

# MATH 4550: Modern Algebra I

## Fall 2017

**Instructor:** Tony Shaheen

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**Office:** Simpson Tower 317

**Office Hours:** to be announced in class.

**Course Website:** Follow the link from <http://www.calstatela.edu/faculty/ashahee/>

**Lectures:** Monday and Wednesday, 4:30pm--5:45pm, BIOS 335.

**Optional Textbook:** There is no required textbook for the course. However, if you want to buy a book then this one is a good one: *A First Course in Abstract Algebra*, by John Fraleigh.

**Prerequisite:** Math 2550 and 3450 with minimum C grade.

**Course Description/Objectives:** Groups, subgroups, cyclic groups, permutation groups, Lagrange's theorem, direct products, finitely generated Abelian groups, group homomorphisms, and factor groups (sometimes called quotient groups). If we have time then we will cover rings and fields.

**Student learning outcomes:** Students who successfully complete this course will be able to: 1. Understand the definition of a group and determine whether or not a set with a given binary operation is a group; 2. Do computations in the various groups, such as the symmetric groups, the integers modulo  $n$ , dihedral groups, matrix groups, etc. These computations include the following: taking the product of two elements, finding the order of an element, and finding the inverse of an element; 3. Understand direct products of groups and do computations in a direct product; 4. Prove or disprove that a subset of a group is a subgroup of the given group; 5. Compute the subgroup generated by a given element of a group; 6. Understand the classification theorem of cyclic groups and find all of the subgroups of a cyclic group; 7. Understand Lagrange's theorem and its consequences; 8. Compute the cosets of a subgroup of a group; 9. Use the fundamental theorem of finitely generated groups to determine all the finite Abelian groups of a given order; 10. Understand the definition of a homomorphism; 11. Determine whether a map is a homomorphism; 12. Compute the kernel of a homomorphism; 13. Apply the fundamental (first) homomorphism theorem; 14. Understand the definition of a normal subgroup and determine whether a subgroup is normal; 15. Do computations in a factor group; 16. Prove theorems about all of the above mathematical objects.

**Grading:** Your grade will be based on two tests and a cumulative final. The tests will be weighted as follows: 30% test 1, 30% test 2, 40% final.

**Homework:** Homework will be assigned, but not collected. The homework assignments will be posted on the course webpage as they are assigned.

**Exams:** There are two tests and a final. All tests are in the regular classroom. The dates and times of the exams are as follows. We may change the dates of test 1 or test 2, but the final date will not change.

Test 1: Wednesday, October 4.

Test 2: Wednesday, November 8.

Final: Wednesday, December 6, 3:40—5:40

**ADA statement:** Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation. Please let me know in the first week of class if you will be taking tests at the OSD office.

**Academic honesty statement:** Students are expected to do their own work. Copying the work of others, cheating on exams, and similar violations will be reported to the University Discipline Officer, who has the authority to take disciplinary actions against students who violate the standards of academic honesty.

**Student responsibilities:** Students are responsible for being aware of all announcements that are made in class, such as changes in exam dates, due dates of homework and papers, and cancellation of class due to instructor's absence. Students are responsible for announcements made on days that they are absent.

Students must check their CSULA email account regularly for information from the instructor and the Department. Failure to do so may result in missed deadlines or other consequences that might adversely affect students. Note that you can forward this email account to any other account of your choosing.