Animal Function and Environmental Adaptation

Programme course

15 credits

Djurens fysiologiska funktioner och deras anpassning till miljön

NBIC49

Valid from: 2018 Spring semester

Determined by
Board of Studies for Chemistry, Biology and Biotechnology

Date determined

Main field of study
Biology

Course level
First cycle

Advancement level
G2X

Course offered for
- Biology, Bachelor´s Programme

Specific information
The course is scheduled for the last time 2018. The course is replaced by NBIC57 Animal Physiology.

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites

Passed basic subjects in biology (75 credits, at least 45 credits theory).

Basic knowledge in statistics.

Understanding of the following essential physiological concepts as presented in Silverthorn, D. U. Human Physiology. An integrated approach (Pearson, Benjamin Cummings, San Francisco, 2007). 1.Homeostasis
2.Negative feedback control loops
3.Resting membrane potential
4.Action potential
5.Synapse
6.Classification of the vertebrate nervous system: central, peripheral, sensory, motor, somatic, autonomic, parasympathetic and sympathetic
7.Receptor adaptation
8.Pituitary hormones
9.Cross-bridge cycling in muscle: role of actin and myosin
10. Dynamics of calcium in muscle contraction
11. Muscle types: skeletal, cardiac and smooth
12. Types of cells in blood
13. Respiratory pigments: hemoglobin
14. Gas partial pressures and Dalton's law
15. Gas solubilities and Henry's law
16. Oxygen dissociation curve
17. Structure of a nephron
18. Chemical digestive enzymes
19. Phases of the menstrual cycle

Intended learning outcomes

The student will increase her/his understanding of how animals adjust their organism to thrive and survive in the environment they live in. They will do this by by applying the essential principles of physiology covered in an earlier basic physiology course such as NBIB29 Fysiologiska principer. For every environmental scenario the student will be able

- to identify the fundamental concepts implicated by discussion with fellow students
- to understand the fundamental concepts by explaining them orally in tutorial sessions
- to integrate all mechanisms involved in a multi-faceted response of the entire organism by writing a concise essay outlining all the steps of the physiological response

In consequence, the student will improve her/his ability

- to articulate and explain scientific concepts orally and spontaneously
- to write briefly and precisely on the progression of biological processes
- to describe quantitatively the outcome of physiological responses

Course content

The weekly themes are the following: 1) dealing with high and low temperatures, 2) dealing with high altitudes, 3) dealing with life under water, 4) dealing with scarce resources (fasting and starvation), 5) dealing with stress (animal welfare), 6) dealing with environmental pollutants, 7) dealing with the embryonic environment and 8) dealing with disease and parasites. In this fashion, all themes will require the integration of two or more physiological systems. For instance theme 4 on dealing with scarce resources incorporates topics of digestive physiology, endocrinology and even kidney physiology when water is scarce. Theme 5 on stress has also numerous consequences on the cardiovascular system (heart failure, for example) but also on reproduction and the theme will require an important consideration of nerve physiology as well. Theme 6 on dealing with environmental pollutants incorporates topics of reproductive physiology (gender bender pollutants), metabolism and kidney physiology.

Teaching and working methods

The course is organized around weekly themes related to environments in which animals are living. The course will emphasize the physiology of vertebrate species with dedicated parts to humans. Each theme will have a similar structure:
Day 1. Presentation of the specific problems related to the weekly theme and further work on them during the day
Day 2. Introductory lectures to the weekly theme (2-4 h) with links to the specific problems
Days 3 and 4. Individual or group work on specific problems related to the theme chosen by the students. There will always be at least one problem emphasizing human physiology and one problem emphasizing animal physiology. Practical activities in the form of laboratory exercises or demonstrations adequate to the week theme will be organized.
Day 5. Colloquium with the different student groups. Discussion of relevant articles and definition of further learning issues.
The last week of the course will be used to collect and work on the further learning issues identified for each theme, which will be used as the subject for the home exam.

Examination

UPG4	Home exam	3 credits	U, 3, 4, 5
UPG3	Laboratory reports	4 credits	U, 3, 4, 5
UPG2	Oral colloquium discussions	4 credits	U, 3, 4, 5
UPG1	Individual written problem essays	4 credits	U, 3, 4, 5

The final grade is the combination of all grades 30% for UPG1 and UPG4 and 20% for UPG2 and UPG3.

Grades
Four-grade scale, LiU, U, 3, 4, 5

Department
Institutionen för fysik, kemi och biologi

Director of Studies or equivalent
Agneta Johansson

Examiner
Jordi Altimiras

Course website and other links
http://cms.ifm.liu.se/edu/coursescms/

Education components
Preliminary scheduled hours: 120 h
Recommended self-study hours: 280 h

Course literature
Hill, R. W., Wyse, G. A. & Anderson, M. Animal Physiology 3rd edition (Sinauer, 2012). ISBN10: 0878936629. ISBN13: 9780878936625

Common rules

Course syllabus

A syllabus has been established for each course. The syllabus specifies the aim and contents of the course, and the prior knowledge that a student must have in order to be able to benefit from the course.

Timetabling

Courses are timetabled after a decision has been made for this course concerning its assignment to a timetable module. A central timetable is not drawn up for courses with fewer than five participants. Most project courses do not have a central timetable.

