Schedule: Applied Cell Biology, 7.5 hp, autumn 2021 (5MO012)

Course time: November 2 to December 2, 2021. (version 1/10, 2021)

Lecture halls: **6A R1** ("Astrid Fagreus hörsal"), located in building 6A close to the entrance of the Dept. of Immunology.
6E R-1 Hörsal **E04**, Building 6E, Floor -1
TBA: "To Be Announced"

Zoom link (valid the entire course):
Meeting URL: https://umu.zoom.us/j/67674225298

Laboratories: 6L, Floor 1, Gröna och röda labbet and 6L, J0, Floor 0, Vita labbet

Course leader: Victoria Shingler (VS), vicky.shingler@umu.se
Laboratory instructor: Martin Gullberg (MG), martin.gullberg@molbiol.umu.se
Lecturer: Martin Gullberg (MG), martin.gullberg@molbiol.umu.se
Course secretary: Ingela Nilsson. 090-785 28 69, ingela.nilsson@umu.se
Literature/text book: Alberts et al., Molecular Biology of the Cell, (5th or 6th edition)

Link to Schedule on cloud.timeedit.net:
https://cloud.timeedit.net/umu/web/public1/ri1w7X3Q2QZZYYQv5Q072211y7Y7.html

Mandatory exercises:

I) Calculation exercises for technical biologists. These exercises comprise 14 tasks, which are aimed to develop the ability to apply and integrate knowledge in several fields of natural science. As a preparation, student view the recorded lecture series "Cell biology by the numbers" by Ron Milo (Weismann Institute, Israel). Students may solve these tasks individually or as a group activity. Guidance will be provided by teachers at scheduled occasions termed "flipped class room".

II) Practical exercises. Students will learn how to handle and culture yeast cells and how to analyze cell growth

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 and mini-case questions (based on materials originally produced by Dr. Per Holmfeldt)
Introduction to the course (6 figures)
Lecture 1: Cell biology – basic concepts (24 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)

Lectures by Ron Milo (Weismann Institute, Israel): "Cell biology by the numbers"
Recorded lecture 1: Quantitative reasoning in molecular and cell biology
Recorded lecture 2: Size, mass and geometry
Recorded lecture 3: Concentrations and absolute numbers
Recorded lecture 4: Energies and Forces
Recorded lecture 5: Rates and durations

Schedule (Text in green: Scheduled activities related to laboratory activities)

Italic text in purple: Scheduled activities related to Ron Milo lectures and practical calculation exercises

Abbreviations: PowerPoint VR – Lecture by PowerPoint Voice record files downloaded at **Canvas**
Locality: TBA – Locality will be announced by mail and/or at Canvas
Zoom – Zoom meeting. Meeting ID xxxxxx

Course week 1

TUE 2/11 **08.00-09.00 (Zoom):** Roll call. Introduction to theoretical and practical parts of the course.
09.00-11.00 (Zoom): Lecture 1 – Basic concepts in modern biology.
12.00-13.00 (E04): *Introduction to lecture series "Cell biology by the numbers" and activities denoted "Flipped class room – calculation exercises for technical biologists"(MG)*
15.00-16.00 (E04): Flipped class room – opportunity for questions and consultation
Unscheduled time: Watch *Ron Milo, lecture 1: "Quantitative reasoning in molecular and cell biology". Search YouTube: Ron Milo Cell Biology by the Numbers, 2014 class, Lecture 1*

WED 3/11 **08.00-11.00 (6A R1): Lecture 2 –** Membrane biology and cellular organelles
12.00-13.00 (6A R1): Introduction to Lab 1: Isolation of yeast clones. Distribution of yeast strain, agar plates and other materials.
13.30-14.30 (6A R1): Flipped classroom - Repetition of basic concepts of modern biology
14.30-15.30 (6A R1): Flipped classroom – Consultation concerning Lab 1
16.00 (locality: students own choice**):** Initiation of Lab 1

THU 4/11 **08.00-11.00 (E04): Lecture 3 –** Cell organelles and intracellular trafficking
12.00-16.00 (6A R1): Debriefing of mini-cases - Repetition of basic concepts of modern biology
Flipped classroom: consultation concerning practical exercises
Unscheduled time: Prepare for case de-briefing week 1 (MON 6/11)

FRI 5/11 **08.00-09.00 (locality**: students own choice**):** Lab 1: Evaluation of plates with single cell streaks. In case of poor results, prepare single streaks on two new plates
10.00-12.00 (Zoom): Question time, mini-cases week 1
Unscheduled time: Prepare for case de-briefing week 1 (MON 6/11) */ watch Ron Milo lecture 2:*

Course week 2

MON 8/11 **08.00-09.00 (locality**: students own choice**):** Lab 1: Evaluation of plates with single cell streaks. In case of poor results, prepare single streaks on two new plates
13.00-16.00 (6A R1): De-briefing of mini-cases, week 1
Unscheduled time: Prepare for case de-briefing week 1

