



# FSG3114 Numeriska metoder i strömningsmekanik 7,5 hp

Numerical Methods in Fluid Mechanics

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

## Fastställande

Kursplan för FSG3114 gäller från och med VT16

## Betygsskala

undefined

## Utbildningsnivå

Forskarnivå

## Särskild behörighet

A course in computer science or programming (e.g. DD1342);  
2. Background in either fluid dynamics or numerical methods, corresponding to one of the second level courses in numerical methods DN2220-DN2225, DN2250-DN2260, DN2266 or a course in fluid dynamics e.g. SG2214 or equivalent.

## Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

## Lärandemål

After reading this course the student should be:

- familiar with the differential equations for flow phenomena and numerical methods for their solution
- able to use and develop flow simulation software for the most important classes of flows in engineering and science.
- able to critically analyse different mathematical models and computational methods for flow simulations
- able undertake flow computations using current best practice for model and method selection, and assessment of the quality of results obtained.

## Kursinnehåll

Short introduction with review of other numerical methods or the basic equations of fluid dynamics (the class will be divided in two groups). Conservation laws: the Navier-Stokes equations. Different levels of approximation, the Euler and Reynolds Averaged equations. Turbulence models. Basics of finite approximations for partial differential equations. Mathematical properties of hyperbolic systems. Numerical treatment of shocks. Finite volume and finite element methods. Boundary conditions. High-resolution methods. Grid generation. Practical algorithms for compressible and incompressible flow. Computer exercises with methods for the Euler equations in 1D and different approximations for 2D compressible and incompressible flows.

## Kurslitteratur

To be announced at course start. In 08/09: **Numerical Computation of Internal & External Flows**, Charles Hirsh, Butterworth-Heinemann, Second Edition, ISBN: 978-0-7506-6594-0, was used.

## Examination

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

## Övriga krav för slutbetyg

One written examination with minimum performance that corresponds to grade B for the Master's course SG2212 (TEN1).

Homework and computer assignments for the master's course SG2212 (LAB1). Additional specific project part for SG3114.

## Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.

- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.