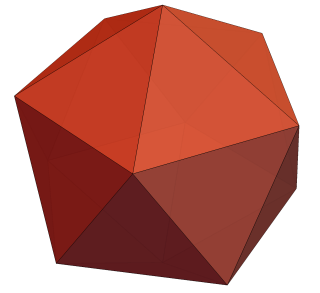
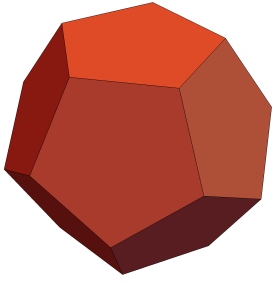


Algebra and Discrete Mathematics Courses – Period V



MS-E1998 Commutative Algebra

Michałek
5cr

Commutative algebra provides unifying, fundamental tools joining central mathematical disciplines like number theory and geometry. From this perspective a prime number is not very different from a point on a line. In our course we will introduce the language of commutative algebra and study commutative rings, such as the ring of polynomials or the ring of integers.

While abstract algebra is a prerequisite, the course will open doors to more advanced topics like algebraic geometry, applied algebra or homological algebra.

MS-E1997 Abstract Algebra II

Greferath
5cr

The famous Sylow theorems form an area in group theory that greatly benefits from finiteness and hence combinatorial influence. We will develop them in class and discuss several conclusions that show, how they impact the theory of finite groups.

Should there be enough time after finishing this topic, I will give a "pedestrian introduction" into the theory of rings and modules and try to explain some of the impressing and counter-intuitive mathematical "effects" that we are not used to, when merely dealing with vector spaces. A suitable prerequisite is Abstract Algebra.

MS-E1995 Applications of Coding Theory in Security

Hollanti
5cr

The course consists of three main parts: 1) Study of algebraic lattices and their applications to physical layer security, referring to a scenario where the eavesdropper is allowed to have infinite computational power and the security lies on the randomness of the communication medium. 2) Study of storage codes used in distributed storage systems (e.g., Google, Facebook, various peer-to-peer networks) with emphasis on securing the stored files and guaranteeing privacy for a user retrieving files. 3) Students' own small presentations/projects on selected topics.

The students should have taken Linear Algebra and Abstract Algebra (or similar courses), Galois Theory and especially Coding Theory are recommended but not necessary.