Musculoskeletal Biomechanics and Human Movements

Muskuloskelettär biomekanik och rörelseapparaten
6 credits

Programme course

TMME67

Valid from: 2022 Spring semester

Determined by	**Main field of study**	
Board of Studies for Mechanical Engineering and Design	Mechanical Engineering	
Date determined	**Course level**	**Progressive specialisation**
2021-09-01	Second cycle	A1X
Revised by	**Disciplinary domain**	
	Technology	
Revision date	**Subject group**	
	Mechanical Engineering	
Offered first time	**Offered for the last time**	
Autumn semester 2020		
Department	**Replaced by**	
Institutionen för ekonomisk och industriell utveckling		

Course offered for

- Master of Science in Design and Product Development
- Master of Science in Energy - Environment - Management
- Master of Science in Biomedical Engineering
- Master of Science in Mechanical Engineering
- Master's Programme in Biomedical Engineering
- Master's Programme in Mechanical Engineering

Prerequisites

Calculus, Linear Algebra and Mechanics (or corresponding physics course)

Intended learning outcomes

The course aims to provide an understanding of the loads the human body is exposed to during both daily activities and more physically demanding activities; this from a mechanical and mathematical perspective, with application of principles in engineering mechanics. This provides the student knowledge to be able to take into account the human and her interaction with the environment, for example in product development. The course also gives an introduction to the analysis of sports performance and injury problems with regard to human movement. After completing the course, the student should be able to:

- capture, interpret and analyze kinematic and kinetic variables from human movement during physical activity
- simplify and model the human body as a musculoskeletal system by applying fundamental concepts in applied mechanics
- use biomechanics software and simulate a musculoskeletal system
- understand why a human musculoskeletal system can become part of the product development process
- understand why the musculoskeletal system can become overloaded during physically demanding activities and the medical problems this can cause.

Course content

Biomechanical Measurements, Human Anatomy and Anthropometry, Multibody Dynamics, Muscle Mechanics, and Simulation Methods for Biomechanics.

Teaching and working methods

The course is structured around teacher-led computer exercises together with supporting lectures, laboratory work and supervision. The computer exercises are part of the examining project.

Examination

PRA1	Written Report of Project Work	3 credits	U, 3, 4, 5
TEN1	Written examination	3 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is “Swedish”, the course as a whole could be given in Swedish, or partly in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is “English”, the course as a whole is taught in English. Examination language is English.
- If teaching language is “Swedish/English”, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English depending on teaching language.

Other

The course is conducted in a manner where both men's and women's experience and knowledge are made visible and developed.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

If special circumstances prevail, the vice-chancellor may in a special decision specify the preconditions for temporary deviations from this course syllabus, and delegate the right to take such decisions.