Kursnamn på svenska  An introduction to Mathematica
Swedish course title

Kursnamn på engelska  An introduction to Mathematica
Englisk course title

Omfattning (högskolepoäng)  5
Higher education credits

Undervisningsspråk  English
Language of instruction

Rekommenderade förkunskaper
Recommended prerequisites
Students should be familiar with linear algebra, calculus and basic programming. No previous knowledge of Mathematica is assumed

Kursens syfte och mål
General course objectives and learning outcomes
By the end of the course, students will be able to:

- Understand the basic structure of computer algebra systems
- Implement various algorithms in the Mathematica language
- Use efficiently substitution-based programming
- Test and optimize Mathematica code
- Design and set up their own Mathematica package
- Handle input/output and the interface with the C/C++ language
- Use Mathematica to solve problems in mathematics, physics and chemistry
- Apply symbolic programming to their research

Kursinnehåll
Course contents
- An introduction to computer algebra systems and symbolic programming
- The basics of Mathematica as a programming language  (symbolic expressions, vectors and matrices, conditional expressions, procedural programming, functional programming)
- Substitutions and patterns, substitution-based programming
- Linear algebra and calculus with Mathematica
- Graphics
- Input/output, C/C++ interface
- Elements of optimization, parallel programming
- Writing your own Mathematica package
- Examples: Gröbner basis, Tensor calculus with xAct, applications to chemistry

Undervisning (kursens upplägning)
Instruction (course structure)
9 lectures (18 h total)
4 tutorial sections (8 h total)

- Textbook: Andrey Grozin, "Introduction to Mathematica for Physicists", Springer
- Lecture notes handed out during course

Examination
Assessment (form of examination)
hand-in problems during tutorials (50%), final project (50%)

Huvudansvarig institution  Physics and Astronomy
Department with main responsibility

Kontaktperson/er (namn, e-postadress)
Contact person (name, e-mail address)
marco.chiodaroli@physics.uu.se

Kurs datum/period   Autumn, 1st period
Course dates/period

Antal platser   30
Maximum number of participants

Anmälan om antagning till kursen ska skickas till
Application for admission to the course is to be sent to
marco.chiodaroli@physics.uu.se

Skicka anmälan senast   April 15
Submit application not later than

Målgrupp/er (om möjligt, specificera ämnen/inriktningar)
Target group/s (specify, if possible, subject/specialization)  Master and doctoral students in Physics, Mathematics, Computer Science, Chemistry and other disciplines.