



FSG3085 Human Movement Analysis and Modeling 3.0 credits

Rörelseanalys och modellering

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FSG3085 valid from Autumn 2016

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

Participants should be enrolled in a PhD program related to biomechanics.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After the course, the student should be able to:

- Understand the concepts and implementation of motion analysis in hospital and research settings
- Implement experimental motion analysis data into a computerized musculoskeletal modeling environment
- Understand how experimental errors may translate into numerical errors and possibly propagate
- Have a basic understanding of motion capture software
- Have a good understanding of graphics-based biomechanical modeling software

Course contents

The course focuses first on the experimental motion analysis of humans, in which active cameras record motion from small markers placed on the subjects, after which a model to calculate actual joint motion and loading is used. This experimental motion analysis can then be implemented into musculoskeletal modeling software, after which muscle activations, anatomical structure, loading conditions and material properties can be modified to represent, for example, presence of pathology, which may change the strategy of the motion.

The motion capture will take place at Karolinska University Hospital and the simulation, at KTH Engineering Science, Mechanics. The course will require familiarity with motion capture and analysis software from Vicon Motion Systems. The program SIMM by Musculographics Inc. is central to the course, with the additional module Dynamic Pipeline, which provides a pipeline between the biomechanical model and the calculated equations of motion in the underlying program SD/Fast.

Disposition

The course begins with a series of experiments in the motion analysis laboratory, after which three modeling assignments based on the experimental data are given. Students can work in groups but must present their material independently. A final project is to be completed individually, according to instructions. A short presentation to the instructor and other students is required.

Course literature

The instructor will prepare relevant publications and material.

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Final project. All three assignments and final project are compulsory. The grading scale is Pass/Fail.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.