

MATH 424

GALOIS THEORY OF COVERINGS AND LINEAR DIFFERENTIAL EQUATIONS

METU Credit & ECTS Credit: (3-0) 3 and 6.0

Prerequisites: Math 262, Math 349, Math 254 or Math 219, or Consent of the Instructor.

Instructor: Yıldırım Ozan, M-217

Schedule: Monday 10:40-12:30 and Wednesday 09:40-10:30 as online Zoom Lecture.
Recorded lectures will be posted on the internet.

Web Site: <http://www.metu.edu.tr/~ozan>

Office Hours: Wednesday between 12:40-13:30 via Zoom or by appointment.

Textbook: Galois' dream by Michio Kuga. A more advanced textbook on the subject is the book Introduction to Differential Galois Theory by J. Sauloy (Lecture Notes, available on the internet.)

Exams and Grading: There will be 2 midterm exams and a final exam. Each midterm exam will worth 35% and the final exam will worth 30% of the total grade. The midterms will be written exams, whereas the final exam will be an oral exam covering all the topics. Throughout the semester I will prepare several problems, mostly theoretical. The oral exam content will be from these problems and written exams questions.

Exam Dates: Midterm 1: April 26, 2021, Monday at 17:40.

Midterm 2: June 7, 2021, Monday at 17:40.

Tentative Weekly Syllabus:

- 1) Topological spaces and free groups
- 2) Fundamental groups of surfaces
- 3) Fundamental groups
- 4) Examples of fundamental groups
- 5) Coverings
- 6) Covering of surfaces and fundamental groups
- 7) Covering of surfaces and fundamental groups continued
- 8) The Group of covering transformations
- 9) The universal covering space
- 10) The correspondence between subgroups of the fundamental group and covering spaces (Galois Correspondence)
- 11) Continuous functions and function theory on covering surfaces
- 12) Differential Equations and elementary methods of solving differential equations
- 13) Regular Singularities
- 14) Differential equations of Fuchsian type