Interrupting a course

The vice-chancellor's decision concerning regulations for registration, deregistration and reporting results (Dnr LiU-2015-01241) states that interruptions in study are to be recorded in Ladok. Thus, all students who do not participate in a course for which they have registered must record the interruption, such that the registration on the course can be removed. Deregistration from a course is carried out using a web-based form: www.lith.liu.se/for-studenter/kurskomplettering?l=sv.

Cancelled courses

Courses with few participants (fewer than 10) may be cancelled or organised in a manner that differs from that stated in the course syllabus. The board of studies is to deliberate and decide whether a course is to be cancelled or changed from the course syllabus.

Regulations relating to examinations and examiners

Details are given in a decision in the university's rule book: http://styrdokument.liu.se/Regelsamling/VisaBeslut/622678.

Forms of examination

Examination

Written and oral examinations are held at least three times a year: once immediately after the end of the course, once in August, and once (usually) in one of the re-examination periods. Examinations held at other times are to follow a decision of the board of studies.

Principles for examination scheduling for courses that follow the study periods:

- courses given in VT1 are examined for the first time in March, with re-

examination in June and August
- courses given in VT2 are examined for the first time in May, with re-examination in August and October
- courses given in HT1 are examined for the first time in October, with re-examination in January and August
- courses given in HT2 are examined for the first time in January, with re-examination at Easter and in August.

The examination schedule is based on the structure of timetable modules, but there may be deviations from this, mainly in the case of courses that are studied and examined for several programmes and in lower grades (i.e. 1 and 2).

- Examinations for courses that the board of studies has decided are to be held in alternate years are held only three times during the year in which the course is given.
- Examinations for courses that are cancelled or rescheduled such that they are not given in one or several years are held three times during the year that immediately follows the course, with examination scheduling that corresponds to the scheduling that was in force before the course was cancelled or rescheduled.
- If teaching is no longer given for a course, three examination occurrences are held during the immediately subsequent year, while examinations are at the same time held for any replacement course that is given, or alternatively in association with other re-examination opportunities. Furthermore, an examination is held on one further occasion during the next subsequent year, unless the board of studies determines otherwise.
- If a course is given during several periods of the year (for programmes, or on different occasions for different programmes) the board or boards of studies determine together the scheduling and frequency of re-examination occasions.

Registration for examination

In order to take an examination, a student must register in advance at the Student Portal during the registration period, which opens 30 days before the date of the examination and closes 10 days before it. Candidates are informed of the location of the examination by email, four days in advance. Students who have not registered for an examination run the risk of being refused admittance to the examination, if space is not available.

Symbols used in the examination registration system:

** denotes that the examination is being given for the penultimate time.

* denotes that the examination is being given for the last time.

Code of conduct for students during examinations

Details are given in a decision in the university's rule book: http://styrdokument.liu.se/Regelsamling/VisaBeslut/622682.

Retakes for higher grade

Students at the Institute of Technology at LiU have the right to retake written examinations and computer-based examinations in an attempt to achieve a higher grade. This is valid for all examination components with code “TEN” and "DAT". The same right may not be exercised for other examination components, unless otherwise specified in the course syllabus.

Retakes of other forms of examination

Regulations concerning retakes of other forms of examination than written examinations and computer-based examinations are given in the LiU regulations for examinations and examiners, http://styrdokument.liu.se/Regelsamling/VisaBeslut/622678.

Plagiarism

For examinations that involve the writing of reports, in cases in which it can be assumed that the student has had access to other sources (such as during project work, writing essays, etc.), the material submitted must be prepared in accordance with principles for acceptable practice when referring to sources (references or quotations for which the source is specified) when the text, images, ideas, data, etc. of other people are used. It is also to be made clear whether the author has reused his or her own text, images, ideas, data, etc. from previous examinations.

A failure to specify such sources may be regarded as attempted deception during examination.

Attempts to cheat

In the event of a suspected attempt by a student to cheat during an examination, or when study performance is to be assessed as specified in Chapter 10 of the Higher Education Ordinance, the examiner is to report this to the disciplinary board of the university. Possible consequences for the student are suspension from study and a formal warning. More information is available at https://www.student.liu.se/studenttjanster/lagar-regler-rattigheter?l=sv.

Grades

The grades that are preferably to be used are Fail (U), Pass (3), Pass not without distinction (4) and Pass with distinction (5). Courses under the auspices of the faculty board of the Faculty of Science and Engineering (Institute of Technology) are to be given special attention in this regard.

1. Grades U, 3, 4, 5 are to be awarded for courses that have written examinations.
2. Grades Fail (U) and Pass (G) may be awarded for courses with a large degree of practical components such as laboratory work, project work and group work.

Examination components

1. Grades U, 3, 4, 5 are to be awarded for written examinations (TEN).
2. Grades Fail (U) and Pass (G) are to be used for undergraduate projects and other independent work.

3. Examination components for which the grades Fail (U) and Pass (G) may be awarded are laboratory work (LAB), project work (PRA), preparatory written examination (KTR), oral examination (MUN), computer-based examination (DAT), home assignment (HEM), and assignment (UPG).
4. Students receive grades either Fail (U) or Pass (G) for other examination components in which the examination criteria are satisfied principally through active attendance such as other examination (ANN), tutorial group (BAS) or examination item (MOM).

The examination results for a student are reported at the relevant department.

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.