Discrete Mathematics (E761029)

Course size   *(nominal values; actual values may depend on programme)*

    Credits 3.0   **Study time 90 h**

Course offerings and teaching methods in academic year 2023-2024

| A (semester 1) | Dutch | Gent | lecture |
| | | | seminar |

Lecturers in academic year 2023-2024

| Denert, Marleen | TW05 | staff member |
| van der Hooft, Jeroen | TW05 | lecturer-in-charge |

Offered in the following programmes in 2023-2024	crdts	offering
Bachelor of Science in Engineering Technology(main subject Electronics and ICT Engineering Technology)	3	A
Bachelor of Science in Engineering Technology(main subject Information Engineering Technology)	3	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject Electronics Engineering)	3	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject Embedded Systems)	3	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject ICT)	3	A
Linking Course Master of Science in Information Engineering Technology	3	A
Preparatory Course Master of Science in Information Engineering Technology	3	A

Teaching languages

    Dutch

Keywords

    Logic, sets, groups, modular arithmetic, finite fields

Position of the course

    Gathering insights and skills in handling fundamental discrete structures and their applications.

Contents

- Logic: truth value, truth table, implication, Boolean algebra, predicates, quantification, proof methods (induction, contraposition, contradiction)
- Sets, relations and functions: elementary concepts, cartesian product, injection, bijection, surjection, order relation, equivalence relation
- Group theory: groups, rings, fields, cyclic groups, generator, order, isomorphism, subgroup, quotient group
- Modular arithmetic: greatest common divisor, Euclid's algorithm, Eulers' totient, linear congruences, Fermat's little theorem, Chinese remainder theorem, diophantic equations, private and public encryption
- Finite fields: construction, calculation rules, applications in coding theory

Initial competences

    Strict prerequisites: none
    Advisory initial competences: basic mathematical knowledge and a solid basic Python knowledge

Final competences

    1 Master, become skillful in and apply elementary concepts from set theory, logic, modular arithmetic and finite fields.

2 Analyse and solve exercises and problems from set theory, logic, modular arithmetic and finite fields.

3 Independently construct mathematically correct deductive and inductive lines of reasoning.

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

Seminar, Lecture

Extra information on the teaching methods

Lab session: guided practice of techniques and concepts, and solving of exercises and problems. Both using pen and paper as well as Python-based programming. A solid basis of Python is a must.

Learning materials and price

Dutch syllabus, slides, exercises, supplementary material on Ufora
Required software: a (local) Python distribution or notebook environment, Excel

References

Frank Ayres Jr., Theory and Problems of Modern Algebra. Schaum Publishing, 1965.
Kenneth H. Rosen, Discrete Mathematics and its Applications. McGraw-Hill Education, 2019.
Normal L. Biggs, Discrete Mathematics. Oxford University Press, 2002.
Donald E. Knuth, The Art of Computer Programming, volume 2. Addison-Wesley, 1981.

Course content-related study coaching

The lecturer is available before and after classroom lectures and practicum.

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment

Examination methods in case of periodic assessment during the second examination period

Written assessment

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

written examination with pen-and-paper as well as programming exercises on the computer, on campus

Calculation of the examination mark

100 % written examination