KURSPLAN
Numerisk analys, 7,5 högskolepoäng

Numerical Analysis, 7.5 credits

Kurskod:	TNAR22	**Utbildningsnivå:**	Avancerad nivå
Fastställd av:	VD 2021-03-01	**Utbildningsområde:**	Tekniska området
Reviderad av:	Utbildningschef 2023-10-25	**Ämnesgrupp:**	MA1
Gäller fr.o.m.:	2024-08-01	**Fördjupning:**	A1N
Version:	2		

Lärandemål

After a successful course, the student shall:

Kunskap och förståelse
- show familiarity with the basic methods for numerically solving problems in mechanical engineering
- display knowledge of methods for solving nonlinear problems by hand and by computer
- demonstrate comprehension of the use of numerical tools required to solve real life problems in mechanical engineering

Färdighet och förmåga
- demonstrate skills of computer programming of finite volume and finite element methods
- demonstrate the ability to approximate any given continuous problem in solid or fluid mechanics by a system of equations

Värderingsförmåga och förhållningssätt
- demonstrate the ability to choose discretization method for a given mechanical problem
- demonstrate an understanding of stability and accuracy in numerical schemes

Innehåll

The course is intended to give the student basic knowledge in numerical approximation. This concerns the approximation of functions, of solutions to ordinary and partial differential equations arising in fluid and solid mechanics, and of integrals in several dimensions. It also concerns the computer implementation of approximation schemes.

The course includes the following elements;
• Interpolation and least squares approximation in several dimensions.
• Numerical integration in several dimensions.
• Explicit and implicit finite difference time stepping methods for ordinary differential equations.
• Finite volume and finite element methods for partial differential equations.

Undervisningsformer

Teaching consists of lectures mixed with computational exercises. Laboratory work with the programming of 2D program codes to solve problems from solid and fluid mechanics.

Undervisningen bedrivs på engelska.

Förkunskapskrav

The applicant must hold the minimum of a bachelor's degree (i.e the equivalent of 180 ECTS credits at an accredited university) with at least 90 credits in Materials and Manufacturing, Mechanical Engineering, Chemical Engineering, Product Development or Engineering Physics or equivalent. The bachelor's degree should comprise a minimum of 15 credits in mathematics. Proof of English proficiency is required.

Examination och betyg

Kursen bedöms med betygen 5, 4, 3 eller Underkänd.

Poängregistrering av examinationen för kursen sker enligt följande system:

Examinationsmoment	Omfattning	Betyg
Examination[I]	5 hp	5/4/3/U
Inlämningsuppgifter	2,5 hp	U/G

[I] Bestämmer kursens slutbetyg vilket utfärdas först när samtliga moment godkänts.

Kurslitteratur

The literature list for the course will be provided 8 weeks before the course starts.

Lecture notes by P. Hansbo