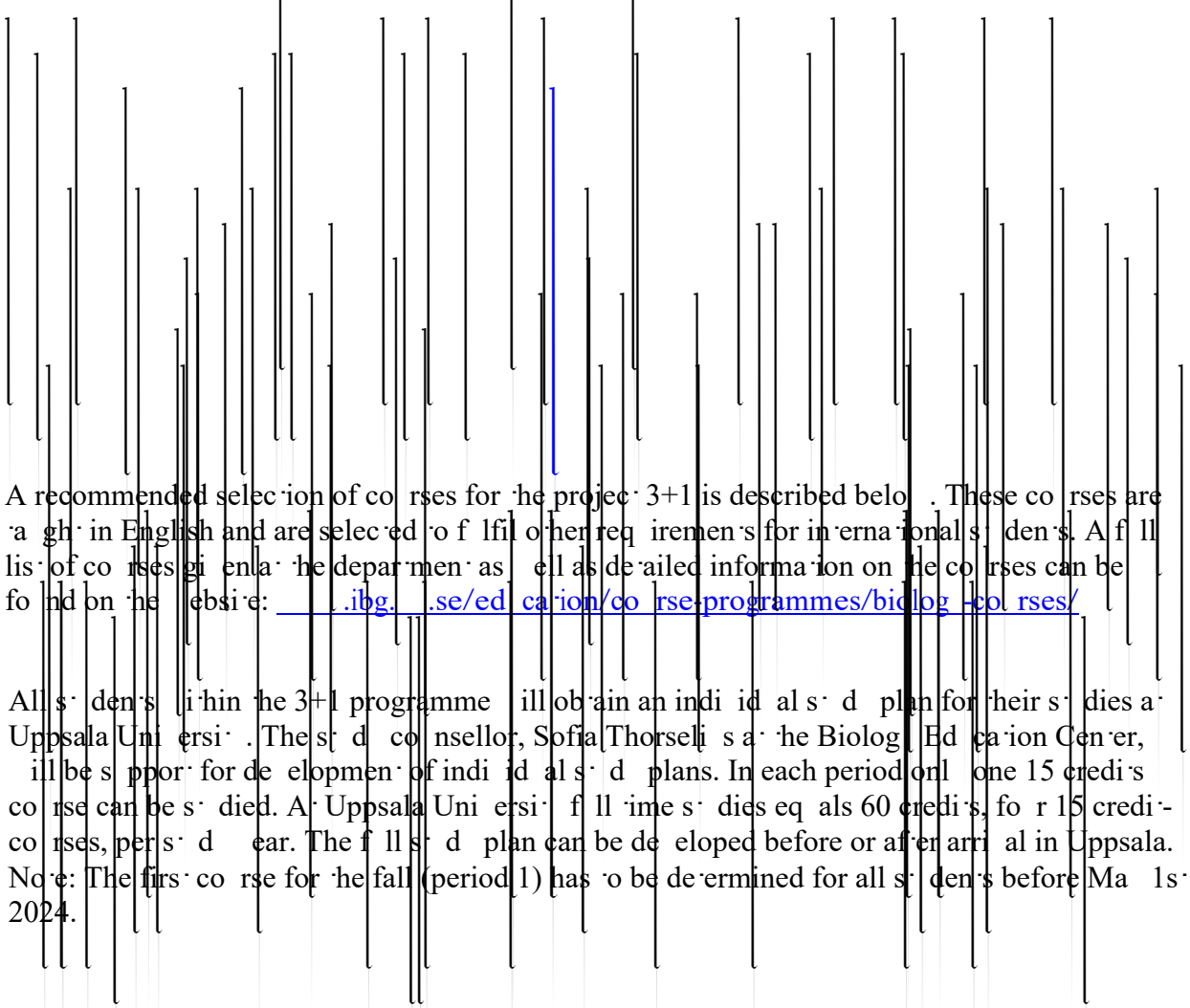

A recommended selection of courses for the project 3+1 is described below. These courses are taught in English and are selected to fulfil other requirements for international students. A full list of courses given at the department as well as detailed information on the courses can be found on the website: www.ibg.uu.se/education/course-programmes/biology-courses/

All students within the 3+1 programme will obtain an individual study plan for their studies at Uppsala University. The study counsellor, Sofia Thorselius at the Biology Education Center, will be supportive for development of individual study plans. In each period only one 15 credits course can be studied. At Uppsala University full time studies equals 60 credits, for 15 credits-courses, per study year. The full study plan can be developed before or after arrival in Uppsala. Note: The first course for the fall (period 1) has to be determined for all students before May 1st 2024.

