TOPICS IN MATHEMATICAL SCIENCE VI, AUTUMN TERM 2020: MODULES AND HOMOLOGICAL ALGEBRA

COURSE INFORMATION

Forms of instruction.

- The course will be given mainly as a series of 15 lectures – see the schedule below. The lectures will be given face-to-face if possible, but may also be moved online if the situation so demands.
- Additional lecture material will be made available online to meet the needs of those students who are not able to attend the lectures in person.
- Individual consultation (online or face-to-face) is offered on demand. The participants of the course are welcome to contact the instructor individually for appointments.

Preliminary lecture plan.

	Date	Topic
1	8th October	Rings and modules
2	15th October	Ideals, morphisms
3	22nd October	Chain conditions
4	29th October	Finite length modules, artinian rings
5	5th November	The Krull–Schmidt–Remak theorem
6	12th November	Exact sequences and projective modules, *I*
7	19th November	Exact sequences and projective modules, *II*
8	26th November	Categories and functors
9	3rd December	Natural transformations
10	10th December	Pullbacks and pushouts
11	17th December	Extensions
12	14th January	The homotopy category of complexes, *I*
13	21st January	The homotopy category of complexes, *II*
14	28th January	Derived functors, *I*
15	4th February	Derived functors *II*

Time and venue. All lectures take place on Thursdays, 13:00–14:30, in room 409 in the Mathematics Building.

Examination. The examination consists of four sets homework assignments, which will be distributed during the course. To pass the course, one must obtain at least *60 %* of the total score of the four assignments combined. The final grade is determined by the total score, as follows:

F: 0–59 %, *C*-: 60–64 %, *C*: 65–69 %, *B*: 70–79 %, *A*: 80–94 %, *A+*: 95–100 %.

The above scale applies for students enrolled in the academic year 2020. Students who enrolled earlier will receive a grade on the scale *A-B-C-D*.

Textbooks. The material in this course is chiefly drawn from the following books:

- P. A. Grillet: *Abstract algebra.* Second edition, Graduate texts in mathematics, 242. Springer, 2007.
- P. J. Hilton, U. Stammbach *A course in homological algebra.* Second edition, Graduate texts in mathematics, 4. Springer, 1997.
- A. Zimmermann, *Representation Theory – a homological algebra point of view.* Algebra and Applications 19, Springer, 2014.

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