HL2040 Physiology in Extreme Environments 7.5 credits

Fysiologi i extrema omgivningar

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

Establishment

On 2020-03-31, the Head of School of CBH has decided to establish this official course syllabus to apply from autumn semester 2020 (registration number C-2020-0671).

Grading scale

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

Education cycle

Second cycle

Main field of study

Medical Engineering

Specific prerequisites

120 credits in engineering, natural science, medicine/health science, sport science, including basic knowledge of anatomy/physiology (verified by successful pass of a respective course; e.g. HL1201 - Medicine and Medical Engineering, HL1007 - Medical Engineering, HL2017 - Advanced Physiology, smaller Course, HL2018 - Advanced Physiology, FSK3530 - Introduction to Biomedicine, and proficiency in English corresponding to English B).

Language of instruction

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

Intended learning outcomes

The objectives are to provide the student knowledge concerning physiological responses and medical constraints during exposure to certain harsh environmental conditions, namely: high gravitoinertial (G) load, weightlessness, increased and reduced ambient pressure and hot and cold environments. The course will also highlight how humans make use of different devices, techniques and/or behavioural strategies to withstand such environments. Upon completion of the course, the student will know about:

• Physiological responses and medical problems during exposure to cold climates.

• Countermeasures against local cold injuries and hypothermia.

• Physiological responses and medical problems during exposure to hot climates.

• Countermeasures against heat exhaustion and heat stroke.

• Physiological responses and medical problems during exposure to high G loads.

• G-protective behaviour and anti-G garments/measures.

• Physiological responses and medical problems during and following exposure to weightlessness

• Countermeasures against undesirable effects of weightlessness.

• Physiological responses and medical problems during immersion and exposure to high ambient pressures.

• Countermeasures against barotrauma and decompression sickness.

• Physiological responses and medical problems in submarine vehicles.

• Life-support systems in submarines and techniques for free escape from a bottomed submarine.

• Physiological responses and medical problems at high altitudes.

• Countermeasures against acute hypoxia and mountain sickness, and high-altitude acclimatisation.

Course contents

The course will mainly be based on lectures . The lectures will cover physiological responses as well as constraints and countermeasures during exposure to high G loads, weightlessness, increased and reduced ambient pressure and hot and cold climates.

The course will also include demonstrations of a human-use centrifuge, hypo- and hyperbaric pressure chambers and physiological responses during local cold exposure.

In addition, the students will be requested to participate in seminars concerning thermal physiology, altitude physiology, diving & hyperbaric physiology and acceleration & gravitational physiology.

Examination

- SEM1 - Project Work, 2.5 credits, grading scale: P, F
- TENA - Examination, 5.0 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.

Final grade according to grade scale A-F.

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.