The aim of the course is to give an insight in to research and development, its organisation and implementation. Optional places for Research training are research departments and institutions, companies or authorities within relevant subject area. The students individual all perform training in a research setting under co-supervision of supervisors and coordinators

!"#$%&'()&*corresponds to undergraduate level (bachelor) and +*',-.&'()*&to graduate level (master). The second level courses *may* be applicable for 3+1 students depending on their studies background.

Period 1: September 2 November 3, 2024 (eeks 36 44)
Period 2: No ember 4, 2024 Jan ar 19 2025, (eeks 45 03)
Period 3: Jan ar 20 March 23, 2025 (eeks 04 12)
Period 4: March 24 J ne 8, 2025 (eeks 13 23)

Christmas break: *usually* here is a break over Christmas and New Year s and no scheduled teaching between December 20,

UPPSALA
UNIVERSITET

Syllabus

Ekologi

15 credits
Course code: 1BG200
Education cycle: First cycle

Main field(s) of study and in-depth level: Biology G2F

Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including The Evolution and Diversity of Organisms (15 credits), Ecology and Populatior Genetics (15 credits), and 7.5 credits in oristics and faunistics.
Responsible department: Biology Education Centre

LEARNING OUTCOMES

The course gives an overview of ongoing ecological research and constitutes a basis for second-cycle studies and work within elds requir knowledge in ecology, ranging from research in evolutionary ecology to practical work in nature conservatio
On completion of the course, the student should be able to

- account for behavioural-ecological theories of sexual selection, foraging, altruism, cooperation, signalling and communicati
- demonstrate understanding of plant and anmal life historie
- quantify and interpret diversity patterns
- account for theories of population dynamics, interspecic competition and trophic interactions in food webs
- carry out simple computer simulations of population dynamics
- plan, carry out and statistically evaluate an ecological study and presentthe results orally and in writir
- critically review and discuss primary scientic texts in Ecology.

CONTENT

Behavioural ecology including the connection between ecology, evolutionary theory, sexual selection and foraging, mating systems, kinsh altruism, cooperation and group living, adaptations to biological enemies, the evolution of signals and communication, and basic li(s) -0.3(

OTHER DIRECTIVES

1BG200 Ecology C and 1BG382 Ecology D can not be included in the same degre

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Syllabus

Limnologi

15 credits
Course code: 1BG227
Education cycle: First cycle

Main field(s) of study and in-depth level: Biology G2F

Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2014-03-13
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023

The teaching is conducted as lectures, seminars, computer exercises, eld courses and laboratory sessions. Participation in seminars, courses and laboratory sessions are compulso

ASSESSMEN

The module Species and habitat knowledge is examined through written and oral tests (4 credits). The eld course requires activ participation and oral and written presentations (4 credits). The theory part requires active participation in seminars and laboratory sessio and passed written exam (7 credits)

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a stude be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab coordinator of the university.

OTHER DIRECTIVES

Cannot be included in the same degree as 1BG380 Limnology I D, 1BG505 Limnology D, 1BG202 Limnology I or 1BG041 Limnology L.

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Syllabus for Applied Ecosystem Eco

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UNIVERSITET

Syllabus for Animal Structure and Function

Djurens struktur och funktion

15 credits
Course code: 1BG203
Education cycle: First cycle
Main field(s) of study and in-depth level: Biology G2F
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5)
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technology
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including 1) The Evolution and Diversity of Organisms (15 credits) and Physiology (15 credits), or 2) Biology A: Patterns and Processes (22.5 credits), or Biology A: Patterns, Processes and Science Education (22.5 credits), and Physiology (15 credits).
Responsible department: Biology Education Centre

LEARNING OUTCOMES

The aim of the course is to provide advanced knowledge of animals as integrated biomechanical and physiological organisms.

Upon completion of the course, the student should be able to:

- describe and be familiar with how some selected organisms have been morphologically and anatomically adapted to a certain mode of life
- describe the most important organ systems and explain their functions
- draw conclusions about interrelationships and evolution through comparative anatomy and morphology
- describe and be familiar with different life cycles of selected groups of organisms
- describe important tissue types, such as muscle, connective tissue, bone, cartilage, kidney tissue, etc., on the basis of histological sections
- practically carry out detailed dissections of selected groups of organisms
- identify and discuss ethical aspects related to animal testing and other uses of animals in teaching and research.

CONTENT

The course explores the connections between comparative morphology, histology, biomechanics and physiology. The information is presented within a phylogenetic framework. The focus lies on how structure and function are integrated, and how they differ between animals with different life styles. Invertebrates and vertebrates will be studied, with an emphasis on the latter.
In-depth knowledge of the animals' structure, for example through a systematic overview of different animal groups, their organ systems and tissue types. Overview of reproductive strategies, life cycles and evolution.

INSTRUCTION

The theoretical teaching is given as lectures and seminars. The practical teaching includes a field course and a series of laboratory practicals based on dissections and physiological experiments. Participation in laboratory practical, field course and seminars is compulsory.

