



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Människan i extrema miljöer Human in Extreme Environments

MAMF35, 7,5 credits, G2 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED C/D

Date of Decision: 2023-04-18

General Information

Main field: Technology.

Elective for: BME4-bdr, R4

Language of instruction: The course will be given in English

Aim

The general aim of the course is to provide basic and in-depth knowledge about the effects on human wellbeing, health and performance associated with exposure to environmental extremes, as well as related prevention and protection. The aim is related to the challenges in UN sustainable goals, particularly goal 3: good health and well-being; goal 8: decent work and economic growth; goal 13: climate action.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to describe risks associated with human stay in extreme environment during work, outdoor life, adventure tourism and extreme sports;
- be able to describe the decisive factors that affect human health, work capacity, comfort and living conditions in extreme environments;
- be able to describe human physical capacities and limitations to adapt to extreme environments, e.g. heat, cold, cold water, fire, high altitude, outer space.

Competences and skills

For a passing grade the student must

- be able to use different evaluation methods and criteria for selecting strategies to reduce

- or eliminate the effects of extreme environments;
- be able to use prediction models for describing the interaction between humans and environment to evaluate the effect and give advice on protection;
- be able to apply relevant measuring methods for assessment of the extreme environment effects on human;
- be able to evaluate the risks in extreme environments and recommend appropriate clothing and equipment;
- independently and critically interpret scientific literature and its relevance in the subject area.

Judgement and approach

For a passing grade the student must

- reflect about his/her personal development and the need of further knowledge in the subject area.

Contents

The course provides knowledge and understanding within chosen topics related to human physiology and the influence of the physical environment on human well-being, health and performance. The topics contain the following

- Introduction to environmental exposure and limits of human performance
- Physical work and human performance
- Human heat balance and heat exchange with the environment
- Cold and hot environments
- Exposure to fire and toxic environments
- Cold water and diving
- High altitude and hypoxic environment
- Space environment
- Survival
- Preventive and protective measures
- Clothing and personal protective equipment
- Methods for risk assessment and simulation
- International standards

The theoretical parts of the course are supplemented with a small project in a group and three laboratory exercises: 1) maximum/sub-maximum oxygen uptake capacity test (VO₂ uptake), 2) exercise in a warm environment, 3) exercise in a cold environment.

Examination details

Grading scale: UG - (U,G) - (Fail, Pass)

Assessment: The examination includes participation in three laboratory exercises in groups, oral and written presentation of project work in groups, as well as an individual written exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

The number of participants is limited to: No

The course overlaps following course/s: TFRC70

Reading list

- Prevent: Personlig skyddsutrustning. Prevent, Stockholm, Sverige, 2008, ISBN: 978-91-7365-027-4.
- Holmér, I.: Human performance in extreme environments. Kompendium, Lund University. 2009. Compendium.
- Åstrand, P-O., Rohdahl, K., Dahl, H., Strömme, S.: Textbook of work physiology: Physiological bases of exercise. Champaign, IL: Human Kinetics, 2003, ISBN: 0-7360-0140-9. Recommended complementary reading.
- Auerbach P.S.: Wilderness medicine. Mosby, Elsevier, 2007, ISBN: 978-0-323-03228-5. Recommended complementary reading.
- Gunga H.-C.: Human Physiology in Extreme Environments. Elsevier, 2015, ISBN: 978-0-12-386947-0. Recommended complementary reading.
- Selection of published articles. Selected scientific papers on specific lecture topics.

Contact and other information

Course coordinator: Chuansi Gao, chuansi.gao@design.lth.se

Course administrator: Lena Leveen, lena.leeven@certec.lth.se

Course homepage: <https://kurser.lth.se/kursplaner/senaste%20eng/MAMF35.html>

Further information: The course provides knowledge on the effect of the external environment on human, especially related to physical work capacity (max and sub-max VO₂ uptake), heat and cold, cold water and diving, high altitude and hypoxic environments, outer space, survival and methods for related risk assessment, prevention and protection.