

# Modular Forms and Representation Theory

Hang Xue

## 1 Overview

This is an introductory course to modular forms and its connection with the modern theory of automorphic representations. The focus of this course is on the basic notions and the correspondence between classical and modern objects.

## 2 Tentative syllabus

1. Holomorphic modular forms and Maass wave forms.
2. Representations of  $GL_2(\mathbb{R})$  and  $GL_2(\mathbb{Q}_p)$ .
3. Tate thesis.
4. Automorphic representations of  $GL_2(\mathbb{A}_{\mathbb{Q}})$ .
5. Relation between modular forms and automorphic representations.

## 3 Prerequisites

1. Standard first year graduate course in analysis and algebra.
2. Some basic complex analysis (contour integrals, residue theorem, etc.)
3. Some basic topology (compactness, completeness, connectedness etc.)

## 4 Reference

1. Bump, D. Automorphic Forms and Representations.
2. Goldfeld, D. Automorphic Representations and L-Functions for the General Linear Group: Volume 1