ASSESSMENT

Invertebrates: laborations and field course 2 credits, and seminars 4 credits. Vertebrates: labs, excursions, seminars and presentations 3 credits, and written examination 6 credits. All course parts require active participation.

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a student to be assessed by another method. An example of special reasons might be a certificate regarding special pedagogical support from the disability coordinator of the university.

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Syllabus for Behavioural Ecology

Beteendeekologi

15 credits
Course code: BG631
Education cycle: Second cycle
Main field of study and in-depth level: Biology A
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5)
Established: 2007-03-15
Established by:
Revised: 2022-04-07
Revised by: The Faculty Board of Science and Technology
Applies from: Autumn 2023
Entry requirements:
Completed courses of 120 credits including 60 credits in biology and 30 credits in chemistry or 30 credits in earth science, or 120 credits in biology. In both cases at least 60 credits completed of one of the advanced courses Ecology 15 credits, Immunology 15 credits, or Evolutionary Processes 15 credits. Proficiency in English equivalent to the Swedish upper secondary course English B.
Responsible department: Biology Education Centre

LEARNING OUTCOMES

Animals are selected to pay close attention to the behaviour of others, be it conspecifics, prey or predators. The course treats these behaviours as evolved characters with a survival and reproductive value. On completion of the course, the student should be able to:

- account for and critically evaluate theories and models for sexual selection, foraging strategies and life history strategies, social predation, speciation, personality and communication
- handle and present current problems in behavioural ecology, in writing as well as orally
- carry out and present practical studies in behavioural ecology
- independently and critically review scientific texts and
- identify and in a structured way discuss ethical issues related to animal testing.

CONTENT

Sexual reproduction, ways of reproducing and sexual selection. Models for sexual selection, foraging, alternative mating and life history strategies, cooperation and personality. The relationship between sexual selection and speciation, life history, sexual conflict and manipulation. The relationship between life history theory, energy use, predation and survival. The evolution of communication and design signals. Orientation in current behavioural ecology research, with aim to prepare for research

INSTRUCTION

Teaching consists of lectures, group exercises (labs and computer exercises), group seminars and group as well as independent literature assignments. Independent work as well as discussions and group exercises have an important part of the course. The course includes handling and presenting behavioural ecology problems in writing as well as orally, and independently and critically reviewing scientific and theories. Participation in group exercises, seminars and literature assignments are compulsory. The course employs integrated communication training with feedback and self-assessment.

ASSESSMENT

Modules: Theory 10 credits, Exercise 5 credits.
The module exercises require active participation in group as well as independent assignments. The course ends with a written examination.

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a student to be assessed by another method. An example of special reasons might be a certificate regarding special pedagogical support from the disability

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Syllabus for Plant Structure and Function

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Syllabus

Mikrobiell genetik

15 credits
Course code: 1BG201
Education cycle: First cycle
Main field(s) of study and in-depth level: Biology G2F
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including 1) Molecular Biology and Genetics (10 credits), Life and Interactions of Microorganisms (5 credits) and Cell Biology (15 credits), or 2) Biology A: Patterns and Processes (22.5 credits), or Biology A: Pattern Processes and Science Education (22.5 credits), and Cell Biology (15 credit
Responsible department: Biology Education Centre

LEARNING OUTCOMES

On completion of the course, the student should be able to

- explain the processes behind mutations and other genetic chang
- identify and distinguish genetic regulatory mechanisms at different level
- solve theoretical and practical problems in genetic analysis particularly concerning genetic mapping and strain constructi
- identify genes and mutations in non-annotated sequence data from databases by means of relevant bioinformatics progra
- plan basic experiments in microbial genetics concerned with clarifying phenotypes and their relationship with the genotyp
- use common methods in microbial genetics
- describe and summarise experimental work in a correct way in a laboratory notebool

CONTENT

Mechanisms behind stability and change in microbial genomes. Mechanisms behind the information ow from DNA to proteins and the multiple levels at which gene expression can be regulated. Genetic aspects of extrachromosomal elements such as bacteriophages plasmids. Genetic methods to construct, map and move mutations, and to measure gene expression, and through exercises in problem-solv at seminars where scientic data are analysed. Laboratory sessions where the students through strain construction, genetic selection a screening familiarise themselves with important and common methods in microbial genetics. Careful and proper use of a laboratory noteboo to record laboratory work.

INSTRUCTION

The teaching is given in the form of lectures, seminars and laboratory sessions. Participation in seminars and laboratory sessions is compul

ASSESSMENT

Modules: Theory 7 credits; Exercises 3 credits; Laboratory notebook 2 credits; Student symposium 3 credit
The theory module requires a writen assignment and a written test. The module Exercises require active participation in laboratory sessio and seminars. The module Laboratory notebook requires proper laboratory reports. The module Student symposium requires acti participation in a student symposium with preparatory literature seminars.

