Course Specifications
Valid in the academic year 2018-2019

Course
Mathematics: Algebra (C003965)

Course size
(nominal values; actual values may depend on programme)
Credits 6.0  Study time 180 h  Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2018-2019
A (semester 1) Dutch
- seminar: practical PC room classes 15.0 h
- seminar: coached exercises 15.0 h
- lecture 30.0 h

Lecturers in academic year 2018-2019
Zamfirescu, Carol WE02 lecturer-in-charge
Van Daele, Marnix WE02 co-lecturer

Offered in the following programmes in 2018-2019
crds offering
Bachelor of Science in Chemistry 6 A

Teaching languages
Dutch

Keywords
Mathematics, algebra, geometry

Position of the course
In the first Bachelor year, distributed over two semesters, two courses in Mathematics are given. This course constitutes the first of these two.

Contents
After recalling the main topics from the 'vakantiecursus', the following new subjects are presented:
- Algebra: complex numbers; matrices; determinants; eigenvalues; characteristic polynomial; diagonalisation; hermitian and unitary matrices
- Plane Geometry: linear transformations in the plane; transformation matrices; change of basis; coordinate transformations; matrix congruence and diagonalisation
- Geometry in Three Dimensions: lines and planes in 3-space; parallelism and orthogonality of lines and planes; cross product; linear transformations; transformation matrices; basis change and coordinate transformations; matrix congruence
- Calculus: survey of various classes of functions; functions in several variables; partial derivation; sequences and series; integrals.

Initial competences
The mathematical background of the incoming students varies from 3 or 4 hours to more than 6 hours per week. For some students, most of the topics are already known, for other many topics will be new. We expect the students to have understood the basic concepts taught in the 'vakantiecursus':
- Arithmetic: fractions and powers, order of computations, absolute value
- Algebra: factorisation, solving equalities and inequalities, rational functions, systems of linear equations
- Geometry: figures, congruence, vectors, equation of a line
- Trigonometry
- Limits: definitions, rules of computation
- Derivatives: definitions, geometric meaning, rules of computation
- Integrals: definite and indefinite integrals, geometric interpretation, substitution method
- Functions: domain and image, symmetries, asymptotes, using the first and second
derivative, geometric representation

Exercises concerning these initial competences will be given during the first two weeks of the course, also by using the computer program Sage. Simultaneously, students will learn the necessary skills to solve mathematical problems with a computer.

Final competences
1. The student can formulate mathematically a wide range of elementary problems from algebra, geometry, and calculus.
2. When confronted with a mathematical problem, the students select and fluently apply suited mathematical techniques. The students know how to use the computer program Sage to assist them in solving a given mathematical problem.

Conditions for credit contract
Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract
This course unit cannot be taken via an exam contract

Teaching methods
Lecture, seminar: coached exercises, seminar: practical PC room classes

Learning materials and price
Lecture notes (in Dutch), exercises, and solutions in printed and/or electronic form. Also Sage-worksheets will be used. All of the course material is available at the electronic learning environment Minerva.
Each student disposes of their own computer.

References

Course content-related study coaching
Exercise classes
Individual coaching by lecturer/assistant: consultation by appointment
Coaching via Minerva.

Evaluation methods
end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period
Written examination with multiple choice questions, written examination

Examination methods in case of periodic evaluation during the second examination period
Written examination with multiple choice questions, written examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation
not applicable

Extra information on the examination methods
Form: Written (closed-book with list of formulas)
Content: Evaluation of the knowledge and insight in basic concepts and the ability to apply these concepts in problematic cases. Using Sage to solve problems.

Calculation of the examination mark
Theory (50%) and Exercises (50%)

(Approved)