CM1010 Human Physiology 6.0 credits

Humanfysiologi

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

Establishment

Course syllabus for CM1010 valid from Autumn 2024

Grading scale

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

Education cycle

First cycle

Main field of study

Medical Engineering

Specific prerequisites

Completed degree project 15 credits in engineering, social sciences, medicine, biomedical technology, industrial economics or entrepreneurship. Alternatively, 1 year of professional experience in medical technology, technical physics, computer technology, electrical engineering or entrepreneurship. English B/ 6

Language of instruction

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

Intended learning outcomes

After completing the course, the student should be able to:

Explain the physiology and anatomy of the immune, nervous, musculoskeletal, circulatory, respiratory, urinary, endocrine, and digestive systems.

Describe how different body systems interact to maintain homeostasis.

Demonstrate the assessment of cardiovascular and respiratory functions.

Course contents

The course provides knowledge of the principal body functions: immune, nervous, musculoskeletal, circulatory, respiratory, urinary, endocrine, and digestive systems. This knowledge is the basis for understanding the integrative regulations necessary for the maintenance of body homeostasis, and their adaptation to stress.

The course is focused on self-learning and group work. Learning material will be provided mainly in the form of recorded lectures, book chapters and online materials. Face-to-face activities will consist of lectures, seminars, and workshops where students will be able to work in groups to discuss physiological mechanisms and practice critical thinking. One laboratory will allow the students to get practical training in measurement of cardiovascular and respiratory function in humans. The main topics covered in the course include:

A. Blood and Body Defenses

- Role of erythrocytes in regulating gas transport.
- Platelets and the regulation of hemostasis.
- Leukocytes and resident immune cells.
- Immune and adaptive immune responses.

B. Nervous System

- Afferent (sensory) and efferent (motor) divisions.
- Autonomous nervous system: sympathetic and parasympathetic.

C. Musculoskeletal System

- Anatomy of skeletal muscle and bones generating movement.
- Molecular, cellular, and biophysical mechanisms generating force in skeletal muscle.
- Nervous mechanisms regulate movement and balance.

D. Cardiovascular System

- Heart electrical activity regulating myocyte contraction.

- Regulation of blood circulation by vasculature.
- Pressure, flow, and resistance affecting fluid distribution and exchange.
- Cardiovascular control mechanisms.

E. Respiratory System

- Structure of airways and respiratory muscles.
- Principles of partial pressures regulating air flow.
- Central control of breathing.

F. Urinary System and acid-base balance

- Filtration, reabsorption, and secretion regulating fluid balance.
- Maintenance of acid-base balance.

G. Endocrinology and reproduction

- Endocrine, paracrine, and autocrine effects.
- Hormone composition, mechanisms of synthesis, receptor type and intracellular signaling.

H. Digestive system

- Food processing and absorption.
- Function of the liver and pancreas in nutrient absorption.

Examination

- TEN1 - Written exam, 6.0 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.