



**SF2729 GROUPS AND RINGS
COURSE PM
2013/14**

1. COURSE PLAN

1.1. **Goals.** After the course, the student shall be able to pursue abstract reasoning concerning algebraic structures. The student shall be trained in logical thinking and in constructions of mathematical proofs. Algebraic structures appear in many disciplines within science and technology. The student shall be able to recognize and use such structures in his or her forthcoming work. Concretely, this means that the student shall be able to:

- Identify and describe fundamental algebraic structures such as groups, rings, and fields;
- Identify algebraic substructures such as subgroups, subrings, and ideals;
- Identify and describe relations between algebraic structures, such as homomorphisms and group actions;
- Define and use bijective functions between algebraic structures, with special attention to permutations;
- Use classical results in basic group theory and ring theory, such as Lagrange's theorem or Cauchy's theorem, to describe the structure of a group or a ring;
- Explain relations using mathematical proofs and logical reasoning;
- Formulate certain practical problems by means of algebraic structures.

1.2. **Content.** Groups, permutations, homomorphisms, group actions, rings, ideals, fields, vector spaces, and field extensions.

1.3. **Eligibility.** SF1604 Linear algebra or a comparable course is required.

1.4. **Examination.** One written exam, with bonus points through homework assignments.¹ Grade scale A, B, C, D, E, Fx, F.

1.5. **Literature.** David S. Dummit, Richard M. Foote: *Abstract Algebra*, 3rd Edition

¹Details about this in Section 3.

2. ACTIVITIES

The course runs for one whole semester with one lecture and one exercise session every week. During the lectures we will discuss the theoretical material and examples and the exercise sessions will be used for problem solving. Apart from this, it is important that the students take the time to study the material on their own and to practice problem solving.

3. EXAMINATION

3.1. Homework assignments and final exam. The course consists of two parts; the first on groups, the second on rings. There will be 12 homework assignments, roughly one for each lecture. Each homework assignment must be handed in to the exercise session teacher before or at the exercise session one week later.

The maximum score for each homework assignment is 3 points, totalling 36 points.

The final exam consists of six problems, each of which can give up to 6 points, for a sum of 36 points.

The final score is the better of

- the final exam score; and
- the weighted average of the final exam score (75%) and the homework score (25%).

The minimum requirements for the various grades are according to the following table:

Grade	A	B	C	D	E
Total points	30	27	24	21	18

In order to pass the exam, a minimum of 18 credits is required. The grade Fx will be given for 16 or 17 credits. It can be upgraded to E by fulfilling an additional requirement, e.g., passing an oral exam.

Registration for the final exam should be done no later than two weeks before the exam.

Homework credit from previous years cannot be used as partial credit for this course.

3.2. Reexamination. There will be a possibility to retake the final exam. Information about the date and location will be available before the end of the course. The deadline for registration for this exam will also be two weeks before the exam. The rules are the same as for the final exam; in particular, homework points count.

3.3. Allowed aids. No aids are allowed during the final exam.

3.4. Rules for exams and homework assignments. In all examination the KTH rules for examination apply (cf. www.kth.se). The homework assignments must be done by the student her- or himself. No copying from other students or from other sources is tolerated. Collaborating is allowed and encouraged, but the solutions must be written up separately and independently.

3.5. Written presentation. In the written exam and the homework assignments, clarity, conciseness, and legibility of the written solutions will determine part of the grade. This holds in particular for explanatory text.

4. ADMINISTRATION

4.1. **Contact information.** The following teachers and administrative personnel are involved in the course:

	Name	email	telephone
Lecturer and Examiner	Tilman Bauer	tilmanb@kth.se	08-790 74 17
Exercise Session Teacher	t.b.a.	t.b.a.	t.b.a.
Course Secretary	t.b.a.	t.b.a.	t.b.a.

Observe that the course secretary only deals with questions regarding registration and reporting of results.

4.2. **Course web page.** On the web page of the course, all relevant information about the course will be found.

URL. <http://www.math.kth.se/math/GRU/2013.2014/SF2729>

5. TIME BUDGET

The course corresponds to a workload of 7.5 ECTS credits, which means 10 hours a week during the whole semester. In total, about 160 hours. We have lectures and exercise sessions using 60 of these hours, leaving 100 hours for studies.