



# HL2018 Advanced Physiology

## 9.0 credits

Avancerad fysiologi

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

### Establishment

Course syllabus for HL2018 valid from Autumn 2023

### Grading scale

A, B, C, D, E, FX, F

### Education cycle

Second cycle

### Main field of study

Technology and Health

### Specific prerequisites

Two years of studies in science/technology at university level. Basic knowledge of anatomy/physiology corresponding to the course Medical Engineering, basic course 6 ECTS. English B/6.

### Language of instruction

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

## Intended learning outcomes

The course provides knowledge of the principal body functions and understanding of the integrative regulations necessary for the maintenance of body homeostasis. This knowledge is the basis for understanding how the function of various organs and body systems are affected during diseases and ageing. The course includes theoretical lectures, group work and practical moments with physical testing methods for measuring normal physiological parameters. After completing the course, the student should be able to:

- Explain the physiology and anatomy of the circulation, respiration, autonomic nervous system, endocrine, urinary, digestive and musculoskeletal systems.
- Understand how different body systems interact to maintain homeostasis
- Integrate physiological adaptation occurring during various stress, disease, ageing and physical activity
- Practically evaluate heart function, respiration, acid-base balance and maximum exercise capacity
- Understand and predict how alteration of the structure and function of body systems drives human diseases

## Course contents

### A. Cardiac, vascular and respiratory systems

- Explain how heart and vasculature regulate circulation of blood in the body
- Explain how lungs and circulation regulate oxygenation of tissues
- Understand feedback loops affecting heart rate, blood pressure and respiration
- Analyze how the different systems interact to maintain a constant internal environment
- Understand and explain how the structure and function of these systems is altered in human cardiac, vascular and respiratory diseases

At the end of this module, students should have the practical skills to:

- Perform and analyze an electrocardiogram, orthostatic test, static and dynamic spirometry
- Measure heart rate and blood pressure
- Identify heart and respiratory sounds

### B. Autonomic nervous and endocrine systems

- Explain the organization of the sympathetic and parasympathetic nervous systems
- Understand the concepts of endocrine, paracrine and autocrine effects

- Classify hormones based on composition, mechanisms of synthesis, receptor type and intracellular signalling
- Integrate the organization and control of nervous and endocrine systems and the function to maintain homeostasis in the healthy body
- Understand and explain how the structure and function of these systems is altered in human diseases

#### C. Digestive and urinary systems

- Explain how food is processed and absorbed at different levels of the alimentary canal
- Describe the function of the liver and pancreas in nutrient absorption
- Explain the role of urinary organs in maintaining fluid and acid-base balance
- Understand the interactions between the nervous, endocrine and digestive system that regulate food processing and absorption
- Understand and explain how the structure and function of these systems is altered in human diseases

#### D. Musculoskeletal system and exercise physiology

- Explain how the anatomy of skeletal muscle and bones generates movement
- Explain the molecular, cellular, bioenergetic and biophysical mechanisms generating force in skeletal muscle
- Understand the nervous mechanisms regulating movement and balance
- Integrate physiological adaptations occurring during physical activity
- Understand and explain how the structure and function of these systems is altered in human diseases and ageing

At the end of this module, students should have the practical skills to:

- Estimate maximum exercise capacity from a cycling exercise bout
- Measure physiological changes occurring during an acute exercise bout

## Examination

- TEN1 - Examination, 9.0 credits, grading scale: A, B, C, D, E, FX, F

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.

## **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.