MP11 GALOIS THEORY 2020

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1 Course page

All course materials, announcements, etc.—including a copy of this page—can be found on the course page `http://geometry.ma.ic.ac.uk/acorti/index.php/teaching/galois-theory/`

2 Timetable

Tue 14:00–15:00 in 144 & Wed 09:00–10:00 in 341 & Fri 15:00–16:00 in 145.

Office Hours One hour a week in 673, time to be decided by the end of Week 1; or by appointment.

3 Assessment and Feedback

There will be two 1-hour long in-class **progress tests** on the following dates. Each progress test is worth 5% of your total mark for the course.We will provide a feedback summary for the whole class on each progress test; in addition, we will give you individual feedback notes when we return the scripts to you.

Test 1: Wed, 12 February

Test 2: Wed, 18 March

4 Worksheets

There will be 4 (or perhaps 5, I am not sure) non-assessed worksheets. Solutions to the worksheets will appear on the course page roughly two weeks after publication.

My style is such that my lectures are not like military campaigns of definitions, lemmas, propositions and theorems: I like to interrupt the flow with worked examples and calculations, "problems" in other words. Nevertheless, I still plan to have up to five "designated" problem classes (roughly one a fortnight).

5 Mastery Topic

As you know, in the final examination, students in their 4th year (MSci and MSc) answer an additional "mastery question" on a slightly more advanced topic. The mastery topic will be discussed with these students later in the course.

6 Texts

All undergraduate texts on Galois Theory go back to Emil Artin's treatment [Art44]. Because of this fact, almost any book will do, in that it is probably not much better than a more or less good copy of Artin. In my day I studied [Her75] and I still like it very much. I also recommend the notes by my friend and long-time collaborator Miles Reid [Rei] (you can find these online).

A big step forward was taken by Grothendieck [GR, Exposé V] with his theory of the étale fundamental group (the axioms of a *Galois category* are listed at the beginning of § 4). Perhaps surprisingly, his treatment did not yet, as far as I know, "trickle down" to undergraduate texts on the subject.

For this course, I have put together my own treatment, which I sketch in notes that you can download from the website. My treatment is close in spirit to Grothendieck's, in that I implicitly take an uncompromisingly "categorical" point of view (I express key definitions and statements in terms of field inclusions; never in terms of elements), but different in detail.

References

[Art44] Emil Artin. *Galois Theory*. Notre Dame Mathematical Lectures, no. 2. University of Notre Dame, Notre Dame, Ind., second edition, 1944.

[GR] Alexander Grothendieck and Michele Raynaud. Revêtements étales et groupe fondamental (SGA 1). `arXiv:math/0206203`.

[Her75] I. N. Herstein. *Topics in algebra*. Xerox College Publishing, Lexington, Mass.-Toronto, Ont., second edition, 1975.

[Rei] Miles Reid. MA3D5 Galois Theory. available from `https://homepages.warwick.ac.uk/ masda/MA3D5/`.