

MAT 1196: Project information

There are many topics that are not mentioned below. Additional comments will be added as time permits.

Exercises in representation theory: Take a collection of exercises from various texts (for example, from [R], [FH], [Ha], [BD] –which texts are used depends on which topics you want to emphasize) and write up solutions.

Exercises from the first part of Robert’s book (concerning representations of compact groups): p. 20 #2,3,4,5; pp.38–39 #1,2,3; pp.51–52 #1,2,3; pp.61–62 #1–6; pp.76–77 #4,5; pp. 107–108 #1–5.

Exercises from the end of Chapter IV of [K2]: Representations of SO_n #8–13; Representations of SU_n #14–16; Integral forms for various examples #17–20.

Representations of compact Lie groups: One reference for this is [BD].

Representations of locally profinite groups: Read Chapters 1–4 of [BH] and do exercises. The emphasis is on representations of $GL_2(F)$ (F a p -adic field) and its subgroups. This topic is quite algebraic.

Representations of semisimple Lie groups: Learn some parts of Knapp’s book ([K1]). This book emphasizes examples.

Topics in representations of finite groups: For example, read about classifying representations of particular families of finite groups.

Representations of Galois groups and Weil groups Background from Chapter 7 and Sections 41 and 42 of [BH]. Paper of Koch classifying primitive representations: Classification of the primitive representations of the Galois groups of local fields, *Invent. Math.* **40** (1977), 195–216. (Paper of Weil on the 2-dimensional case *Invent. Math.* **27** (1974), 1–22. (This might be an interesting topic for someone interested in representation theory and number theory.)

Read a research paper in representation theory: Learn about topics in representation theory that are used in a paper.

Representations of Lie algebras: The book by Humphreys ([H]) is a standard reference. Chapter V of Knapp’s book ([K2]) discusses finite-dimensional representations of complex semisimple Lie algebras. There are exercises at the end of the chapter. There may also be some parts of [FH] which are relevant.