



## COMPUTER SCIENCE AND ENGINEERING

### **DIT855 Applied mathematical thinking, 7.5 higher education credits**

Tillämpat matematiskt tänkande, 7,5 högskolepoäng

*First Cycle*

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#### **Confirmation**

This course syllabus was confirmed by Department of Computer Science and Engineering on 2017-06-09 to be valid from 2017-08-28, autumn semester of 2017.

*Field of education:* Science 100%

*Department:* Computer Science and Engineering

#### **Position in the educational system**

The course is a compulsory course in the Applied Data Science Master's Programme, and can also be given as a single-subject course at the University of Gothenburg.

The course can be part of the following programme: 1) Applied Data Science Master's Programme (N2ADS)

#### *Main field of studies*

Data Science

#### *Specialization*

G1F, First Cycle, has less than 60 credits in first-cycle course/s as entry requirements

#### **Entry requirements**

To be eligible for the course the student should have successfully completed university level courses of at least 30 hec.

#### **Learning outcomes**

On successful completion of the course the student will be able to:

#### *Knowledge and understanding*

- Explain different aspects of mathematical thinking: mathematical reasoning, problem solving, modelling.

- Explain how mathematical thinking can be applied in different areas.

#### *Skills and abilities*

- Show familiarity with basic mathematical concepts such as definitions, theorems, as well as different kinds of mathematical reasoning and proofs (mathematical reasoning).
- Solve complex and unknown problems with a structured and investigative approach (mathematical problem solving).
- Investigate real problems, determine if they can be seen from a mathematical perspective and translate to mathematical problems, and adapt mathematical conclusions to the real problem (mathematical modelling).
- Communicate about and with the help of mathematics.
- Use different mathematical tools as a natural part of thinking and working mathematically.

#### *Judgement and approach*

- Show ability to balance previous knowledge and own thinking.
- Show a reflective attitude to the course contents and to your own thinking.
- Show care for precision and quality in all work.

### **Course content**

The course is mainly intended to strengthen the students' mathematical thinking, and their ability to apply such thinking in applications, and in their continued studies. The focus is not on mathematical knowledge in the traditional sense, but on the often implied abilities needed to effectively be able to apply the mathematics you already know, and efficiently be able to learn new mathematics. The most important parts are mathematical reasoning, problem solving and modelling. Important aspects such as using the computer as a part of your mathematical thinking, and to be able to communicate with and about mathematics are also integrated in the course. The course will also pointwise relate to mathematics at the university level.

By developing the ability to think mathematically, the course complements other more traditional courses in mathematics, and by providing the student with experience of different areas of application, the gap between mathematical theory and relevant applications is bridged.

The core of the course is a number of carefully selected problems, used as starting points for the student's own learning, where student by working in an investigative way develop their own abilities. We also have lectures which provide a broader understanding, follow-up and perspective. The problems illustrate many different areas of application, and their level of difficulty is adapted to efficiently practice the abilities to think and work mathematically in different situations.

**Form of teaching**

The course is mainly organized in modules. For every module there is an introductory lecture and a compulsory follow-up lecture providing feedback on the problems of the module.

The learning is supported by an interactive way of teaching with a lot of contact between students and teachers. This occurs during supervision hours where students work with the problems and regularly discuss with the supervisors. They will then receive individual feedback and guidance in their own problem solving, and develop their independent abilities.

*Language of instruction:* English

**Assessment**

The course is examined through written assignments and with a final report, where the students are encouraged to summarize and reflect over the course in a personal way. The assignments and the final report are normally written in groups of two persons.

To pass the course, attendance of selected lectures is also required.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In cases where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year from the last time the course was given.

**Grades**

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

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To pass the course, the assignments and the final report must pass. To get the grade Pass with distinction (VG), this grade is required both for the assignments and for the final report.

To pass the final report, the student needs to show a basic understanding of the course contents, and the presentation and the content of the report must be correct and possible to understand. To get the grade Pass with distinction (VG) on the report, the student must show a deeper understanding of the subject, describing own insights and showing particular attention to quality.

To pass the assignments the reasoning must be correct, and fulfil basic measures of quality. To get the grade Pass with distinction (VG) on the assignments, the student must show a deeper understanding of the subject, describing own insights and showing particular attention to quality.

**Course evaluation**

The course is evaluated through meetings both during and after the course between teachers and student representatives. Further, an anonymous questionnaire is used to ensure written information. The outcome of the evaluations serves to improve the course by indicating which parts could be added, improved, changed or removed.