



# CM2025 Advanced Techniques in Physiology 3.0 credits

Avancerade tekniker inom fysiologi

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

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

## Establishment

The course plan applies from and including HT 2024 according to school head decision: C-2023-1913. Decision date: 2023-09-28

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Medical Engineering

## Specific prerequisites

Basic knowledge of anatomy and physiology corresponding to the courses HL1001 Basic Medicine, HL1201 Medicine and Medical Engineering, Basic Course, CM1010 Human Physiology or equivalent.

## 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:

- Describe how to perform human cardiorespiratory and metabolic phenotyping.
- Evaluate cardiovascular, respiratory, muscular, and metabolic functions.
- Explain how environmental factors influence blood glucose levels and the physiological mechanisms responsible for maintaining glucose homeostasis.
- Describe the physiological principles underlying exercise capacity and how to measure them (lactate threshold, oxygen uptake)
- Analyze how diet and exercise affect different body systems.

## Course contents

Through practical training, the course provides advanced knowledge of clinical devices used for human clinical phenotyping and their use to estimate cardiometabolic health. The course is focused on practical training. Learning material will be provided mainly in the form of recorded lectures, book chapters and online materials. Face-to-face activities will consist of workshops and laboratories where students will be able to work in groups to develop protocols, perform human testing and critically interpret their results. The course will include:

- Bioenergetics: nutrition, substrate preference, metabolic sensing, and metabolic flexibility.
- Musculoskeletal system: anatomy, biomechanics of movement, molecular mechanisms of contraction and muscle fiber metabolism.
- Exercise physiology: physiological response to acute exercise and adaptation to exercise training, heat and energy balance, muscle mass and metabolism.
- Blood glucose: homeostasis and regulation by diet and exercise.
- Clinical exercise testing: maximal oxygen uptake, lactate threshold.

## Examination

- RED1 - Laboratory exercises with written and oral presentation, 3.0 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.

## **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.