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a studer be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab coordinator of the university.

OTHER DIRECTIVES

The course cannot be included in the same degree as 1BG389 Microbial Genetics I

UPPSALA
UNIVERSITET

Syllabus for Diversity and Evolution of Micro Eukaryote

Mikrobiella eukaryoters diversitet och evolution

15 credits
Course code: 1BG235
Education cycle: First cycle

Main field(s) of study and in-depth level: Biology G2F

Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2021-03-04
Established by: The Faculty Board of Science and Technolog
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including 1) The Evolution and Diversity of Organisms (15 credits, course completed), Molecular Biology and Genetics (10 credits, course completed), Life and Interactions of Microorganisms (5 credits, course completed), Ce Biology (15 credits, course completed), and Ecology and Population Genetics (15 credits, course taken, 7 credits completed), or 2) Biology Patterns and Processes (22.5 credits), or Biology A: Patterns, Processes and Science Education (22.5 credits), and in both cases Cell Bi (15 credits).
Responsible departmen: Biology Education Centre

LEARNING OUTCOME

On completion of the course, the student should be able to

- describe the major lineages of the eukaryotic tree of life and analyse how they relate to each oth
- discuss the morphology, cell structure and genome characteristics of the main groups of protists and fur
- use and evaluate morphological and DNA analysis tools to study environmental diversity of protists and fun
- critically assess the current consensus on the origin and evolution of the eukaryotic cell and organell
- analyse the consequences of main transitions in life styles, such as evolution of photosynthesis, parasitism and multicellularity, on t evolution of eukaryotes
- discuss the ecosystem and societal importance of protists and fungi, for example as producers of enzymes for industry, and as para of human, crop and livestock

CONTENT

The course purpose is to develop an understanding of the full width of diversity in eukaryotes with a focus on fungi and protists. We focus o the diversity of microbial eukaryotes including photosynthesising, free living and parasitic species. The presently established hypotheses ab the origin of the eukaryotic cell are presented, together with the most important groups of fungi and protists and their relationships, including algae, agellates, amoebas, ciliates, predators, yeast and mould. The course covers the diversity and origin of algae, chloroplast mitochondria evolution, and the evolution of plants, animals and fungi from unicellular ancestors. Parasitism is studied by highlightin examples of parasite diversity. We also overview the importance of fungi and protists for ecosystems and socie

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a stude
be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab
coordinator of the university.

READING LIS

The reading list is missing. For further information, please contact the responsible departmen

UPPSALA UNIVERSITET

Syllabus for Evolutionary Gene

Evolutionär genetik

15 credits
Course code: 1BG205
Education cycle: First cycle
Main field(s) of study and in-depth level: Biology G2F
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including 1) The Evolution and Diversity of Organisms (15 credits, course completed), Molecular Biology and Genetics (10 credits, course completed) and Ecology and Population Genetics (15 credits, course taken), or 2) Biolo A: Patterns and Processes (22.5 credits) or Biology A: Patterns, Processes and Science Education (22.5 cred
Responsible department: Biology Education Centre

LEARNING OUTCOME

On completion of the course, the student should be able to

- describe the basic mechanisms behind evolution of DNA sequences and gene structu
- describe the principles for population genetics
- describe the latest progress within molecular genetic
- use molecular genetic laboratory method
- describe the main elds of research and studies of modern evolutionary genetics
- use available sources of information as well as basic laboratory methods to generate molecular genetic informat

CONTENT

The course focuses on the following concept and processes: Historical introduction to evolutionary genetics. Mutations: the source of gene variation. DNA sequence evolution and mechanisms for molecular evolution. Population genetics: factors determining the composition an change in allale and genotype frequencies. Genetic markers and sequencing technologies. Mapping of genes: establishing the link betv phenotype and genotype. Conservation genetics. Evolution of genetic systems, sex chromosomes and sex determination mechanis Speciation processes. Selsh genes: conicts between genetic elements within an individual. Phylogeny: methods to analyse evolutiona relatedness between populations. Domestication: changes in the genetic composition of wild animals through selective breedi

INSTRUCTION

Lectures, laboratory sessions, seminars, discussion sessions, computer exercises, literature assignments and projects. Participation practicals, computer assignments and project work is compulsor

ASSESSMEI

To pass the course, the students shoul
o complete practical exercises and lab reports, 4 credi
o participate in seminars, 3 credits
o pass an examination, 8 credit
The grading is based on the results of the examination. Satisfactorily performed laboratory sessions and discussions can give extra pc

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a studer be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab

coordinator of the university.

