

Schedule for Cell Biology, 15 hp, spring 2021 (3MB038 & 5MO100)

Course dates: Start January 18 – end March 23, 2020. (Update 14/1 -21)

Lecture hall: Jan 18 – Feb 17, (depending on restrictions!) 6A103 (“Astrid Fagreus salen”), building 6A.

Laboratories: Feb 22 – March 19: Green lab – Undervisningsnod J1 (building 6L, top floor, entry by the southern entrance of Dept. of Molecular Biology)

Course leader: Martin Gullberg 090-785 67 03, martin.gullberg@umu.se

Teachers for the practical part of the course: Anna Gharibyan, anna.gharibyan@umu.se
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Martin Gullberg

Course secretary: Lina Helgesson, lina.helgesson@umu.se

Literature/text book: Alberts et al., Molecular Biology of the Cell, (5th or 6th edition)

Mandatory exercises:

Practical exercises (i.e. experimental work and "Practical training in quantitative cell biology"). Note that also scheduled introductions to these exercises are mandatory.

The following rules apply to all mandatory activities of the course:

- i)** In case of absence from a mandatory exercise, the student should notify the course leader as soon as possible. The reason for absence must to be stated in this mail.
- ii)** Provided that there is a valid reason (e.g. illness or something else that give the right for absence from an ordinary job), students will be given the opportunity to perform a complementary exercise within four weeks.
- iii)** Students must report by mail to the course leader the intention to participate in a complementary exercise.
- iv)** In case of discontinuation of the course; this should be reported to the course secretary.

Lecture handouts (based on materials originally produced by Dr. Per Holmfeldt)

Introduction to the cell biology course (6 figures)

Lecture 1: How to study cells (29 figures)

Lecture 2: Membrane biology and cellular organelles (30 figures)

Lecture 3: Cell organelles and intracellular trafficking (30 figures)

Lecture 4 & 5: Cellular communication part I & II (54 figures)

Lecture 6 & 7: Cell cycle and cell death part I & II (54 figures)

Lecture 8 & 9: Cytoskeleton part I & II (56 figures)

Lecture 10: Cell adhesion and ECM (28 figures)

Lecture 11: Cytoskeleton, cell cycle & disease (30 figures)

Lecture 12: Summary lecture with a tumor biology perspective (36 figures)

Schedule abbreviations: **PowerPoint VR** – PowerPoint Voice Record files downloadable from **Cambro** (“Resources” / folder “Lectures“ / folder “Lectures Voice Record pptx files”)

Locality: TBA – Locality will be announced at Cambro

Zoom — Meeting URL (entire course): <https://umu.zoom.us/j/68471581441>

Week 3 (course week 1)

Mon 18/1, 10.00-11.00 (**Zoom**): Roll call and introduction to study question/mini-case sessions
(PowerPoint VR): Lecture 1: How to study cells

Tues 19/1, (PowerPoint VR): Lecture 2: Membrane biology and cellular organelles

Wed 20/1, (PowerPoint VR): Lecture 3: Cell organelles and intracellular trafficking

Thu 21/1: 13.00-15.00 (**Zoom**): “Flipped class room” & question time, study questions week 1
Time allocated to work on the study questions

Fri 22/1, 12.00-16.00 (**Zoom**): De-briefing of study questions week 1

Week 4 (course week 2)

- Mon 25/1, (PowerPoint VR): Lecture 4: Cellular communication I
- Tue 26/1, (PowerPoint VR): Lecture 5: Cellular communication II
- Wed 27/1, Time allocated to work on the study questions
- Thu 28/1, 13.00-15.00 (Zoom): “Flipped class room” & question time, study questions week 2
Time allocated to work on the study questions
- Fri 29/2, 12.00-16.00 (Zoom): De-briefing of study questions week 2

Week 5 (course week 3)

- Mon 1/2, 13.00-16.00 (Zoom): Lecture 6: Cell cycle I
- Tue 2/2, 13.00-16.00 (Zoom): Lecture 7: Cell cycle II and cell death
- Wed 3/2, 13.00-16.00 (Zoom): Lecture 8: Cytoskeleton I
- Thu 4/2, 13.00-15.00 (Zoom): “Flipped class room” & question time, study questions week 3
Time allocated to work on the study questions
- Fri 5/2, 12.00-16.00 (Zoom): De-briefing of study questions week 3

