



**Karolinska
Institutet**

Course syllabus for

Molecular Biology 2, 7.5 credits

Molekylärbiologi 2, 7.5 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:

Autumn2011 , [Autumn2013](#) , [Spring2014](#) , [Spring2018](#)

Course code	1BA059
Course name	Molecular Biology 2
Credits	7.5 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Biomedical Laboratory Science
Level	G2 - First cycle 2
Grading scale	Pass with distinction, Pass, Fail
Department	Department of Laboratory Medicine
Decided by	Programnämnd 6 (Biomedicinsk analytiker- och Röntgensjuksköterskeprogrammen)
Decision date	2011-04-18
Course syllabus valid from	Autumn 2011

Specific entry requirements

General entry requirements for higher studies, and specific entry requirements as stated in the programme syllabus for the Biomedical laboratory science education or the equivalent. In addition to this is required that at least 105 higher education credits are passed from semester 1-4 in Biomedical Laboratory Science Programme or the equivalent knowledge. In these credit points should be included Molecular Biology and methods in molecular biology equivalent to at least 7.5 HE credits.

Objectives

The course should give advanced knowledge of the structure and function of the genetic material in eukaryotic cells, and advanced and extended knowledge and skills in molecular biological methodology. On completion of the course, the student should be able to: - at a detailed level, account for the organisation and contents of the human genome - account for causes for DNA damages and genetic changes and explain the different mechanisms that underly these changes and how cells handle this - at a molecular level account for how changes in the genome can result in genetic diseases, including cancer diseases - account for various types of vector systems and explain how they can be used for - explain different methods to identify, isolate and analyze gene-sequences - explain different methods to analyze gene products - independently, based on method descriptions, be able to plan and perform commonly

occurring molecular biological methods; such as purifying nucleic acids, PCR and hybridization - critically, interpret, evaluate and compare one's own data with expected results and general principles

Content

The theoretical part of the course, that basically, comprises lectures, seminars and group assignment, aims at advancing the knowledge in molecular biology and methods in molecular biology. Important parts within molecular biology are the organization, function and contents of the human genome. Likewise, what is behind instability and changes in the genome, and what the consequences may be at a cell and individual level. In this part, an introduction to cancer genetics is also included. Important parts within molecular biological methodology are prokaryotic and eukaryotic vector systems, and how they are used. Methods for isolation and analysis of genes such as cloning, PCR, sequencing and mutation analyses are reviewed, as well as methods for analysis of gene products such as blotting and hybridization techniques, RT-PCR and micro array. The laboratory part of the course comprises laboratory sessions and seminars. Laboratory parts that are included are preparation of nucleic acid, real-time PCR including primer design, immunohistochemistry and Western blot. The following parts are included: Theory and Methods in Molecular Biology, 6 HE credits Laboratory sessions, 1.5 HE credits (two-graded scale)

Theory and methods in molecular biology, 6.0 hp

Grading scale: VU

The theoretical part of the course intends to deepen and increase the knowledge in molecular biology and methodology. Important parts in molecular biological theory are a deepening in the human genome's organization, function and content. Mechanisms that cause instability and changes in the genome, and how it influences the function of the cell. How genes expression can be affected in different ways including chromatin organization, epigenetics and non-coding RNA.

Molecular biology methodology includes how to isolate and analyze genes in different ways. Among the methods discussed are linkage analyses, cloning, PCR, sequencing and mutation analyses. Here are also included different methods to analyse gene products such as blotting, hybridisation techniques and analyses of protein interactions, RT-PCR, microarray, massspectrometry. Comparison of methods is made and which information one can obtain from different methods is discussed. Work in databases is included during primer design.

Laborationer experiments, 1.5 hp

Grading scale: GU

A large part of the course consists of a laboratory project, where the student will write a project plan to be approved by the supervisor before the laboratory work begins. During the lab-project, the student works independently with the analysis and interpretation of the results. The laboratory project is presented in writing in a report written according to scientific structure. This also includes critically reviewing another student's report.

Laboratory methods included in the project are purification of nucleic acid, RT-qPCR including primer design, immunohistochemistry and Western blot. The work is documented continuously in a workbook

Teaching methods

The teaching is given as lectures, laboratory sessions, group assignments and seminars. Students work during parts of the course in groups on molecular biological issues and search information from literature, scientific articles and internet. The student independently should plan the laboratory parts and

document laboratory work in own workbook.

Examination

The course is examined by giving the student a number of questions. The answers are submitted in written form and finally discussed in an oral examination. The laboratory part is examined with regard to planning and performance of the laboratory work, and submission of a workbook, or a laboratory report at the end of the laboratory session. Seminars and laboratory sessions are compulsory. In case of absence, an agreement concerning compensation is made between the student and the responsible teacher. Students who have not passed the regular examination are entitled to participate in five more examinations. If the student is not approved after four examinations, he/she is recommended to retake the course at the next regular course date and may, after that, participate in two more examinations. If the student has failed six examinations/tests, no additional examination or new admission in the course is given. The number of times that the student has participated in one and the same examination is regarded as an examination session. Submission of a blank examination is regarded as an examination. An examination for which the student registered but not participated in, will not be regarded as an examination. However, a maximum of 6 examinations.

Other directives

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

Literature and other teaching aids

Strachan, Tom; Read, Andrew P.; Strachan, T.

Human molecular genetics

4. ed. : New York : Garland Science, c2011 - xxv, 781 p.

ISBN:978-0-8153-4149-9 (pbk.) LIBRIS-ID:11816769

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