

**MTH 540**  
**Abstract Algebra I: Exploring groups**  
Spring Semester 2018

**Course Meetings:**

**Instructor:** Dr. Timothy Ferdinands   **Email:** timothy.ferdinands@bethelcollege.edu  
**Office:** S 013

**Textbook:** *Abstract Algebra: An Inquiry Based Approach* by Hodge, Schlicker, and Sundstrom.

**Prerequisites:** MATH 293, MATH 242

**Approximate Course Content:** Abstract algebra includes the study of groups, rings, and fields. Informally, a group, ring, or field is a set of mathematical objects with operations defined (e.g., addition and/or multiplication) that obey certain properties. For example, one could consider the set of matrices with addition and multiplication. One could ask if multiplication is commutative (like integer multiplication is) or if we can define division (like we can in the rational numbers).

This course will be an in-depth study of the algebraic structure of groups. We will discuss both finite and infinite groups as well as different structures used to classify them. Some of the topics include the study of cosets and normal subgroups, group homomorphisms and isomorphisms, the first isomorphism theorem, and the classification of finite abelian groups.

**Course Goals:** In this course we will focus both on content goals and developing your mathematical habits (in thinking, communicating, and team work). More specifically, we will strive to,

- *Abstract the similarities and differences between various numbers systems and sets of mathematical objects.* The main content goal of the course is to study sets of mathematical objects (e.g., the integers, rational numbers, complex numbers, integers modulo  $n$ , polynomials, matrices, etc.) and determine the properties that they share.

This ability to abstract and classify objects is a God-given ability. I believe this is one way that we can see ourselves as created in the image of God.

- *Develop mathematical habits of mind.* There are many skills that can be developed in the context of mathematics, independent of specific content. In particular, we will strive to
  - make sense of problems and persevere in solving them
  - reason abstractly and quantitatively
  - communicate precisely
  - identify and make use of structure and patterns, and generalize

**Class Format:** The class is designed to have students be active. That is, you will be doing something instead of being a passive learner. Class time will be a mix of presentations by students, small group work, class discussion, and occasional presentations by the instructor. For class time to be useful for your learning, you must come prepared. In particular, this means you should keep up with class work and review notes from the previous class before class starts. Rationale for the class format: You will have time to engage in the process of mathematics and develop mathematical habits of mind in the presence of the instructor and your peers. The way that mathematics is often presented as a fully formed idea with perfect proofs is misleading. Actually, mathematics is a (sometimes messy) process involving pattern seeking, conjecturing, testing, searching for counterexamples, development

of definitions, formalizing, and communicating new ideas. We will engage in these processes as often as possible. Not only will this help with the second course goal, but this process allows you to understand the material in a deep and lasting way. It is important through this process to remember that I am here to help, though I cannot learn the mathematics for you.

**Policies:**

- You are expected to attend class regularly and punctually. Student are responsible for obtaining, completing and submitting missed assignments.
- Cell phones and other mobile devices should be in silent mode and inside a bag or purse during class. These will not be accessed during class time.
- Assignments are due one their specified dates. Late work will only be accepted in exceptional circumstances. Do not expect to receive credit for late work.
- Students will be held responsible for all material covered in class and in the text.
- Announcements made in class or by email are considered official notification of assignments or syllabus changes. Make sure you check your email regularly.
- Students receiving a failing grade on an assignment or test should arrange to meet with me as soon as possible.

**Grading:** The final grade for the course will be computed as follows:

Preview Activities	10%
In class presentations	10%
Written Homework	20%
Project	15%
Midterm	20%
Final	25%

**Preview Activities:** You will be expected to turn in preview activities a the beginning of many classes. These preview activities will be posted in canvas about two days in advance. You can expect to spend 15-30 minutes on each preview activities. These activities will be graded as follows:

- 3 points for completing the activity with virtually no mistakes
- 2 points for completing most of the activity with minor mistakes
- 1 point for not completing the activity, or major mistakes
- 0 points for not doing the activity.

Your total grade for the preview activities will be calculated out of 50 points.

**In Class Presentations:** The last 15 minutes of each class will be spent with presentations over the worksheet from that class. **Everyone** will be expected to present **once** per a week. Presentations will be graded using the same 0-3 points scale as Preview Activities.

**Written Homework:** Written homework problems will be assigned on a regular basis. These will be graded in the traditional way.

**Participation:** This is an *active* class. You are expected to participate fully in completing the worksheet with your group. Additionally you are expected to pay close attention to your classmate's presentations and participate in class discussion.

**Midterm:** We will have an in-class midterm exam on **Wednesday October 11**.

**Final Exam:** The final exam will be on **Monday December 11** from 1-3pm.

**Grading Scale:** The final grade for the course will be assigned as follows:

A	90-100%
A-	87-89.999%
B+	83-86.999%
B	80-82.999%
B-	77-79.999%
C+	73-76.999%
C	70-72.999%
C-	65-69.999%
D	60-64.999%
F	0-59.999%

### **Cheating/Plagiarism**

"Any act of deceit, falsehood or stealing by unethically copying or using someone else's work in an academic situation is strictly prohibited."

1. A student found guilty of plagiarism or cheating will receive an "F" (zero) for that particular paper, assignment or exam. Should this occur, the professor will have an interview with the student and will submit a written report of the incident to the academic dean.
2. If a second offense should occur, the student will be asked to appear before the professor, the academic dean and the vice president for student development. The student should realize that at this point continuation in a course and even his/her academic career may be in jeopardy. In the event of a recommendation for dismissal, the matter shall be referred to the Student Development Committee. (Bethel Student Handbook, page 156)

It should be noted that obtaining solutions from an unapproved source, without giving credit to those sources, is considered an act of plagiarism.

### **Cell Phone Policy**

Please be sure that cell phones are completely silenced or turned off and stowed out of sight at the beginning of class each day to help minimize class interruptions. Any student using a cell phone (without permission) will be asked to leave the class and an unexcused absence will be recorded. Students using cell phones during graded activities (e.g. exams, quizzes, etc.) may be cited for cheating (at the professor's discretion). In the case of unexpected emergencies, students may seek permission from the professor to leave their cell phones on during class, but the phone must remain stowed out of sight. Professors reserve the right to have operational cell phones in class. The use of laptops, tablets and similar devices should be guided by the same policy. Use of such devices for access to the e-book and/or WebAssign during class should be approved by the instructor.

### **Students with Disabilities Policy**

In accordance with the provision of the Americans with Disabilities Act, if you require any special assistance or adaptations in this course, please contact the professor immediately. Students with disabilities are requested to contact the Office of Academic Support in the Life Calling and Student Enrichment Center to complete the intake process and determine their eligibility for reasonable accommodations. These arrangements should be made well in advance of the first course exam.

**Disclaimer:** This syllabus is not a legal contract, but serves as a general outline for the semester. The professor reserves the right to make adjustments to the course as the need arises.