NANYANG TECHNOLOGICAL UNIVERSITY

Teaching, Learning and Pedagogy Division

Reg. No. 200604393R

PROPOSED COURSE OUTLINE TEMPLATE FOR STUDENTS AT NTU

Academic Year	AY17/18	**Semester**	2
Course Coordinator	Frederique Oggier		
Course Code	MH3200		
Course Title	Abstract Algebra I		
Pre-requisites	MH2200 - Groups and symmetry		
No of AUs	3		
Contact Hours	2h course, 1h tutorial		
Proposal Date	07-Dec-2017		

Course Aims

This mathematics course, which is mandatory for students in the pure mathematics track, aims at understanding the algebra concepts that are groups and rings. Groups and rings capture structures that are common to diverse mathematical objects. Once these structures are recognized, their properties are abstractly studied, which can then be applied to different mathematical contexts. This theory is essential for future algebra courses and anyone who will need to work with coding theory, cryptography, geometry or topology.

Intended Learning Outcomes (ILO)

By the end of this course, you (as a student) should be able to:

1. state basic definitions related to groups and rings and explain them to a layman
2. give examples and counter-examples involving rings and groups
3. analyze the interaction between groups and other algebraic structures via group action
4. categorize groups and rings based on their properties
5. compute quotient groups and quotient rings
6. distinguish ideals from subrings
7. apply group/ring isomorphism theorems to prove that two groups/rings are isomorphic
8. prove or disprove statements involving groups and rings

Course Content

Group and subgroup, automorphism, direct and semi-direct product, group isomorphism theorems, classification of finite abelian groups, group actions
Ring and subring, characteristic, zero divisor, integral domain, ring homomorphism, ideal (two-sided, prime, maximal, principal), quotient ring, ring isomorphism theorem

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/Individual	Assessment rubrics

1. Final Examination	1,2,3,4, 5,6,7,8	A1,A2,A3, B4,C1	50%	Individual	Point-based marking
2. CA1: Midterm	1,2,3,4 5,7	A1,A2,A3 B3	25%	Individual	Point-based marking
3. CA2: Midterm	1,2,4,5 6,7,8	A1,A2,A3	25%	Individual	Point-based marking
4.					
5.					
Total			100%		

Formative feedback

You will receive formative feedback for your CA. It is done by commenting on the mistakes and misunderstanding that appeared in your CA. This is possible because this course has a small number of students (typically less than 20). General feedback for your performance as part of the end of course review is done based on the final exam: the most common mistakes, as well as the questions that were best answered, are discussed in the report provided to all students.

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Interactive Lecture	The suggested learning and teaching approach consists of breaking the flow of the lectures by introducing exercises to be solved by the students in small groups during the lectures themselves. A typical pattern would be: the lecturer introduces a new concept, or a new proof, and then asks you to answer a question or solve a small exercise involving the new concept/proof. The lecturer then discusses the answer with you. If the newly introduced concept is understood well enough, the lecturer can then continue to build upon it, otherwise, further explanation is given. This also ensures that you have improved your knowledge in each of the classes that they are attending. This also encourages you to attend the classes, by being more active.

Reading and References

Lecture notes are provided.

Course Policies and Student Responsibilities

You are expected to attend all classes punctually and take all scheduled assignments and tests by due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements. You are expected to participate in all discussions and activities.

You are expected to attend the midterms. In case of medical leaves, You should provide a satisfying medical certificate on time.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	Office Location	Phone	Email
Frederique Oggier	MAS05-13	6513 2026	frederique@ntu.edu.sg

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
Week 1	Basic definitions from group theory	1,2,4,8	You will read the introduction section on groups. You will be asked to provide examples of groups that you have seen in previous courses.
Week 2	Quotient groups and isomorphism theorems.	1,2,4,5,7,8	You will read the section on quotient group, and the section on group isomorphism theorems, including the factor theorem.
Week 3	Direct and semi-direct products	1,2,4,8	You will read the section on internal/extermal direct products, and semi-direct products.
Week 4	Group actions	1,2,3,4,8	You will read the section on group action.
Week 5	Use of Group actions	1,2,3,4,8	You will read examples of group actions.
Week 6	Classification of abelian groups, preliminary results	1,2,4,8	You will read the section on abelian group structures.
Week 7	Classification of abelian groups	1,2,4,8	You will read about classifying all abelian groups.
Week 8	Basic definitions from ring theory	1,2,4,8	You will read the introduction section on rings. You will be asked to provide

			examples of rings that you have seen in previous courses.
Week 9	Ideals and homomorphisms	1,2,4,6,8	You will read the section on ideals and the section on ring homomorphisms.
Week 10	Quotient rings and isomorphism theorems	1,2,4,5,6,7,8	You will read the section quotient rings, and the section on isomorphism theorems.
Week 11	Maximal and prime ideals	1,2,4,5,6,8	You will read the section on maximal and prime ideals.
Week 12	Polynomial rings	1,2,4,5,6,8	You will read the section on polynomial rings.
Week 13	Unique factorization	1,2,4,8	You will read the section on unique factorization.