READING LIST

The reading list is missing. For further information, please contact the responsible department

UPPSALA
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Syllabus for Molecular Biology and Genetics II

Molekylärbiologi och genetik II

15 credits
Course code: 1BG230
Education cycle: First cycle

Main field(s) of study and in-depth level: Biology G2F

Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2015-03-12
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including 1) Molecular Biology and Genetics (10 credits), or 2) Biology A: Patterns and Processes (22.5 credits) or Biology A: Patterns, Processes and Science Education (22.5 credits). In both cases students must have taken courses Cell Biology (15 credits) and Physiology (15 credits). They must also have taken the courses The Basic Principles of Chemistry credits), Organic Chemistry I (10 credits) and Biochemistry I (5 credits), and have completed 20 of the credits for these courses. The course requires practical laboratory experience in molecular biology
Responsible department: Biology Education Centre

LEARNING OUTCOMES

After passing the course the student should be able t

- describe thoroughly how gene expression is regulated in bacteria, archaea and eukaryo
- independently use and optimise molecular tools such as PCR and cloni
- use some and describe several methods and strategies for deeper analysis of biological questions, e.g. gene inactivation, gene e uorescent reporter genes and model organism
- describe how advanced molecular tools such as large-scale sequencing and proteomics can be used to study gene expre
- describe current applications of molecular biology and genetics, within e.g. evolutionary biology and medicin
- read and evaluate scientic articles and suggest follow-up experiment
- describe ethical issues related to the subjects that are covered during the cou

CONTENT

The course focuses on regulation of gene expression in bacteria, archaea and eukaryotes, and basic molecular biological and genetic metho well as the latest large-scale methods that are used to study gene function and gene expression. The following subjects are covered during course: epigenetics; transcriptional and post-transcriptional regulation of gene expression; regulatory RNA. The latest methods within analy of gene expression, e.g. large-scale sequencing and proteomics. Applications of molecular biology and genetics in current research. Method further studies of gene function: inactivation of genes, reporter genes, model organisms. Experimental strategies: selection of methods to st a specic scientic problem. Theoretical and practical training in PCR, cloning, epigenetics in ssion yeast and inactivation of reverse genetics in the roundworm C. elegans. Ethical questions within molecular biology and genetic

INSTRUCTION

Lectures, laboratory sessions, seminars and problem-solving exercis

ASSESSMENT

Written examination (9 credits), written and oral presentation of laboratory sessions (5 credits) as well as oral and written presentation a literature seminar (1 credit).

be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab coordinator of the university.

UPPSALA UNIVERSITET

Syllabus for Neurobiology

Neurobiologi

15 credits
Course code: 1BG207
Education cycle: First cycle
Main field(s) of study and in-depth level: Biology G2F
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including 1) Molecular Biology and Genetics (10 credits, course completed) and the cours Cell Biology (15 credits, course taken), or 2) Biology A: Patterns and Processes (22.5 credits, course completed), or Biology A: Patter Processes and Science Education (22.5 credits, course completed), and the course Cell Biology (15 credits, course tak
Responsible department: Biology Education Centre

LEARNING OUTCOMES

On completion of the course, the student should be able to

- describe the structure and function of neurons and glia cell
- describe how the nervous system is established and how neurons are connected in neuronal circuits that control bodily functions a behavioral output
- describe the central nervous system, the autonomous nervous system and the peripheral nervous system including the structure a function of the sensory organs and the motor systems. Describe and analyse how the interactions between these neuronal system various neurotransmitters inuence the functions of the body
- describe some of the functions of the nervous system such as the regulation of, movement, motivation, pain, emotions and memo and how these can be dysfunctional in neurological and neuropsychiatric disorde
- analyse a given theoretical problem/case, identify gaps in knowledge and retrieve knowledge from relevant scientic literatur
- give an account for basic and advanced neurobiological techniqu
- identify and apply a suitable method theoretically or practically to address the research question at han
- compile and present a literature study and develop an ability to critically analyse and discuss science by reviewing texts in public a scientic papers
- identify and discuss ethical issues related to scientic activities

CONTENT

The course structure is aimed at in-depth knowledge of the molecular and cellular neurobiology and basic knowledge of general neurobiolo The emphasis is on mammalian neurobiology, particularly humans. Course introduction focuses on neuroanatomy and basic neurocellu mechanisms such as chemical and electrical signaling and neurotransmission. It then describes more advanced functions of the nervous sy from the molecular to the integrated level, such as the different senses (sight, smell, etc.), motor and movement control, reward syste emotions and pain. The course also describes current methods in neuroscience resea

INSTRUCTION

The teaching consists of lectures, laboratory sessions, problem-based learning sessions and literature semi

ASSESSMEN

To pass the course, passed participation in all compulsory parts (laboratory sessions, seminars, literature assignment and presentation, passed continuous exams such as half-time control), and passed results of examination are required. Credit points of the modules are: writ

exam 9 credits, laboratory sessions 2 credits, seminars, 2 credits, the literature assignment and presentation 1 credit, and continuous exam called "duggas", 1 credit

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a studer be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab coordinator of the university.

