

## **Applied Computational Fluid Dynamics 7.5 cr**

Tillämpad numerisk flödesmekanik 7,5 hp

Set by Faculty of Engineering and Sustainable Development

Version	Set at	Valid from
	3/16/15	HT2015
	5/29/18	HT2018

Level	A1F
Education level	Second cycle
Course identifier	ETA324
Credits	7.5 cr
Main field of study	Energy Systems
Subject group	Energy Technology
Disciplinary domain	Technology 100.0 %

Learning outcomes

After completion of the course the student shall be able to Knowledge and understanding

explain some of the important and basic terms of CFD (Computational Fluid Dynamics)
describe different methods for numerical solution of fluid flow problems and their applicability for different types of flow

3. describe the process from a mathematical description to numerical solution of a fluid mechanical problem, and under which conditions the system is soluble

4. describe the sources of errors in the process from mathematical description to numerical solution of a fluid mechanical problem and how these errors affect the solution

Skills and abilities

5. analyse a fluid flow case and suggest a strategy for the solution of it with respect to governing equations, possible simplifications and choice of appropriate numerical method 6. assess the suitability and applicability for various boundary conditions

7. design and dimension computational grids

8. identify and quantify sources of error and consider the quality and reliability of the calculation results

Plagiarism is a form of cheating that involves imitating or copying someone else's work, such as a text, an image, or a table, and then present this as your own or without providing any reference. Self-plagiarism is also considered cheating, that is, using one's own previously submitted or published work without providing any reference.

	<ul><li>9. independently identify and formulate projects and plan and us implement the same within a given timeframe</li><li>10. orally and in writing present their projects and discuss their or knowledge and arguments that form the basis for these</li></ul>	e appropriate m	ethods to the		
	Judgement and attitudes 11. show awareness of ethical aspects of research and developm	ent.			
Course content	The course contains methods for numerical solution of incompressible fluid mechanical problems. The most common numerical solution methods for these types of systems of partial differential equations are treated. The course also discusses different types of turbulence models and how these affect the accuracy of the solution. Different types of computational grids and how these affect the accuracy are also treated. A review of the various steps to implement a CFD analysis. Implementation of two major projects (complete CFD analysis). Analyse and evaluate calculation results.				
Teaching	Lectures, seminars, project work and laboratory work				
Prerequisites	English language proficiency equivalent to (the Swedish upper secondary school) English course 6/B. Introduction to Fluid Mechanics 7.5 cr, Introduction to Thermo Dynamics 7.5 cr, Heat Transfer 7.5 cr, or equivalent.				
Examination	Written Examination, Project 1 and Project 2 0010 Written examination examines Learning outcomes 1-6, grades A-F. 0020 Project 1 examines Learning outcomes 1-6, grades A-F. 0030 Project 2 examines Learning outcomes 1-6, grades A-F.				
Grade	A, B, C, D, E, Fx, F				
Other regulations	The final course grade is based on a combination of the grades in the different parts of the examination. Grading criteria announced by the examiner or course coordinator at the start of the course.				
Sustainable environment	A minor part of the course content deals with sustainable development.				
Module	0010 Written examination	2.5 cr	Grade: AF		
	0020 Project 1	2.5 cr	Grade: AF		
	0030 Project 2	2.5 cr	Grade: AF		
	0040 Laboration	1 or	Grada: UG		
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