**SYLLABUS**

# Numerics and partial differential equations 7.5 credits C7004M

## Numerik och partiella differentialekvationer

**Course syllabus admitted: Autumn 2014 Sp 1 - Autumn 2016 Sp 2**

DECISION DATE
**2014-02-14**

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LULEÅ TEKNISKA UNIVERSITET

# Numerics and partial differential equations 7.5 credits C7004M

## Numerik och partiella differentialekvationer

## Second cycle, C7004M

| Education level | Grade scale | Subject | Subject group (SCB) |
| --- | --- | --- | --- |
| Second cycle | G U 3 4 5 | Teknisk- vetenskapliga beräkningar | Mathematics |

# Entry requirements

# Selection

The selection is based on 30-285 credits

# Examiner

Inge Söderkvist

# Course Aim

After the course the student should:

1. Knowledge and understanding

- Understand how different sources of errors affect the accuracy in computations.
- Understand basic techniques, such as linearization and discretization, for numeric computing.

2. Skills and abilities

- Be able use numerical methods for solving advanced computational problems, such as e.g. partial differential equations.
- Be able to implement different methods on a computer and to use existing software, e.g., matlab.

3. Assessment and attitudes

- Be able to judge different methods regarding strengths, weaknesses and usability.
- Be able to judge the reliability of computed results.
- Be oriented about current research in the areas.

# Contents

Discretisation of differential equations. Numeric methods for non-linear equations, linear systems of equations, liner least squares, eigenvalue problems, interpolation and approximation, differentiation and integration, optimisation, and ordinary and partial differential equations.

# Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
Lessons and supervision in connection to assignments and project.
Most part of the studies are performed, outside the scheduled lectures, by working with different assignments were different algorithms are implemented and analysed.
The students will here be trained in understanding and implementing different algorithms and to judge them. The students are also trained in structuring problems and to use written communication in order to discuss mathematical algorithms.
Groups are also working with small projects (which they choose themselves). The projects are presented orally to other students in the course. The students are trained to define and find boundaries for the problem. They are trained in searching for information, to interpret, analyse, and structure this information, and to give presentations to non specialists.
By listening to other presentations they are also orientated about a broad spectrum of different problems.

# Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.
Computer assignments, oral presentation of project, and a written exam.

# Overlap

The course C7004M is equal to C7005M

# Literature. Valid from Autumn 2012 Sp 2

Fundamentals of Scientific Computing, Bertil Gustafsson, 2011
Förlag: Springer

# Course offered by

Department of Engineering Sciences and Mathematics

# Items/credits

| Number | Type | Credits | Grade |
| --- | --- | --- | --- |
| 0001 | Written Exam | 2.5 | G U 3 4 5 |
| 0002 | Computer Assignments | 3 | U G# |
| 0003 | Projects | 2 | U G# |

# Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

# Last revised

by Mats Näsström 2014-02-14

# Syllabus established

by Dept. TVM Mats Nässtrom 2012-03-14