UPPSALA UNIVERSITET

Toxikologi

Toxikologi

15 credits
Course code: 1BG209
Education cycle: First cycle
Main field(s) of study and in-depth level: Biology G2F
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including Molecular Biology and Genetics (10 credits), Cell Biology (15 credits) and Physiology (15 credits). Students must also have taken the courses The Basic Principles of Chemistry (15 credits), Organic Chemistry I (10 credits) and Biochemistry I (5 credits), with 20 credits completed.
Responsible department: Biology Education Centre

LEARNING OUTCOME

On completion of the course, the student should be able to

- describe basic toxicological principles and describe how different chemicals are taken up by, processed in and eliminated from t body
- describe different the importance of different organs for detoxication/ toxication of chemicals, and describe mechanisms for chemically induced neurotoxicity and endocrine toxicity
- describe different behaviour tests and their importance to discover of different neurological and endocrinological disturbance
- describe when different chemicals are most toxic, and mechanisms behind the effects. Be able to discuss when and how differe chemicals can interact under the development to induce effect
- describe different genetic testing methods and injuries after various types of ionising radiatio
- apply different toxicological frameworks within the professional disciplines and have awareness about different risk assessment crite

CONTENT

General toxicological principles and overview of toxic substances: The part includes basic description how substances are absorbed distributed and eliminated from the body. The part contains awareness about toxicokinetic models and the processes of biotransformatio

Toxicity in specic target organs ? effects and mechanisms: The part includes basic toxicological knowledge of the effect of chemicals c central organs that are of signicance for the uptakes/elimination and detoxication/toxication. Basic knowledge about how the communication systems of the body, the nervous system and the endocrine system is inuenced of chemical

Behaviour toxicology: The part includes basic behaviour toxicological knowledge, how behavioural techniques can reveal chemicals that gi functional disturbances

Development toxicology: The part includes basic knowledge of different developmental phases; embryonic and embryonic developmer development during the neonatal period. Critical developmental phases then teratogenic injuries and functional disturbances are induce

Genetic toxicology and ionising radiation: The part includes basic knowledge about genetic injuries and general genetic testing methods a mechanisms behind chemically induced injuries and injuries after ionising radiatior

Toxicology in the society: Environmental toxicology, food toxicology, clinical toxicology, epidemiology, risk assessment

INSTRUCTION

Lectures, group tuition, seminars and laboratory sessions. Attendance at the laboratory work and connected lessons is compulsory. The co
may be given in English

ASSESSMENT

Modules: Theory 10 credits: Written examination
Laboratory sessions 4 credits: Written laboratory report
Literature assignment 1 credit: Written and oral presentation of literature assignmen
A passing grade for the entire course requires passing grades for the laboratory work and semin

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a stude
be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab
coordinator of the university.

TRANSITIONAL PROVISIONS

This course and the course 1BG381 Toxicology D cannot both be included in the same degre

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Syllabus for Animal Structure and Function

Djurens struktur och funktion

15 credits
Course code: 1BG203
Education cycle: First cycle
Main field(s) of study and in-depth level: Biology G2F
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including 1) The Evolution and Diversity of Organisms (15 credits) and Physiology (15 credits), or 2) Biology A: Patterns and Processes (22.5 credits), or Biology A: Patterns, Processes and Science Education (22.5 credits), Physiology (15 credits).
Responsible department: Biology Education Centre

LEARNING OUCOMES

The aim of the course is to provide advanced knowledge of animals as integrated biomechanical and physiological organis

Upon completion of the course, the student should be able to

- describe and be familiar with how some selected organisms have been morphologically and anatomically adapted to a certain mode life
- describe the most important organ systems and explain their function
- draw conclusions about interrelationships and evolution through comparative anatomy and morpholog
- describe and be familiar with different life cycles of selected groups of organism
- describe important tissue types, such as muscle, connective tissue, bone, cartilage, kidney tissue, etc., on the basis of histolo sections
- practically carry out detailed dissections of selected groups of organisr
- identify and discuss ethical aspects related to animal testing and other uses of animals in teaching and resea

CONEN

The course explores the connections between comparative morphology, histology, biomechanics and physiology. The information is present within a phylogenetic framework. The focus lies on how structure and function are integrated, and how they differ between animals with different life styles. Invertebrates and vertebrates will be studied, with an emphasis on the latte
In-depth knowledge of the animals' structure, for example through a systematic overview of different animal groups, their organ systems ar tissue types. Overview of reproductive strategies, life cycles and evolutior

INSUCION

The theoretical teaching is given as lectures and seminars. The practical teaching includes a eld course and a series of laboratory practi based on dissections and physiological experiments. Participation in laboratory practical, eld course and seminars is compulsc

ASSEN

Invertebrates: laborations and eld course 2 credits, and seminars 4 credits. Vertebrates: labs, excursions, seminars and presentations 3 cre and written examination 6 credits. All course parts require active participation.

