Math 4813, Groups and Representations

Course Information Spring 2015

Professor: Dr. Lisa Mantini, 410 Math Sciences
- ▷ Telephone 405–744–5777,
- ▷ Email: lisa.mantini@okstate.edu,
- ▷ FAX number: 405–744–8275.
- ▷ Office hours: M 2:30–3:20 PM, W 1:30–2:20 PM, R 1:00–1:50 PM, or by appointment.

Course Times: MWF 12:30 – 1:20 PM in MS 509.

Course Objectives: The aim of this course is to introduce you to my favorite topic in abstract algebra, the theory of groups and their *representations*, or actions as symmetry groups of objects like geometric figures, molecules, or data sets. I will try to show you some of the ways mathematicians discover interesting ideas through calculation of examples and analysis of patterns, and I'll try to show you some of the unity of mathematics by including applications to geometry and analysis. This course continues with topics from Math 3013, Linear Algebra, and Math 3613, Introduction to Modern Algebra, and is an excellent course to take before Math 4613, Modern Algebra I.

Prerequisites: The prerequisite is Linear Algebra as taught in Math 3013. You'll also need "mathematical maturity" or the ability to reason logically and to read and write mathematical arguments clearly, perhaps gained in Math 3613 or another "proof" course. I will summarize facts that we'll use from Math 3613 and from Math 2233 (Differential Equations) as needed.

Texts: There is no purchased text for this course. I will pass out notes as we go along. Your old textbooks from Introduction to Modern Algebra (particularly the chapter on elementary group theory) and Linear Algebra (particularly eigenvectors and eigenvalues, diagonalization, and change of basis) will be useful. For those who are suitably advanced mathematically, there are graduate texts that may serve as references for this material, primarily *Representation Theory: A First Course*, by W. Fulton and J. Harris, and *Linear Representations of Finite Groups*, by J. P. Serre.

Course Requirements: Students enrolled in this course will complete the following:

ITEM	DUE DATE	POINTS	WEIGHT
Exam 1	Friday 20 February	150 pts	25%
Exam 2	Friday 10 April	150 pts	25%
Homework	various	150 pts	25%
In-class work, quizzes	various	75 pts	12%
Final Project	April 27, 29 or May 1, 6	75 pts	13%
TOTAL		600 pts	100%

Graduate Credit: Graduate students wishing to earn graduate credit will complete all assignments individually, including the final project and any group work assigned, and they may have an occasional extra problem on an assignment. Any curve applied to the undergraduate and/or graduate sections will be determined independently.

Grading: The points assigned during the semester add up to a total of 600 points for the course. Preliminary cutoffs for the final course grade are as follows:

▷ 540 points (90%) guarantees an A in the course;
▷ 480 points (80%) guarantees a B;
▷ 420 points (70%) guarantees a C;
▷ 360 points (60%) guarantees a D.

Homework: Homework will be collected about once every week for most weeks. I expect about 10 assignments, worth about 15 points each. Homework is typically due by 5:00 PM on the days it is due, but submitting assignments in class is preferred. Late homework is very rarely acceptable and only if approved by me **in advance**. Please prepare your homework on 8.5" by 11" paper, stapled, with no ragged edges. In order to receive full credit your work must be clear and legible, you must show all work, and explanations must be written out in correct English sentences.

Drop Policy and Special Dates: Please note the following dates for Spring 2015:

▷ University Holiday: Monday, January 19;
▷ Last drop day without charge: Tuesday, January 20;
▷ Last drop day with 50% refund: Friday, January 23;
▷ Spring Break: March 16–20;
▷ W withdrawal deadline: Friday, April 10;
▷ W/F withdrawal deadline: Friday, April 24.

Attendance Policy: Attendance is a part of your course grade only during the student presentations at the end of the semester, but it is very highly recommended at all times. You are responsible for all material covered in class and all assignments. I would prefer you notify me in advance of absences.

Academic Dishonesty: Oklahoma State University is committed to the maintenance of the highest standards of integrity and ethical conduct of its members. This level of ethical behavior and integrity will be maintained in this course. Participating in a behavior that violates academic integrity (e.g., unauthorized collaboration, plagiarism, cheating on examinations, helping another person cheat, and so on) will result in your being sanctioned. Violations may subject you to disciplinary action including the following: receiving a failing grade on an assignment, examination or course, receiving a notation of a violation of academic integrity on your transcript (F!), and being suspended from the University. Carefully read the OSU policy at academicintegrity.okstate.edu.

Specifically, for this course, any group assignments and routine homework may be discussed with other students but all written work should be your own unless an assignment is specifically identified as a group assignment. You should not show your written work on an individual assignment to other students and should not read the written individual work of another student before you submit your own work. **No collaboration or discussion of problems from a take-home quiz or exam is permitted unless those discussions take place with your instructor.**

Homework assignments: The first few homework assignments are as follows:

ASN	DUE	SECS	PROBLEMS ASSIGNED
1	1/21	1.1	2, 3, 5, 6, 8, 9
2	1/28	1.1	10
		1.2	1, 4, 6, 8, 11, 12, 13
3	2/6	1.3	2, 3, 5, 6 a–f (no proofs required), 9, 11, 15, 17
4	2/13	1.4	not collected: 1, 2, 4 collected: 3, 5, 6, 10, 11, 12, 15, 16