program SLOs	UOG ILOs	Method of Assessment
SLO 1	MA PR 1,2,3,4,5	ILO 1,2,3,5,6	Homework, Presentation, Quiz, Test
SLO 2	MA PR 1,2,3,4,5	ILO 1,2,3,5,6	Homework, Presentation, Quiz, Test
SLO 3	MA PR 1,2,3,4,5	ILO 1,2,3,5,6	Homework, Presentation, Quiz, Test
SLO 4	MA PR 1,2,3,4,5	ILO 1,2,3,5,6	Homework, Presentation, Quiz, Test
SLO 5	MA PR 1,2,3,4,5	ILO 1,2,3,5,6	Homework, Presentation, Quiz, Test

### Course SLOs

SLO 1: State the definition of degree of field extension and relate field extensions to vector spaces.

SLO 2: Present and prove properties of examples of fields and field extensions involving rational, real, complex, and finite fields.

SLO 3: Give an outline of the proof of advanced group theory such as the Fundamental Theorem of finitely generated abelian groups and Sylow theorems.

SLO 4: Understand the Fundamental Theorem of Galois theory, the Galois correspondence between intermediate fields and subgroups of the Galois group.

SLO 5: Apply Galois theory to derive consequences such as unsolvability of polynomial equations by radicals.

### Math PLOs

MA PR 1: Demonstrate critical thinking, problem solving skills and ability to use mathematical methods by identifying, evaluating, classifying, analyzing, synthesizing data and abstract ideas in various contexts and situations.

MA PR 2: Exhibit a sound conceptual understanding of the nature of mathematics, and demonstrate advanced mathematical skills in mathematical analysis, modern algebra, and other mathematical discipline(s).

MA PR 3: Argue and reason using mathematics, read, create and write down logically correct mathematical proofs, use exact mathematical language and communicate mathematics efficiently orally, in writing and using information technology tools.

MA PR 4: Apply abstract thinking, mathematical methods, models, and current practices in the sciences, including state-of-the-art mathematical software, to solve problems in theoretical mathematics or in a diverse area of mathematical applications.

MA PR 5: Show maturity in mathematical knowledge and thinking that prepares and encourages students to pursue graduate studies in mathematics or in related fields.

MA PR 6: Demonstrate an appreciation of and enthusiasm for inquiry, learning and creativity in mathematical sciences, a sense of exploration that enables them to pursue lifelong learning and up-to-date professional expertise in their careers through various areas of jobs, including governmental, business or industrial jobs in mathematics, related sciences, education, or technology.

### **UOG ILOs**

ILO 1: Mastery of critical thinking & problem solving

ILO 2: Mastery of quantitative analysis

ILO 3: Effective oral and written communication

ILO 4: Understanding & appreciation of culturally diverse people, ideas & values in a democratic context

ILO 5: Responsible use of knowledge, natural resources, and technology

ILO 6: An appreciation of the arts & sciences

ILO 7: An interest in personal development & lifelong learning

### **Academic Integrity Policy:**

Academic Integrity is about performing in your role as student in ways that are honest, trustworthy, respectful, responsible, and fair (see [www.academicintegrity.org](http://www.academicintegrity.org) for more information). As a student, you will complete your academic assignments in the manner expected by the instructor. Academic dishonesty, including but not limited to cheating and plagiarism may result in suspension or expulsion from the University. Refer to the UOG Student Handbook and Code of Conduct for more information.

### **No Recording Policy**

Recording of online class meetings is not allowed. Not only is the delivery of course content the intellectual property of the instructor, but students enrolled in the course have privacy rights. Unauthorized recording and distribution of online courses may violate federal law.

### **UOG Disabilities Policy**

For individuals covered under the ADA (Americans with Disabilities Act), if you are a student with a disability requiring academic accommodation(s), please contact the Disability Support Services Office to discuss your confidential request. A Faculty Notification letter from the Disability Support Services counselor will be provided to me. To register for academic accommodation, please contact or visit Sallie S. Sablan, DSS counselor in the School of Education, office 110, [disabilitysupport@triton.uog.edu](mailto:disabilitysupport@triton.uog.edu) or telephone/TDD 671-735-2460.

Office Hours: Monday to Thursday 9:00-noon and 1:00-3:00; Friday by appointment only

To schedule an appointment at <https://calendly.com/sssablan>, Office: School of Education, room 110

Office Phone Number/TTY: 735-2460, Email address: [sssablan@triton.uog.edu](mailto:sssablan@triton.uog.edu)

Disability Support Services email: [disabilitysupport@triton.uog.edu](mailto:disabilitysupport@triton.uog.edu)

Scheduled appointments preferred.

### **Tobacco-free/Smoke-free/Vaping-free campus:**

UOG is a tobacco-free/smoke-free, vaping/e-cigarette free campus. Thank you for not using tobacco products or e-cigarettes on campus, for helping to fight cancer, and for helping make UOG a healthy learning and living environment.

### **Notification of Rights Under FERPA:**

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. These rights for students, parents and school officials can be viewed at

<http://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html>