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a studer be assessed by another method. An example of special reasons might be a certificate regarding special pedagogical support from the disat coordinator of the university.

UPPSALA UNIVERSITET

Syllabus for Ecotoxicolo

Ekotoxikologi

15 credits
Course code: 1BG308
Education cycle: Second cycle
Main field(s) of study and in-depth level: Biology A1N
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses of 120 credits including 60 credits in biology and 30 credits in chemistry. Participated in the advanced course Toxicolo 15 credits. English 6. Pro ciency in English equivalent to the Swedish upper secondary course English
Responsible departmen: Biology Education Centre

LEARNING OUTCOME

The main objective of the course is to give the students knowledge and skills that allow an overall assessment of the fate of foreign chemic in the environment and of their effects on different biological organisation levels. To that end, the conceptual framework introduced during the course in toxicology will be further developed and used
On completion of the course, the student should be able to

- describe sources and fates of chemicals in the environme
- present and explain mechanisms for adverse effects of chemic
- estimate the risk for adverse effects of a chemical on different biological organisation levels based on knowledge about the toxici degradability, and bioavailability of the chemical
- retrieve and critically evaluate toxicological information from different sources (internet-based databases, hand books, scienti articles)
- independently carry out, and present orally and in writing , classi cation and labelling of chemicals dangerous for the environmer
- independently carry out, and present orally and in writing, environmental risk assessment of chemica

CONTENT

Environmental chemistry: This part comprises an overview of different chemical groups of anthropogenic origin present in the environment Focus is on their sources and fates in the environmer

Effects of anthropogenic chemicals: This part comprises negative effects of chemicals on different biological organisation levels (cell, org organism, population, ecosystem) with focus on mechanisms. An experimental study is carried ou

Hazard assessment: This part comprises retrieval and critical evaluation of toxicological information from different sources (internet-base databases, hand books, scienti c articles etc.) for classi cation and labelling of chemicals. The students perform an individual project c classi cation and labelling of chemicals dangerous for the environment according to EU guideline

Environmental risk assessment: This part comprises environmental risk assessments of chemicals and is done as pro

INSTRUCTION

The teaching is given as lectures, seminars, a laboratory practical, exercises and theoretical project work. Active participation in all parts of t laboratory practical and the theoretical project work is compulsory. The course includes integrated communication training

ASSESSMEI

Modules: Theory 8 credits; Project work 7 credits
The theory is examined through written examination. The module project work is examined through written and oral presentations and critical evaluation of other course participants' project reports.

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a studer be assessed by another method. An example of special reasons might be a certi cate regarding special pedagogical support from the disat coordinator of the university.

UPPSALA
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Syllabus for Genes, Brain and Behavior

Gener, hjŠrna och beteende

15 credits
Course code: 1BG344
Education cycle: Second cycle

Main field(s) of study and in-depth level: Biology A1N

Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5

Established

The theory part is examined in a written home examination with access to reading list. The laboratory sessions require written laborator reports. The seminars and workshop require that each student presents the contents in, and initiate the discussion of, a scientic article and list of key concepts that have been discussed during the cours

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a studer be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab coordinator of the university.

UPPSALA UNIVERSITET

Syllabus for Neurobiology

Neurobiologi

15 credits
Course code: 1BG207
Education cycle: First cycle
Main field(s) of study and in-depth level: Biology G2F
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including 1) Molecular Biology and Genetics (10 credits, course completed) and the cours Cell Biology (15 credits, course taken), or 2) Biology A: Patterns and Processes (22.5 credits, course completed), or Biology A: Patter Processes and Science Education (22.5 credits, course completed), and the course Cell Biology (15 credits, course tak
Responsible department: Biology Education Centre

LEARNING OUTCOMES

On completion of the course, the student should be able to

- describe the structure and function of neurons and glia cell
- describe how the nervous system is established and how neurons are connected in neuronal circuits that control bodily functions a behavioral output
- describe the central nervous system, the autonomous nervous system and the peripheral nervous system including the structure a function of the sensory organs and the motor systems. Describe and analyse how the interactions between these neuronal system various neurotransmitters inuence the functions of the body
- describe some of the functions of the nervous system such as the regulation of, movement, motivation, pain, emotions and memo and how these can be dysfunctional in neurological and neuropsychiatric disorde
- analyse a given theoretical problem/case, identify gaps in knowledge and retrieve knowledge from relevant scientic literatur
- give an account for basic and advanced neurobiological techniqu
- identify and apply a suitable method theoretically or practically to address the research question at han
- compile and present a literature study and develop an ability to critically analyse and discuss science by reviewing texts in public a scientic papers
- identify and discuss ethical issues related to scientic activities

