



THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

DEPARTMENT OF MATHEMATICAL SCIENCES

MTS306-ABSTRACT ALGEBRA II

COURSE PARTICULARS

Course Code: MTS306

Course Title: ABSTRACT ALGEBRA II

No. of Units: 3

Course Duration: TWO hours of theory and ONE hour of tutorial per week for 15 weeks.

Status: Compulsory

Course Email Address: mts306@gmail.com

Course Webpage: <http://www.mts.futa.edu.ng/courseschedule.php?coursecode=mts306%>

Prerequisite: MTS303

COURSE INSTRUCTORS

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COURSE DESCRIPTION

This course is compulsory for pure mathematicians who wish to specialise in the areas of real , complex analysis and functional analysis. The course synopsis is as follows: Normal subgroups and quotient groups. Homomorphism and isomorphism theorems. Cayley's Theorem. Direct product. Groups of small orders. Group acting on sets. Sylow's Theorems. Ideals and quotient rings. Principal *deal Domains*; *Unique Factorization Domains*; *Euclidean Rings*; *Irreducibility*; Field Extensions; Degree of an Extension; Minimum Polynomial; Algebraic and Transcendental Extensions.

COURSE OBJECTIVES

The objectives of this course are to:

- introduce students to the basic concepts of algebraic structures embedded in Group and Ring Theories;
- explain to students the role commutativity plays in Abstract Algebra;
- demonstrate to students that this is a branch of pure mathematics whose applications to real life situations is still explorable;
- provide a text from which an average student of maths can acquire as much depth and comprehension in his study of abstract algebra exclusive of linear algebra as possible;
- emphasize the fact that abstract concepts arise from the analysis of concrete situations;
- develop student's power to think for himself in terms of concepts, include a variety of examples on each topic;
- demonstrate to students that there is a partial converse of Lagrange theorem;
- capture the canonical homomorphism via normality leading to isomorphism of two groups.

COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the student will be able to:

(Knowledge based)

- distinguish exactly the domain of definition of function;
- widen the knowledge base of students in the applications of algebraic structures;
- identify number systems equipped with specific operation as a commutative which plays a very important role in commutative algebra.

(Skills)

- Ability to apply these algebraic structures to real-life applications, particularly for group classification during political election;
- Manipulation of subsets of a given set in realising an achievable objective;
- Ability to obtain an isomorphism between two groups of different cardinality.

GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

Class Attendance	10%
Assignments	10%
Test(s)	20%
<u>Final Examination</u>	<u>60%</u>
<u>TOTAL</u>	<u>100%</u>

GENERAL INSTRUCTIONS

Attendance: Every student registered for the course must attend lectures except for cases like illness, unforeseen circumstances or other reasonable excuses supported by valid evidences from sponsor or parents or recognized medical health centres.

Academic Integrity: Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited. You are not allowed to make copies of another person's work and submit it as your own; that is plagiarism. All cases of academic dishonesty will be reported to the University Management for appropriate sanctions in accordance with the guidelines for handling students' misconduct as spelt out in the Students' Handbook.

Assignments and Group Work: Students are expected to submit assignments as scheduled. Failure to submit an assignment as at when due will earn you zero for that assignment. Only under extenuating circumstances, for which a student has notified the lecturer in advance, will late submission of assignments be permitted. Study Group will be encouraged by making sure each group consists of a mixture of both bright and dull students.

Code of Conduct in Lecture Rooms and Laboratories: Noises, such as cell phones, communications between two students not related to class discussion must be prohibited during lecture. Academic staff, not necessarily mathematicians, or registered staff.

are welcomed to attend lecture for knowledge acquisition to assist in their research works.. Food and drinks are not permitted in the lecture room.

READING LIST

⁴Goldberg,R. R. (1964). Methods of Real Analysis. Blaisdell Publishing Company. N.Y. USA.

¹Royden, H. L.(1968).Real Analysis.Macmillan Publishing Compahy., Inc. N.Y. USA.

⁴Rudin,W.(1976). Principles of Mathematical Analysis . 3rd Edition.McGraw-Mill Publishing, Inc. NY.USA.

Legend

- 1- Available in the University Library
- 2- Available in Departmental/School Libraries
- 3- Available on the Internet.
- 4- Available as Personal Collection
- 5- Available in local bookshops.

COURSE OUTLINE

Week	Topic	Remarks
1-2	Introduction of the Course Overview With basic concepts, such as definitions of Groups, subgroups, Normal subgroups and quotient groups; Homomorphism, Monomorphism, epimorphism and isomorphism between two groups.	Students are given quiz to assess their background for the course. However, this will not be graded.
3-5	Cayley's Theorem, Direct Product of groups to obtain a new group. Group acting on sets. Monotonicity and subadditivity of measure applied to sequence of sets with algebraic structures and operations; Non-measurable set.	Examples are presented on the real line and arbitrary collection of sets (Test Number 1)
6-8	Lebesgue Measurable functions with algebraic structures and operations; The concept of almost everywhere(a.e)	MID-TERM TEST will be given to Students to determine their level of understanding of the course so far.
9-11	Simple and characteristic functions; Lebesgue integrable function on finite domain.	.Real –life examples will be presented to the students.
12-14	Fatou's Lemma; Lebesgue dominated convergence theorem	Examples will be presented to explain the abstractness of this concept.
15	Revision of sample problems and exercises.	