Elliptic Curves and Modularity

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Timetable: 16 hrs., February/March 2019, Torre Archimede, Room 2BC/30.

Course requirements: basic modular form, cohomology, local fields.

Examination and grading:

SSD: MAT/02 MAT/03

Aim: The aim of the course is to explain the statement of the modularity theorem, which asserts a deep connection between elliptic curves defined over Q and modular forms. This theorem is the heart of Wiles’ proof of Fermat’s Last Theorem.

Course contents: Topics to be discussed (which may be more or less fleshed out depending on interest and background of the audience)

1. Elliptic curves: basic theory (the group law, reductions mod p, the Tate module, etc.)
2. Modular forms: basic theory of modular forms, Hecke operators, modular curves and their Jacobians, Galois representations associated to modular forms.
3. (If time permits) Diophantine applications of the modularity theorem.

Syllabus: A good reference for the course is the book ”A first course on modular forms” by Diamond and Shurman, which roughly shares the same aim as this course.