CONTENT

The course structure is aimed at in-depth knowledge of the molecular and cellular neurobiology and basic knowledge of general neurobiolo The emphasis is on mammalian neurobiology, particularly humans. Course introduction focuses on neuroanatomy and basic neurocellu mechanisms such as chemical and electrical signaling and neurotransmission. It then describes more advanced functions of the nervous sy from the molecular to the integrated level, such as the different senses (sight, smell, etc.), motor and movement control, reward syste emotions and pain. The course also describes current methods in neuroscience resea

INSTRUCTION

The teaching consists of lectures, laboratory sessions, problem-based learning sessions and literature semi

ASSESSMEN

To pass the course, passed participation in all compulsory parts (laboratory sessions, seminars, literature assignment and presentation, passed continuous exams such as half-time control), and passed results of examination are required. Credit points of the modules are: writ

exam 9 credits, laboratory sessions 2 credits, seminars, 2 credits, the literature assignment and presentation 1 credit, and continuous exam called "duggas", 1 credit

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a studer be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab coordinator of the university.

UPPSALA UNIVERSITET

Syllabus for Plant Structure and Func

VSxternas struktur och funktion

15 credits
Course code: 1BG206
Education cycle: First cycle
Main field(s) of study and in-depth level: Biology G2F
Grading system: Fail (U), Pass (3), Pass with credit (4), Pass with distinction (5
Established: 2007-03-15
Established by:
Revised: 2022-10-17
Revised by: The Faculty Board of Science and Technolog
Applies from: Autumn 2023
Entry requirements:
Completed courses worth 60 credits in biology including 1) The Evolution and Diversity of Organisms (15 credits, course completed), Molecular Biology and Genetics (10 credits, course completed), and the courses Cell Biology (15 credits, course taken) and Physiology (credits, course taken), or 2) Biology A: Patterns and Processes (22.5 credits, course completed), or Biology A: Patterns, Processes and Sc Education (22.5 credits, course completed), and the courses Cell Biology (15 credits, course taken) and Physiology (15 credits, course take
Responsible department: Biology Education Centre

LEARNING OUTCOME

On completion of the course, the student should be able to

* Give examples of several evolutionary innovations essential for the terrestrial plants possibilities to establish and diversify in differe environments
* Account for fundamental physiological/functional, genetic/developmental and phylogenetic/biodiversity aspects of these innovation
* Describe how we, from different perspectives, can illustrate and contribute to a more general understanding of the origin of evolutionar innovations and their underlying genotypic and phenotypic mechanism
* Describe
- fundamental aspects regarding phylogenetic relationships, morphology, anatomy and physiology of plan
- the principles behind historical analysis of relationships and character evolutio
- molecular mechanisms behind important morphological and physiological innovation
- the principles of inference for evolutionary mechanisms based on genomic variatio
- the principles for analysis of DNA sequences and gene expressi
* Independently make use of phylogenetic trees to describe evolutionary patterns and analyse evolutionary causalit
* Perform and show practical skills in microscopy and genetic analys
* Discuss and communicate principles, problems and research results for questions within the framework of the contents of the cour

CONTENT

During evolution, different morphological, structural and physiological innovations have had central importance for the possibility of plants to establish and diversify in different environments. The course focuses on some of these innovations, for example the origin of vascular tis and owers and how different plants adapt to their environment. The course provides a deep understanding of these evolutionary innovation from different perspectives. The subparts include

- Physiological/functional aspects of the evolutionary innovations covered by the cours
- Genetic-developmental biological aspects of evolutionary innovations covered by the cour
- Phylogenetic-biodiversity aspects of evolutionary innovations covered by the cours
- Project work: in connection to one of the involved research disciplines, and related to one or more of the learning outcomes, practical or literature-based independent project is carried out

INSTRUCTION

The teaching consists of lectures, seminars, project work, study visits, and laboratory sessions. Participation in seminars, laboratory sess and project work are compulsory.

ASSESSMEI

Parts of the course: Theory 8 credits, projects 3 credits, laboratory sessions 4 cred

The theory part is examined by written exams, written and oral presentations of parts with PBL character. The project work is examine through a written and an oral presentation including peer-review on another project. Laboratory sessions and seminars require acti participation.

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a stude be assessed by another method. An example of special reasons might be a certicate regarding special pedagogical support from the disab coordinator of the university.