

Advanced Eukaryotic Cell Biology 2 - Cellular Mechanisms in Development and Cancer

Title	Advanced Eukaryotic Cell Biology 2 - Cellular Mechanisms in Development and Cancer
Semester	F2025
Master programme in	Chemical Biology / Molecular Health Science
Type of activity	Course
Teaching language	English
Study regulation	Read about the Master Programme and find the Study Regulations at ruc.dk Læs mere om uddannelsen og find din studieordning på ruc.dk

REGISTRATION AND STUDY ADMINISTRATIVE

Sign up for study activities at [stads selvbetjening](#) within the announced registration period, as you can see on the [Studyadministration homepage](#).

When signing up for study activities, please be aware of potential conflicts between study activities or exam dates.

Registration

The planning of activities at Roskilde University is based on the recommended study programs which do not overlap. However, if you choose optional courses and/or study plans that goes beyond the recommended study programs, an overlap of lectures or exam dates may occur depending on which courses you choose.

Number of participants The Master Programme/Institute reserves the right to cancel the course if fewer than 8 studentes are registered for the course.

ECTS 5

Responsible for the activity Pia Nyeng (pnycng@ruc.dk)

Head of study Lotte Jelsbak (ljelsbak@ruc.dk)

Teachers

Study administration INM Registration & Exams (inm-exams@ruc.dk)

Exam code(s) U60186

ACADEMIC CONTENT

Overall objective Theoretical course in advanced eukaryotic cell biology aiming to give the students an introduction to the regulation of intercellular interactions, with an emphasis on embryonic development, stem cells and cancer.

Content:

We will discuss eukaryotic cells in their social context. The aim is to provide an overview of how eukaryotic cells interact with each other and the immediate environment to form and maintain tissues, organs and organisms. We will also discuss how these processes are dysregulated in disease (mostly cancer). The course is mostly focused on mammalian cellular biology.

Detailed description of content In problem-solving workshops we will practice how to interpret research data, form hypotheses, and design experiments within cell and tissue biology, enabling students to develop ideas for master thesis projects in cell & molecular biology.

Topics include: Methods and models in cell biology, Cell adhesion and the extracellular matrix, Cell cycle regulation, Cell growth, Programmed cell death, Cancer, Mitochondrial function and genetics, Tissue cell biology, Embryonic development, and Stem cells and cell replacement therapy

Course material and Reading list All course literature is in English. "Molecular Biology of the Cell", Alberts et al. 6.ed., Garland Science 2015. ISBN 9780815344643.

The curriculum also includes research papers, reviews and movies, which will be mentioned in the course schedule on Moodle.

Study intensity:

Overall plan and expected work effort

- Exam 3 hrs
- Lectures 26 hrs

- Problem solving and theoretical exercises 6 hrs
- Question time 2 hrs
- Preparation 98 hrs

- Total 135 hrs

Teaching and learning activities

- Lectures, Interactive quizzes, Problem solution in groups

Format

The course includes formative evaluation based on dialogue between the students and the teacher(s).

Evaluation and feedback

Students are expected to provide constructive critique, feedback and viewpoints during the course if it is needed for the course to have better quality. Every other year at the end of the course, there will also be an evaluation through a questionnaire in SurveyXact. The Study Board will handle all evaluations along with any comments from the course responsible teacher.

Furthermore, students can, in accordance with RUCs 'feel free to state your views' strategy through their representatives at the study board, send evaluations, comments or insights from the course to the study board during or after the course.

The course includes a program with the following main topics within eukaryotic cell biology. Each topic will be treated during lectures with active participation elements and most topics are concluded with a problem solving session.

Programme

- 1) Methods and models in advanced cell biology
- 2) Mitochondrial function and genetics
- 3) Cell adhesion and extracellular matrix
- 4) Regulation of cell number and size
- 5) Embryonic development and maintenance of tissues and organs

A more detailed program is provided in Moodle

ASSESSMENT

After completing the course, the students will be able to:

- explain the organization and function of mitochondria, cellular junctions, extracellular matrix, and tissues of eukaryotic organisms
- explain the function and regulation of processes in and between eukaryotic cells including adhesion, signaling, cell cycle, differentiation, growth and apoptosis
- describe and discuss the organization, function and regulation of multi-cellular systems, including embryo development, and homeostasis/cancer in adult tissues
- discuss how experiments have contributed to the current principles of multicellular biology
- compare the structure and function of proteins and molecules in eukaryotic cells, such as adhesion proteins, extracellular matrix proteins, receptors and signaling molecules
- describe, analyze and evaluate results from cell biology experiments
- design new experiments addressing eukaryotic cell biology questions
- complete a theoretical review of the latest scientific literature in advanced eukaryotic cell biology, with an emphasis on development and cancer
- formulate new scientific hypotheses as the starting point for a thesis project in eukaryotic cell biology

Overall learning outcomes

Individual written invigilated exam

Form of examination

The duration of the exam is 3 hours.

Permitted support and preparation materials for the exam: Own notes (maximum 10 A4 size pages). Dictionaries and non-programmable pocket

calculator.

Assessment: 7-point grading scale

Form of Re-examination
Type of examination in special cases

Samme som ordinær eksamen / same form as ordinary exam

Individual written invigilated exam consisting of a main question of 50 points and 5 minor sub-questions of 10 points each. Questions are essay-style and will include data interpretation.

Evaluation criteria: It will be assessed to which degree the student:

Examination and assessment criteria

- Describes and explains the organization and function of mitochondria, cellular junctions, extracellular matrix and tissues of eukaryotic organisms
- Describes and explains the function and regulation of processes in and between eukaryotic cells including adhesion, signaling, cell cycle, differentiation, growth and apoptosis
- Describes and discusses the organization, function and regulation of multi-cellular systems, including embryo development, and homeostasis/cancer in adult tissues
- Describes and compares the structure and function of proteins and molecules in eukaryotic cells, such as adhesion proteins, extracellular matrix proteins, receptors and signaling molecules
- Proposes experimental designs and methods to address specified eukaryotic cell biology questions
- Describes, analyzes, and evaluates given results/data from cell biological experiments and uses own conclusions to formulate scientific hypotheses
- Uses appropriate scientific language and terms in English
- Fulfills all formal exam requirements as described on the front page of the exam set

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