Simulation and Modeling Toolbox MH2042, 6 credits

Today a wide variety of simulation tools are available to help with engineering tasks. Numerical solutions of the incredibly complex Navier-Stokes equations have been around for almost a century; in the early 20th century it was performed by human computers and today it can be performed on any desktop computer or on various super computers around the world. In materials processing simulation of steel flows is a very useful tool to aid with process understanding – many of the processes have such an environment that regular experimental methods cannot be used and as such modeling can complement experimental techniques. It is also important to note that problem solving skills and innovation are highly valued in any industry and as such there will be a focus on solving actual industrial problems in this course.

Intended Learning outcomes (ILO)

During the course you will plan, carry out and present an industrially relevant project, in a scientific manner, that also assesses the business impact. Hereafter a number of ILOs will be listed with specific items that assess them. After successful completion of the course you will be able to

1. Present project ideas as well as project results in a clear and informative manner to a group of Peers.
   a) Dragon’s den pitch.
   b) Project seminar.

2. Incorporate ideas of innovation and entrepreneurship into the project in order to enhance the outcome.
   a) Project report

3. Operate in a project group with the intended goal to deliver a solution to an industrially relevant problem, using CFD simulation software. Assess the organization structure of the project group.
   a) Individual reflection

4. Write, assess and criticize reports based on CFD simulations.
   a) Lab report 1
   b) Lab report 2
   c) Peer-review lab report 1
   d) Peer-review lab report 2
   e) Opponent session during final seminar

5. Have a working understanding of the finite volume method in order to design a CFD model according to an industrially relevant problem.
   a) Project report

Examination

The course gives a total of 6 credits with grade A,B,C,D,E,F
It is divided into the following two parts

PRO1 – Project assignment, 4 credits, grade scale: A,B,C,D,E,F
SEM1 – Seminar, 2 credits, grade scale: A,B,C,D,E,F

The ILOs are connected to the grading in the following manner

PRO1 – Project assignments, 4 credits, grading A, B, C, D, E, F

Contributing ILO assessment
2a (P/F)
3a (P/F)
4a (P/F)
4b (P/F)
4c (P/F)
4d (P/F)
4e (P/F)
5a (A/B/C/D/E/F)

The PRO1 grading will be based on the total score of the contributing ILOs.

A maximum of 2 “F” will lead to “Fx” in those respective ILO assessments. In case of 3 or more “F” there will be no more “Fx” opportunities and “F” will be assigned for PRO1.

NOTE: NOT handing in an assignment on time will automatically result in an “F” for that assignment.

SEM1 – Seminar, 2 credits, grading A, B, C, D, E, F

Contributing ILO assessment
1a (A/B/C/D/E/F)
1b (A/B/C/D/E/F)

The SEM1 grading will be based on the average score of the contributing ILOs (both are judged equally).

In case of maximum one (1) “F” the total grade of SEM1 will be given as “Fx”. In case of two (2) “F” then the grade will be given as “F” for SEM1.

Disposition

6 credits corresponds to a work of 160 hours. Most of the course content is available online and there is a sizable degree of self-study. It is expected that each group makes several appointments with the course responsible to discuss the ongoing project work.

Lectures: 8h
Exercise/Lab: 16h
Seminar: 4h

Recommended prerequisites

Transport Phenomena (MH1018 or similar)
Numerical Methods (SF1514 or similar)

Literature

All course material will be available online on the Canvas platform.

Contact

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Alternative contact persons, in case the course responsible is sick for an extender period of time

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