



# HL2035 Biomechanics and Neuronics 7.5 credits

## Biomekanik och neuronik

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Course syllabus for HL2035 valid from Autumn 14

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

**Grading scale:** A, B, C, D, E, FX, F

**Education cycle:** Second cycle

**Main field of study:** Medical Engineering

### Intended learning outcomes

To integrate medical and technical knowledge by providing the students insight into anatomy, biological materials, and their properties. To give knowledge of injury mechanics and injury criteria for biological tissues, in particular the central nervous system. Further to give knowledge of how numerical modelling of soft and hard biological tissue can be used to calculate deformations, strains and stresses in the tissue in effort to predict injury/instability of the tissue.

During this course you are expected to acquire the following skills:

- Describe the human anatomy and the function of the nervous system.
- Describe the basic constituents of human tissues and their mechanical properties.
- Explain the mechanical properties of human tissues based on their design, purpose, and structure of the basic constituents.
- Derive the simple viscoelastic material models and describe how the more complex viscoelastic relations can be modeled.
- Explain the fundamental theories and the equations of motion for static and dynamic FEA.
- Perform a dynamic FEA and evaluate the reliability of the results.
- Analyze an accident, predict the injury outcome and suggest preventive strategies.
- Describe the energy absorption of foam materials and discuss how this can be used to protect the human, for example in helmet design.

### Course main content

Basic anatomy and physiology. Mechanical properties of biological material. Numerical modelling of biological tissue. In particular the brain and cervical spine. Injury criteria.

### Language of instruction

Language of instruction is specified in the course offering information in the course and programme directory.

## Eligibility

Base programme BD, M, P, T or equivalent. Fundamental knowledge in solid mechanics is necessary and basic knowledge in FEM is recommended.

## Literature

Kurskompendium/Course folder.

## Examination

- LAB1 - Laboratory Work, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F

Approved project report and experimental lab (3 credits), and passed written exam (4.5 credits).