



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Molekylär cellbiologi

Molecular Cell Biology

KMBF01, 15 credits, G2 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED B/K

Date of Decision: 2023-04-18

General Information

Main field: Technology.

Compulsory for: W2

Language of instruction: The course will be given in English

Aim

To provide basic, theoretical and practical, knowledge about the reactivity of chemical compounds and toxicity as well as to highlight the structure and function of living cells, in particular the microorganisms.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- demonstrate significant knowledge and understanding of microbiology
- demonstrate significant knowledge and understanding of microbial genetics and physiology and have molecular knowledge of proteins, metabolism, energy transformations and the reactivity/toxicity of chemical compounds
- demonstrate significant knowledge and understanding of how microbes can be used for solving environmental related problems
- demonstrate significant knowledge and understanding about relationships between reactivity-properties-toxicity of chemical compounds in both individual living organisms and in whole ecosystems
- demonstrate significant knowledge and understanding about toxico-chemical concepts and relationships

Competences and skills

For a passing grade the student must

- show experience of handling microorganisms and enzymes through laboratory practicals
- be able to present, analyse and discuss laboratory results in written reports
- be able to extract the physical and chemical properties of a to the student unknown compound from its chemical structure and relate that to its effect in a biological or ecological system
- carry out and orally present a literature project, in which the different toxicology, biochemistry, and biology parts of the course are integrated, analysed, synthesized, and discussed from a problem-solving perspective

Judgement and approach

For a passing grade the student must

- present orally a critical and interdisciplinary report based on scientific papers
- be able to critically evaluate other students' performance
- able to in a qualified manner judge and value environmental and health risks from a chemical structure with help of obtained knowledge and skills in toxicology

Contents

The course introduces the student to the fascinating world of living cells, in particular bacteria, their genetics and physiology. The course covers enzymatic catalysis, genome of cells, cellular transport mechanisms and techniques to detect, quantify, identify and cultivate different types of microorganisms. In addition, cellular energy metabolism is covered in order to give a deeper understanding of biogeochemical cycles. In connection to energy metabolism aspects of respiration and photosynthesis are exposed.

The laboratory exercises illustrate theoretical aspects of the course such as the reactivity of chemical compounds and toxicity, purification and characterisation of enzymes, and how microorganisms may adapt to new environments through genetic exchange. The diversity of microorganisms and functionality are illustrated by studying the morphology, physiology, and growth behaviour. The genetic expression and regulation is exemplified by determining the physiological adaptation of bacteria under different cultivation conditions. The influences of cytotoxic and antimicrobial compounds are studied on eukaryotic cells as well as on bacteria.

The chemical basis for how health-damaging and environmentally hazardous compounds are absorbed and metabolized by organisms and the mechanisms behind their effects are discussed thoroughly. Emphasis is put on relationships between structure, chemical properties, and biological effects.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Written examination, written reports, oral presentation, and oral opposition.

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.

Parts

Code: 0116. **Name:** Molecular Cell Biology, part 1 .

Credits: 9. **Grading scale:** UG. **Assessment:** Passed written examination.

Code: 0216. **Name:** Molecular Cell Biology, part 2 .

Credits: 6. **Grading scale:** UG. **Assessment:** For a passing the student must complete labs and labreports, pass a written home assignment, and complete and pass an oral presentation and opposition. **Contents:** Detailed laboratory reports. Detailed written account on a molecular level of a compound that affects humans and/or environment. Completed oral scientific in-depth presentation and defense of a focused subject related to the course content. Completed oral opposition of a presentation.

Admission

The number of participants is limited to: No

The course overlaps following course/s: KMB050

Reading list

- Joanne Willey, Kathleen Sandman, Wood Dorothy: Prescott's Microbiology, Eleventh Edition. McGraw-Hill Education, 2019, ISBN: 978-1-260-57002-1.
- Compendium in Biochemistry.
- Olov Sterner: Chemistry, Health & Environment, 2nd Edition. Wiley Blackwell , 2010, ISBN: 978-3-52732582-5.
- Laboratory manual.

Contact and other information

Course coordinator: Docent Lei Ye, Lei.Ye@tbiokem.lth.se

Course coordinator: Docent Ed van Niel, Ed.van_Niel@tmb.lth.se

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