Week 6 (course week 4)

- Mon 8/2, 13.00-16.00 (Zoom): Lecture 9: Cytoskeleton II
- Tue 9/2, 13.00-16.00 (Zoom): Lecture 10: Cell adhesion and ECM
- Wed 10/2, 13.00-16.00 (Zoom): Lecture 11: Cytoskeleton, cell cycle & disease
- Thu 11/2, 10.00-12.00 PPT Arbetsliv och karriär, biomedicinstudenter, Victoria Sörensson. 6A103
13.00-15.00 (Zoom): “Flipped class room” & question time, study questions week 4
Time allocated to work on the study questions
- Fri 12/2, 12.00-16.00 (Zoom): De-briefing of study questions week 4

Week 7 (course week 5)

- Mon 15/2, 13.00-16.00 (Zoom): Lecture 12: Summary lecture with a tumor biology perspective
- Tue 16/2, Time allocated to final preparation before the exam
14.30 – 16.30 (Zoom): “Flipped class room”, time for review and questions
- Wed 17/2, Time allocated to final preparation before the exam
14.30 – 16.30 (Zoom): “Flipped class room”, time for review and questions
- Thu 18/2, Time allocated to final preparation before the exam
- Fri 19/2, 09.00-15.00 **Exam** (theoretical part of the course): Östra Paviljongen

Re-exam: time and location to be announced

Preliminary schedule for the practical part of the course

This part involves the following exercises:

I. Practical training in quantitative cell biology, which serves as an entry point for students to explore some of the key numbers of cell biology and make connections with previous course segments

As examination, each student should submit i) a brief vignette which illustrate some quantitative aspect of cell biology and ii) a detailed account of calculations related to a specified task.

II. Experimental work that involves model systems and methodology for cell biological studies. This includes training in independently planning experiments and analyses.

Examination is based on participation in the practical exercises and individual lab reports.

Week 8 (course week 6, week 1 of the practical part of the course)

Optional time and locality: Ron Milo lecture 1 - 6: "Quantitative reasoning in molecular and cell biology". Search YouTube: Ron Milo Cell Biology by the Numbers, 2014 class, Lecture 1 (Lecture 2, Lecture 3 etc). It will help you a lot to make notes while viewing these lectures.

Mon 22/2: (PowerPoint VR): Introduction to course activities termed "Practical training in quantitative cell biology" and lecture series "Cell biology by the numbers", by Ron Milo

11.00 – 13.00 (Zoom): **Introduction to the laboratory course: Safety issues**

Introduction to Lab I

Lab safari, pipettes, centrifuges, cytospin etc.

15.00 – 17.00 **Gang A: initiation of Lab I**

Tue 23/2: 09.00 -16.00 Gang A: continuation of Lab I (Day 2)

15.00 – 17.00

Gang B: initiation of Lab I

Wed 24/2: 09.00 -16.00: Gang A: Fluorescence microscopy, Lab I, (Day 3)

09.00 -16.00:

Gang B: continuation of Lab I (Day 2)

15.00 – 17.00

Gang C: initiation of Lab I

Thu 25/2: 09.00 -16.00: Gang B: Fluorescence microscopy, Lab I, (Day 3)

09.00 -16.00:

Gang C: continuation of Lab I (Day 2)

Fri 26/2: 09.00 10.30: **Introduction to Lab II** (Lecture hall 6A103)

10.30 – 17.00:

Gang C: Fluorescence microscopy, Lab I, (Day 3)

Sat 27/2: 09.00 14.0 **Gang A-C:** Optional microscopy exercises for students perceiving themselves as covid-19 risk group. This provides an opportunity for analysis of samples prepared during Lab 1 under conditions of "extraordinary" social distancing.

Week 9 (week 2 of the practical part of the course)

Optional time and locality: "Practical training in quantitative cell biology", task 1 - 4.

