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81, Oedae-ro, Mohyeon-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, 17035, Korea

Hankuk University of Foreign Studies

2024 Summer Session

MATH 240 Abstract Algebra

Course Outline

Course Code: MATH 240

Instructor: Professor Vadim Olshevsky

Home Institution: University of Connecticut

Office Hours: TBA and by appointment

Email: olshevsky@gmail.com

Credit: 4

Class Hours:

This course will have 52 class hours, including 32 lecture hours, professor 8 office hours, 8-hour TA discussion sessions, 4-hour review sessions.

Course Description:

This course discusses the basic elementary facts about integers, polynomials, groups, rings, integral domains, and fields. Abstract algebra is a beautiful subject which will arm you with tools that will prove indispensable in a very broad range of mathematics courses (from geometry to number theory) in the future. MATH 240 is recommended strongly for all students planning to go to graduate school in mathematics.

Required Course Materials:

First Course in Abstract Algebra, A, 8th edition, by John B Fraleigh and Neal Brand. ISBN 9780135758168 (paperback) | ISBN 9780321390363 (ebook). Can be purchased directly from First Course in Abstract Algebra, A, 8th edition | eTextBook Subscription | Pearson+

In addition, the professor will provide a number of additional handouts supplementing the textbook.

Grading:

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In addition to weekly homework there will be one midterm and a final exam.
Attendance and participation: 10%
Homework: 30%
Midterm: 30%
Final: 30%

Grading Policies: No makeups for the midterm and the final.

Grading System (1 ~ 100)

A+ : 96 - 100	A : 91 - 95
B+ : 86 - 90	B : 81 - 85
C+ : 76 - 80	C : 71 - 75
D+ : 66 - 70	D : 60 - 65
F : 0 - 59	
Pa : Pass	Fa : Fail

Course Schedule:

WEEK 1
Groups, Subgroups, Abelian and nonabelian examples. Cyclic groups. Generating sets and Caley digraphs.
Permutations, finitely generated Abelian groups. Cosets and Lagrange theorem. Plane isometrics.

WEEK 2
Factor groups. Factor group computations and simple groups. Group actions on a set. Applications of G-sets to Counting.
Isomorphisms. Sylow theorems. Free Abelian groups. Free groups. Group permutations.

WEEK 3
Rings. Fields. Integral domains. Fermat's and Euler's theorems.
The field of quotients of an integral domain. Factorization of polynomials over a field.
Applications to coding theory. Homomorphisms and factor rings. Prime and maximal ideals.
Noncommutative examples.

WEEK 4
Vector spaces. Unique factorization domains. Euclidean domains. Number theory. Algebraic geometry. Grobner bases for ideals.
Extension fields. Algebraic extensions. Finite fields.

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Student responsibilities/expectations: The main course material will be presented through lectures. A discussion session, to be held every Friday, will offer an opportunity for students to discuss course material and assigned problems with a teaching assistant (TA). Students are advised to keep pace with the course material as it is being presented. Consequently, students should endeavor to attend all class meetings and discussion sessions, be early for class, and spend sufficient time working on assigned homework problems. If for any reason a student misses a class, he/she should endeavor to obtain the notes and learn the missed material before the next class meeting. Students should not hesitate to ask questions or seek additional assistance to ensure that they are staying on pace with the class. Students will be expected to come to class prepared and ready to participate actively. Please, turn off your cell phones and put aside any unrelated material before class begins. Students should exhibit a sense of responsibility and respect towards fellow students. Late-coming to class or early departure from class meetings will not be allowed.

Examinations: There will be one midterm exam plus one cumulative final exam. The exams will contain problems to solve and definitions, brief explanations of concepts, and proofs.