MATH 466- Groups and Geometry

Spring 2024-2025

Course Syllabus

Instructor: Gökhan Benli (E-mail: benli (at) metu.edu.tr Office: M227)

Website: https://blog.metu.edu.tr/benli/teaching/math-466-groups-and-geometry/
Office hours: Monday 9:30-11:30 or by appointment via email.

Catalog Description: Symmetry. Isometrics of Rn, the Euclidean group, symmetry groups of regular polygons and polyhedra, classification of finite subgroups of the three dimensional rotation group. Frieze groups, crystals, wallpaper groups, groups of acting on trees. Reflection groups, root systems, classification of finite reflection groups, crystallographic root systems and Weyl groups.

Textbooks: I will not follow one specific book. Parts of the course will use parts of the books from the following list:

- "Groups and Symmetry" by M. A. Armstrong, Springer Verlag, 1988.
- "Symmetries" by D.L. Johnson-Springer, 2001
- "From Groups to Geometry and Back", V. Climenhaga and A. Katok, American Mathematical Society, 2017.
- "Reflection Groups" by C. T. Benson and L. C. Grove, Springer-Verlag, 1985.
- "Introduction to Geometry" by H. S. M. Coxeter, John Wiley & Sons, 1969.
- "Groups and Symmetry" by D. W. Farmer, AMS, 1996.
- "Reflection Groups and Coxeter Groups" by James E. Humphreys, Cambridge University Press, 1994.
- "Transformation Geometry" by George E. Martin, Springer-Verlag, 1982.

Course Outline: I will try to follow the catalogue description from various of the suggested textbooks. I will document weekly progress and share it with you.

Prerequisites: The official prerequisite for this course is Math 367/267. Hence a strong background in abstract algebra (specifically group theory) is needed for success in this course. I will recall important notions from group theory whenever needed, but you need to have a good grasp of fundamentals of abstract algebra. Hence, if you do not have a good understanding of basics of group theory, I do not recommend enrolling in this course, especially if you are in your last semester.

Weekly Exercises: I will assign weekly exercises for you to solve. These will NOT be homework but solving these is strongly recommended.

Grading: There will be **two** midterms (each one out of 100) and a final exam (out of 100). Midterm dates will be announced later. Your total grade will be calculated by the following formula:

Total grade = (Midterm 1 + Midterm 2) x 0.3 + Final x 0.4

Class Attendance: Regular class attendance is strongly recommended. I may take attendance randomly during classes to record whether you are following the course or not. I may use this record for grading purposes.

NA policy:

- If your two midterm scores **add up to less than 20 points**, (i.e., M1+M2 < 20) then you shall not be able to take the final exam and get an NA grade.
- If you will take the makeup exam for one of the midterms and your score of the other midterm is **less than 10**, then you shall not be able to take the final exam and get an NA grade.
- If you miss more than one midterm, then you shall not be able to take the final exam and get an NA grade.

Make-up policy: There will be one makeup exam at the end of the semester. No make-ups will be given without an official report. You cannot take more than one make-up exam even if you have official report.

You have 48 hours after the exam to notify the instructor about your exam absence.

Academic dishonesty policy: You are expected to be familiar with the university's academic integrity guide for students. No form of academic dishonesty is tolerated. If you are caught cheating, then you will fail the course **and** official disciplinary action may be pursued.

Information for students with disabilities: To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course coordinator and the METU Disability Support Office as soon as possible. For further information, visit the web site http://engelsiz.metu.edu.tr.