Mon 1/3, 08.30 – 12.00: **Gang A: initiation of Lab II**

Tue 2/3, 09.00 – 16.00: Gang A: continuation of Lab I (Day 2, cell staining)

13.00-15.00: **Gang B and C, Practical training in quantitative cell biology, session I: Discussion of task 1-4 (6A103)**

Wed 3/3, 08.30 – 12.00: **Gang B: initiation of Lab II**

12.30 – 17.00: Gang A: continuation of Lab II (Day 3, Microscopy)

Thu 4/3, 09.00 – 15.00: Gang A: continuation of Lab II (Day 4, Microscopy)

09.00 – 16.00:

Gang B: continuation of Lab II (Day 2, cell staining)

Fri 5/3, 12.30 – 17.00: Gang B: continuation of Lab II (Day 3, Microscopy)

13.00-15.00: **Gang A: Practical training in quantitative cell biology, session I: Discussion of task 1-4 (6A103)**

Sat 6/3: 09.00 14.0 **Gang A-C**: Optional microscopy exercises for students perceiving themselves as covid-19 risk group.

Week 10 (week 3 of the practical part of the course)

Optional time and locality: "Practical training in quantitative cell biology", task 5 - 8.

Mon 8/3, 08.30 – 12.00: **Gang C: initiation of Lab II (Day 1)**
 09.00 – 15.00: Gang B: continuation of Lab II (Day 4, Microscopy)

Tue 9/3, 09.00 – 16.00: Gang C: continuation of Lab II (Day 2, staining)

Wed 10/3, 09.00 – 13.00: Gang C: continuation of Lab II (Day 3, Microscopy)
 09.00 – 11.00: Opportunity for consultation concerning "Practical training in quantitative cell biology" (6A103)

Thu 11/3, 09.00 – 15.00: Gang C: continuation of Lab II (Day 4, Microscopy)
 09.00 – 17.00: Gang A, B & C: How to analyse and interpret flow cytometry data
 At this occasion files of flow cytometry will be distributed to each group.
 These data should be included into the report on Lab 3

Fri 12/3, 08.00 - 11.00: Cleaning of laboratory
 15.00 - 17.00: Instructions for report and seminars (Lab II): How to prepare figures and interpretation of data (6A103)

Sat 13/3: 09.00 14.0 **Gang A-C**: Optional microscopy exercises for students perceiving themselves as covid-19 risk group.

Week 11 (week 4 of the practical part of the course)

Optional time and locality: "Practical training in quantitative cell biology", task 9 - 14. During this week students are expected to work on tasks that serve as examination of this course segment, namely i) a brief vignette which illustrate some quantitative aspect of cell biology and ii) a detailed account of calculations related to Task 14.

Mon 15/3: 09.00 – 13.00: Analysis of data and preparation of lab seminars
 09:00-13:00 Spare time for microscopy for all gangs.
 13.00-15.00: Practical training in quantitative cell biology, session II:
 Discussion of task 5-8 (6A103)
 15.00-17.00: Opportunity to consultation concerning lab II report: How to prepare figures and interpretation of data (6A103)

Tue 16/3, 12.00 – 17.00: **Gang A: lab seminar** (6A103)
 12.00 – 17.00: Gang B and C: Analysis of data and preparation of lab seminars

Wed 17/3, 12.00 – 17.00: **Gang B: lab seminar** (6A103)
 09.00 – 17.00: Gang C: Analysis of data and preparation of lab seminars

Thu 18/3, 12.00 – 17.00: **Gang C: lab seminar** (6A103)
 09.00 – 11.00: PPT Arbetsliv och karriär, biomedicinstudenter, Victoria Sörensson.
 Examinationstillfälle och därmed obligatorisk närvaro. Lokal: Thymine, (Plan 1, 6K, Dept. of Molecular Biology, close to the lunch room, but one level up)

Fri 19/3, 08.00 – 13.00: Work on Lab report and the examination task for "Practical training in Quantitative cell biology"
 13.00-15.00: Practical training in quantitative cell biology, session III: Discussion of task 9 – 14. At this session, there is also time for questions concerning the obligatory report on this course segment. (6A103)

Week 12 (week 5 of the practical part of the course)

Mon 22/3: Work on Lab report and report on "Practical training in Quantitative cell biology"

Tue 23/3: 17.00 Deadline lab report II
 17.00 Deadline for reports on "Practical training in quantitative cell biology"