

## Logon

You are logged on as  
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## Menu

Programmes  
Courses

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Reports  
Deadlines  
Links

## Programmes and Courses Year 2015/2016

### DAT325 - Domain Specific Languages of Mathematics 7,5c

Owner: TKDAT - COMPUTER SCIENCE AND ENGINEERING

Department: 37 - DATA- OCH INFORMATIONSTEKNIK

Swedish: Matematikens domänspecifika språk

English: Domain Specific Languages of Mathematics

Credits: 7,5

Grading: TH - Five, Four, Three, Not passed

Education cycle: First-cycle

SCB code: IF1 - Informatik/Data- och systemvetenskap

Education Field: TE - Technical Science

Major subject: Computer Science and Engineering, Information Technology, Mathematics

Theme: Unmarked

Reporting of result: Reported several times

Can be shopped by all other programmes: Yes

Examiner: 9823 - Patrik Jansson

Ana Bove (bove)

**Course administrators:** Cezar Ionescu (cezar)  
Patrik Jansson (patrikj)

Replaces course/courses:

#### Course round 1:

Teaching language: English

Block schedule:

The course is open for exchange students: No

Minimum number of students: -, Maximum number of students: -

#### Credit distribution

Course elements	Sp1	Sp2	Sp3	Sp4	Summer course	No Sp
0115 Written and oral assignments, Grading: TH			3,5c			
0215 Examination, Grading: TH			4,0c			

#### In programs

COMPUTER SCIENCE AND ENGINEERING, Grade 3

SOFTWARE ENGINEERING, Grade 3

ENGINEERING MATHEMATICS, Grade 3

**Eligibility:** In order to be eligible for a first cycle course the applicant needs to fulfil the general and specific entry requirements of the programme(s) that has the course included in the study programme.

#### Course specific prerequisites

The student should have successfully completed

- a course in discrete mathematics as for example Introductory Discrete Mathematics.
- two more courses mathematics, for example Linear Algebra and Calculus
- two courses in computer science, for example (Introduction to Programming or Mathematical Software) and Object Oriented Programming
- an additional three courses (22.5 hec) of any mathematics or computer science courses.

#### Aim

The course will present classical mathematical topics

from a computing science perspective: giving specifications of the concepts introduced, paying attention to syntax and types, and ultimately constructing DSLs of some mathematical areas mentioned below.

**Learning outcome**

**After completion of this course, the student should be able to**

*Knowledge and understanding*

- design and implement a DSL (Domain Specific Language) for a new domain
- organize areas of mathematics in DSL terms
- explain main concepts of elementary real and complex analysis, algebra, and linear algebra

*Skills and abilities*

- develop adequate notation for mathematical concepts
- perform calculational proofs
- use power series for solving differential equations
- use Laplace transforms for solving differential equations

*Judgement and approach*

- discuss and compare different software implementations of mathematical concepts

**Content**

The lecture topics are:

- Introduction to functional programming and calculational proofs
- Introduction to Domain Specific Languages (DSLs): case study linear algebra
- DSLs and mathematics: case study category theory
- Real analysis: mean value theorems, Taylor formulas
- Real analysis: a DSL for power series
- More linear algebra: eigenvalues and optimization

**Organisation**

The main forms of instruction are lectures, seminars, case studies and group work.

**Literature**

See separate list.

**Examination**

The course is examined by an individual written exam which is carried out in an examination hall at the end of the course and by written assignments carried out in groups of normally 3-4 students.