Proposed schedule for the seminar "Class field theory and the Langlands correspondence for GL_1"
University of Luxembourg, Winter Semester 2022

Organizers: Andrea Conti, Emiliano Torti, and Gabor Wiese

The seminar will take place on Tuesdays from 11:30 to 13:00 in room MNO 6A.

The main reference for the seminar is Neukirch's book [Neu13], but complete expositions of the topic can also be found in Milne's [Mil20] and Sharifi's [Sha] notes. When no mention is made, references in the program are to Neukirch's book.

Class Field Theory is the theory of classifying abelian extensions of local fields and/or number fields. One can also view it as the basis for the 1-dimensional case of the Langlands conjectures (and already in the 2-dimensional case, a lot is unknown).

We will follow Neukirch's approach going through "abstract" class field theory and then studying its incarnations for p-adic and number fields: the classification of all abelian extensions of a local field via the units of the field, and the classification of all abelian extensions of a number field via ideles (units of adeles). We will present refined statements taking into account ramification properties and other major theorems like the "principal ideal theorem".

If you have any questions or wish to volunteer for a talk, you can write to `andrea.conti@uni.lu`, `emiliano.torti@uni.lu` or `gabor.wiese@uni.lu`.

1. Overview I [Andrea Conti, 27/9]

2. Overview II [Gabor Wiese, 11/10]

3. Group Cohomology I [Flavio Perissinotto, 18/10]
Chapter 1, Sections 1, 2, and 3 up to 3.8.

4. Group Cohomology II [Fabio La Rosa, 25/10]
Chapter 1, Sections 3 (starting from 3.9), 4 and 5.

5. Cohomology of cyclic groups and Tate's Theorem [??]
Chapter 1, Sections 6 and 7.

6. [??]
Chapter 2, Sections 1 and 2.

7. [??]
Chapter 2, Sections 3 and 4.

8. [??]
Chapter 2, Sections 5 and 6.

9. [??]
Chapter 2, Section 7.

10. [??]
Chapter 3, Sections 1 and 2.

11. [??]
Chapter 3, Section 3.

12. [??]
Chapter 3, Section 4.

13. [??]
Chapter 3, Section 5.

14. [??]
Chapter 3, Section 6.

15. [??]
Chapter 3, Sections 7 and 8.

References

[Mil20] James S. Milne. *Class field theory*. 2020. URL: https://www.jmilne.org/math/CourseNotes/CFT.pdf.

[Neu13] Jürgen Neukirch. *Class field theory*. The Bonn lectures, edited and with a foreword by Alexander Schmidt, Translated from the 1967 German original by F. Lemmermeyer and W. Snyder, Language editor: A. Rosenschon. Springer, Heidelberg, 2013, pp. xii+184.

[Sha] Omar Sharifi. *Algebraic Number Theory*. URL: https://www.math.ucla.edu/~sharifi/algnum.pdf.