TUE 9/11 **08.00-11.00 (6A R1**): **Lecture 4 –** Cellular communication I
12.00-13.00 (6A R1) Introduction to Lab 2: Estimation of number of live yeast cells by viable count. Distribution of materials.
14.00-15.00 (6A R1): Flipped classroom – Consultation concerning Lab 2
15.00-17.00 (Gröna och Röda labbet or students own choice**):** Initiation of Lab 2
Unscheduled time: Prepare for case de-briefing

WED 10/11 **08.00-11.00 (Zoom): Lecture 5 –** Cellular communication II
Unscheduled time: Prepare for case de-briefing / *watch Ron Milo lecture 3*

THU 11/11 **13.00-15.00 (6A R1**): Question time, mini-cases week 2 & *calculation exercises, Task 1-4*
15.00-17.00 (6A R1 or students own choice**):** Lab 2, scoring of plates used for viable count
Unscheduled time: Prepare for case de-briefing / *watch Ron Milo lecture 4 & calculation exercises, Task 1-4*
12.00: Dead line for peer-review of "General questions concerning Disinfection and sterilization"

FRI 12/11 **14.00-17.00 (E04):** De-briefing of mini-cases, week 2
Unscheduled time: Prepare for case de-briefing / *watch Ron Milo lecture 5* / Lab 2, scoring of plates used for viable count
24.00 Dead line report on Lab 1 and General questions concerning Disinfection and sterilization"

Course week 3

MON 15/11 **08.00-11.00 (E04)**: **Lecture 6 –** Cell cycle I
13.00-14.00 (E04): Introduction to Lab 3: Monitoring growth and fermentation by brewer yeast.
15.00-17.00 (Vita labbet): Lab 3, initiation of lab: Inoculation, hydrometer measurement and microscopy.

TUE 16/11 **08.00-11.00 (E04)**: **Lecture 7 –** Cell cycle II and cell death
12.00-13.00 (E04): Flipped classroom – Consultation concerning Lab 3
14.00-17.00 (Vita labbet): Lab 3, 24 h time point, hydrometer measurement and microscopy.
24.00 Dead line report on Lab 2

WED 17/11 **09.00-10.00 (E04):** ***Session I: "Flipped class room" – calculation exercises, Task 1-4***
11.00-13.30 (Vita labbet): Lab 3, 48 h time point, hydrometer measurement and microscopy.
14.00-17.00 (E04): **Lecture 8 –** Cytoskeleton I
Unscheduled time: Prepare for case de-briefing / *calculation exercises, Task 5-8*

THU 18/11 **11.00-13.30 (Vita labbet)**: Lab 3, 72 h time point, hydrometer measurement and microscopy.
15.00-17.00 (Zoom): Question time, mini-cases week 3 and *calculation exercises, Task 5-8*
Unscheduled time: Prepare for case de-briefing / *calculation exercises, Task 5-8*

FRI 19/11 **10.00-12.30 (Vita labbet)**: Lab 3, 96 h time point, hydrometer measurement and microscopy.
13.30-17.00 (6A R1): De-briefing of mini-cases, week 3
Unscheduled time: Prepare for case de-briefing / *calculation exercises, Task 5-8*

Course week 4

MON 22/11 **09.00-12.00 (E04)**: **Lecture 9 –** Cytoskeleton II (MG)
13.00-15.00 (6A R1): ***Session II: "Flipped class room" – calculation exercises, Task 5-8***
Lab 3, consultation on how to write the report
Unscheduled time: *calculation exercises, Task 9 – 13*

TUE 23/11 **14.00-15.00 (6A R1)**: *Consultation: guidelines concerning suitable topics for a vignette*
Unscheduled time: Prepare for case de-briefing / *calculation exercises, Task 9-13, and vignette*

WED 24/11 **24.00** Dead line: report on Lab 3
Unscheduled time: Prepare for case de-briefing / *calculation exercises, Task 9-13, and vignette*

THU 25/11 **09.00-11.00 (6A R1)**: ***Session III: "Flipped class room" – calculation exercises, Task 9-13***
13.00-15.00 (6A R1): Question time, mini-cases, week 4
Unscheduled time: Prepare for case de-briefing / *calculation exercises, Task 9-13, and vignette*

FRI 26/11 **13.00-17.00 (6A R1)**: De-briefing of mini-cases, week 4
Unscheduled time: Prepare for case de-briefing / *calculation exercises, Task 9-13, and vignette*

Course week 5

MON 29/11 **14.00-16.00 (6A R1):** Review of course content and questions

Unscheduled time: Prepare for exam /*calculation exercises and vignette*

TUE 30/11 Prepare for exam /*calculation exercises and vignette*

WED 1/12 **14.00-16.00 (6A R1):** Review of course content and questions

THU 2/12 **08.00-12.00** (Östra paviljongen) Theoretical Exam)
24.00 Dead line: ***Report on calculation exercises for technical biologists & vignette***