

## Information about the course in algebra 2010

Lecturer and examiner: Per Salberger

Organization: The course consists of approximately 15 double lectures and 15 double problem sessions. The problem sessions are devoted to solutions of the exercises in the textbook.

Lectures: There are lectures on Tuesdays 8-10 and on Thursdays 13-15. The first Tuesday January 19<sup>th</sup> there is also a lecture 10-12. All lectures are given in English.

Problem sessions : The problem sessions are held on Tuesdays 10-12 and on Fridays 10-12. The first problem session is held January 22<sup>th</sup>. There are two groups. Per Salberger is the leader of the Swedish-speaking group and Oscar Marmon of the English-speaking group.

Textbook: J.R. Durbin: Modern Algebra, An Introduction, John Wiley & Sons, version 5 or 6. Note that the sections 53, 54, 55 in the fifth edition correspond to sections 56, 57, 58 in the sixth edition.

Contents: Operations, groups, subgroups, symmetries, permutations, equivalence relations and partitions, prime numbers, fundamental theorem of arithmetic, congruences, arrangement of groups and elements in groups, cyclic groups, cosets and Lagrange's theorem, isomorphism, direct products of groups, isomorphism classes of finite abelian groups, Cayley's theorem, group homomorphisms, image and kernel, normal subgroups, quotient groups, the fundamental homomorphism theorem, orbits, stabilizers, Burnside's theorem, Sylow's theorem, the definitions of rings and fields, integral domain, characteristic of a field, polynomial rings, the division algorithm, irreducible polynomials, Euclidean rings, fields with unique factorization, ring homomorphisms, ideals, principal ideals, residue class rings, adjunction of a zero, the existence and construction of finite fields, zeros of polynomials, factorization of polynomial rings, various number systems.

Exercises: On the home page there is a list of "recommended exercises" selected from Durbin's book. All these are important, and most of them will be discussed during the lectures.

Type of examination: There is a written exam the March 11<sup>th</sup>. There are two re-exams. The first takes place after the summer and the other in January 2011.

