Faculty of Health, Science and Technology
Mathematics

Syllabus

Advances in Continuum Modeling

Course Code:	MAAD26
Course Title:	Advances in Continuum Modeling *Kontinuummodellering*
Credits:	7.5
Degree Level:	Master's level
Progressive Specialisation:	Second cycle, has only first-cycle course/s as entry requirements (A1N)

Major Field of Study:
MAA (Mathematics)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2017-08-25, and is valid from the Spring semester 2018 at Karlstad University.

Prerequisites
Mathematics 90 ECTS course credits, or equivalent

Learning Outcomes
Upon completion of the course, students should be able to:
- produce a complete mathematical model based on a text describing a physical, chemical or biological scenario,
- control if a given mathematical model is correct.

Content
Non-dimensionalization and scaling. Extensive quantities and the link to the concept of measure. Local and global balance equations in terms of measure. Radon-Nikodym's theorem. Cauchy fluxes. Cauchy's and Piola-Kirchoff's stress tensors. Real and virtual work. Deformation tensor. Constitutive laws. Shock, Rankine-Hugoniot relations. Derivation of boundary conditions. General properties of Newtonian flows. Flows of inviscid fluids. Viscous flows and thermohydraulics. Chemical reactions. Derivation of combustion equations for mixtures. General equations for linear elasticity. Principle of virtual work and variantional formulations. Derivation of non-linear constitutive laws via asymptotic homogenization. Balance laws for extensive quantities in materials with microstructures.

Reading List
See separate document.

Examination
Assessment is based on a written exam and a written presentation of an individual project.

Grades
One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course.

Quality Assurance
Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate
A course certificate will be provided upon request.

Additional information
The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.