



**Karolinska
Institutet**

Course syllabus for

Biochemical and molecular toxicology, 18 credits

Biokemisk och molekylär toxikologi, 18 hp

This course has been cancelled, for further information see Transitional provisions in the last version of the syllabus.

Please note that the course syllabus is available in the following versions:

Spring2011 , Spring2013 , Spring2015

Course code	4TX010
Course name	Biochemical and molecular toxicology
Credits	18 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Toxicology
Level	AV - Second cycle
Grading scale	Pass with distinction, Pass, Fail
Department	Institute of Environmental Medicine
Decided by	Programnämnd 7
Decision date	2010-10-26
Revised by	Education committee IMM
Last revision	2023-11-09
Course syllabus valid from	Spring 2015

Specific entry requirements

At least the grade Pass for the courses Introduction to toxicology, Target organ toxicology and Health risk assessment of chemicals.

Objectives

On completion of the course, the student should be able to: With respect to knowledge and understanding:

- account for current methods that are used in biochemical and molecular toxicology
- account for alternative methods for toxicological testing
- account for statistical methods within biochemical and molecular toxicology

With respect to skills and ability:

- plan laboratory experiments that can be used to answer biochemical and molecular toxicological issues

- in a safe way implement methods and analyses within toxicological laboratory work including working with toxic chemicals
- analyse and evaluate results of toxicological laboratory work orally and in writing account for and discuss the conclusions
- identify and discuss sources of errors, weaknesses and strengths for different methods within biochemical and molecular toxicology and for alternative methods for toxicological testing
- Identify and apply relevant statistical methods for the analysis of data from laboratory experiments and interpret results and draw statistical conclusions
- identify and formulate issues related to global perspectives within toxicology and the importance of chemical safety for sustainable development,

With respect to judgement and approach:

- make assessments considering scientific and ethical aspects regarding toxicological methodology
- make assessments considering social and ethical aspects regarding the role of toxicology in sustainable development and in a global perspective.

Content

The course is divided in five parts:

Practical laboratory methods in toxicology, 8.5 hp

Grading scale: VU

This part contains theory and practical application of current biochemical and molecular methods within toxicology. The part also includes alternative methods within toxicological research and testing such as in vitro, in silico and alternative animal models. Laboratory technology and laboratory safety is included. The methods that are included can vary from course to course depending on current research issues. Examples of methods that may be included are: molecular biological methods for the analysis of DNA, RNA levels, protein levels and enzyme activity. Cell culture. Different omics and in silico technologies and methods. Methods within epigenetics. Methods for determination of DNA-damage and cell toxicity. Methods within endocrine toxicology. Methods for analysis of dose-effect relationships and relative toxic potency.

Alternative methods for toxicity testing, 1.5 hp

Grading scale: VU

This part contains analysis of need, development, validation and regulatory acceptance of alternative methods (that substitute, improve and decrease the number of vivisections) for toxicological testing.

Global perspectives in toxicology, 1.5 hp

Grading scale: GU

This part includes global perspective in toxicology including the importance of chemical safety for sustainable development and the role of toxicology in this.

Integration of biochemical and molecular toxicology, 5.0 hp

Grading scale: VU

The course is completed with an integrating part where the contents from the parts Toxicological laboratory methods in practice, Alternative methods for toxicological testing and Global perspectives in the toxicology be examined summationally.

Biostatistics, 1.5 hp

Grading scale: VU

This part contains theory and practical application of basic statistical principles and methods that are applied within experimental toxicological research.

Teaching methods

The teaching includes laboratory sessions (including computer exercises), lectures, written reports, oral presentations and group assignments.

Examination

Biochemical and molecular toxicology in practice (8.5 credits) are graded Pass with distinction/Pass/Fail and is examined through individual written laboratory reports. Biostatistics (1.5 credits) is graded Pass with distinction/Pass/Fail and is examined through written examination. Alternative methods for toxicological testing (1.5 credits) are graded Pass with distinction/Pass/Fail and is examined through individual written reports and oral presentations. Global perspective in the toxicology (1.5 credits) are graded Pass/Fail and is examined through written reports and oral presentations. Integration of biochemical and molecular toxicology (5 credits) is graded Pass with distinction/Pass/Fail and is examined through written examination. Final grades in the course are based on the grade for all parts. For the grade Pass in the course a Pass is required for all parts.

Compulsory participation All practical modules including presentations and occasional lectures (indicated in the schedule) are compulsory. The course director decides if and in that case how absence may be compensated. Before the student has participated in compulsory parts or compensated absence in accordance with the course director's instructions, results for each module are not registered in LADOK.

Transitional provisions

The course has been cancelled and was offered for the last time in the fall semester of 2016.

Other directives

The course language is English.

Course evaluation will be carried out in accordance with the guidelines established by the Board of Higher Education.

Oral evaluation in the form of course council meetings will be carried out during the course.

Literature and other teaching aids

Mandatory literature

Hayes, A. Wallace; Kruger, Claire L.

Hayes' principles and methods of toxicology

6. ed. : - xxvi, 2157 p.

ISBN:9781842145364 (hardcover : alk. paper) LIBRIS-ID:16954170

[Library search](#)

Recommended literature

Casarett, Louis J.; Doull, John

Casarett and Doull's toxicology : the basic science of poisons

Klaassen, Curtis D.

8th ed. : New York : McGraw-Hill, 2013. - 1454 s.

ISBN:9780071769235 (Book + DVD) LIBRIS-ID:14293294

URL: [Contributor biographical information](#)

[Library search](#)

Handouts, scientific papers and other assigned literature.