

Course: **Algebraic Structures.**
Course code: **NSC524.**
Credits: **2-4.**
Level: **Intermediate.**
Prerequisite: **Permission of instructor.**
Location & Times: **Sci217, TuTh 10-11.20am.**
Instructor: **John Arhin, jarhin@marlboro.edu**
Course website: **<http://cs/courses/fall2009/algebraic/home>**
Course Text: **Introduction to Algebra (Second Edition) by Peter J Cameron.**
Course text website:

- <http://www.maths.qmw.ac.uk/~pjc/algebra/>

Please note that the course text website includes online notes specifically for Algebraic structures.

Introduction

Algebraic structures such as numbers, polynomials, vectors and matrices each have operations such as addition and such as multiplication. Each of these operations satisfy similar familiar laws. We generalise these structures together with their operations to form the foundation of algebraic structures.

Content

We will be regarding two kinds of algebraic object:

- rings, with two operations such as addition and multiplication;
- groups, with just one operation such as multiplication or composition.

In particular, we will be looking at similarities and differences between rings and groups.

With the notions of rings and groups, in mind, we will be investigating subrings (i.e. rings contained within rings) and subgroups (i.e. groups contained within groups). In addition, we will consider tests for subrings and for subgroups.

Another core topic includes ideals and normal subgroups. We will view an ideal as a subring with a certain property, and we will view a normal subgroup as a subgroup with another certain property. Using these properties, we will regard ideals and normal subgroups as analogues of each other. Taking this idea of analogues one stage further, we will study the isomorphism theorems for both rings and groups. We will see that groups and rings are not that different from one another, when it comes to constructing "new" rings from "old" ones and constructing "new" groups from "old" ones.

Finally, we will look at theorems relating to the structure of rings and the structure of groups to emphasize the differences between rings and groups.

Grading

Final exam: 40%.
Project and Presentation: 20%.
Assignments: 40%.

Final Exam

- A 24 hour take-home exam based on the assignments.

Project and Presentation

- Towards the end of term you will complete a project, and give a presentation based on this project. In the project, you will discuss a real world example of a group or of a ring. You will investigate how the core topics of the course, mentioned above, relate to your chosen example. Higher marks will be awarded for investigating a suitable theorem from advanced algebraic structures, relating to the structure of rings and structure of groups, and explaining what these theorems say about your chosen example.

Attendance in selected units, punctuality, class participation and prompt submission of homework are expected. Your performance in these areas will influence your final result by up to one letter grade.

A couple of final comments

You are expected to be aware of the college's policy on academic integrity and to abide by it. It can be found on the college website, and is linked from the course website. Please come and talk to me if anything is unclear.

As a rough guide, taking this course for four credits means that you should be expecting to spend in the region of twelve hours each week (including class time) working on it.

If you have a medical condition or disability that I (as your instructor) should be aware of please contact Megan M. Littlehales in the Health Center, who will in turn contact me.