

LIFS2240 Cell Biology Laboratory Course Outline

The course LIFS 2240 Cell Biology Laboratory comprises altogether five laboratory exercises and their associated tutorial sessions.

The aims of laboratory exercises are three-fold: 1) to enhance the comprehension of the students in the practical sense of what they have learnt in lectures; 2) to provide the students some hands-on experience in the fields of Cell Biology, and 3) to equip the students with knowledge that will be practically useful in advanced studies.

Every experimental exercise is associated with one tutorial, where background principles and practical protocols related to the particular experiment will be presented. There will also have some discussion on the experimental results obtained from the laboratory exercise.

Taken together, this course is aimed to help students to acquire various basic laboratory techniques in cell biology, and to develop skills in laboratory write-up by presenting experimental data in a formal laboratory report format or worksheet. Students will also learn how to collaborate effectively to perform the experimental tasks in a group.

Learning Outcomes

Upon completion of this course, students will be able to:

1. Demonstrate basic laboratory techniques in cell biology:
 - Describe and differentiate cellular structures of various cell types, including mammalian cells, plant cells, in light microscopy
 - Mammalian cell culture techniques and quantification of cell density by hemocytometer
 - Cell Fractionation by centrifugation, and protein assay and enzymatic assay of cell fractions
 - Study of membrane permeability by plant cells
 - Bacterial cell culture techniques and transformation
2. Qualitatively and quantitatively analyze experimental data and apply cell biology knowledge to interpret the results
3. Write formal laboratory reports
4. Work and coordinate effectively in a group to accomplish laboratory-based tasks

Teaching Team

Course Coordinator and Tutorial Instructor

Laboratory Instructor

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Course Schedule
 <Spring Semester 2023>

	Tutorial	Laboratory
Venue	Room G010, CYT	Room 4160 (Lift 33)
Time	Wednesday, 18:00 – 18:50	Thursday, 13:00 – 16:50 (except follow-up*)
Introduction	16 February	
Exercise 1	Microscopy	
	22 February	23 February
Exercise 2	Membrane Permeability	
	1 March	2 March
Exercise 3	Cell Culture	
	8 March	9 March
		*Follow-up: 10, 13, and 15 March (10:30 – 11:20 TBC)
	15 March	16 March
Exercise 4	Cell Fractionation and Quality Checking	
	22 March	23 March
	29 March	30 March
Exercise 5	Complementation of β-galactosidase in <i>Escherichia coli</i> by transformation	
	12 April	13 April
		*Follow-up: 14 April (10:30 – 11:20)
Final Examination	To be confirmed	

Note:

- Students are required to attend ALL tutorial and regular laboratory sessions.
- *Only two students from each group are required to attend the follow-up sessions.

Course Assessment

The course will be **in P/F grade**. The grade for this course will be determined as follows:

Method of Assessment	Contribution to Final Grade	Learning Outcomes to be Assessed
Tutorial Quizzes	12%	1,2
Laboratory Write-ups	25%	2,3
Laboratory Performance	14%	1,2,4
Final Exam	49%	1,2

Tutorial Quizzes

Good practice always is to study the laboratory manual before attending the lab sessions. Good preparation is encouraged and is assessed by quizzes, which are held in the tutorial using the Canvas quiz function. *The quiz is on a sudden and random basis* and will consist of multiple-choice questions to assess the experimental details and theory of that laboratory session.

Final Examination

The format and details of the final examination are yet to be confirmed. In principle, it will be a written examination to test your understanding of the principles and techniques studied in the experimental exercises. It will be very important for you to be able to apply those principles you learnt in the experiments. The date and venue of the examination will be announced later.

Laboratory Write-up

Each student is required to submit FIVE laboratory write-ups in different formats:

Exercise	Format of Write-ups	Submission Deadline
1	Laboratory Report	2 Mar
2	Worksheet	9 Mar
3	Laboratory Report	23 Mar
4	Worksheet	6 Apr
5	Worksheet	20 Apr

Apart from the content (see guidelines below), each write-up should contain Course Code, Submission Date, Student Name, Student Number, Group Number, and Title of the Exercise. The write-ups should be submitted in **PDF format** on Canvas by the deadline. **Any late submission would have 20% of the final mark deducted per day after the deadline.** These write-ups will be marked by different Teaching Assistants (TAs). If you have any questions on the marking, you should read the comments first and contact the corresponding TA within one week of mark release.

Note that all write-ups **MUST BE YOUR OWN WORK** writing in your own words. **DO NOT COPY** anything from others, previous submissions, course notes, books, or the internet. Academic integrity and honesty are key values at HKUST. A student who is found cheating (i.e. making up data) or committing plagiarism (i.e. presenting others' work as if your own without giving them credit) will receive **ZERO MARK** for that write-up. **If you are found committing plagiarism repeatedly, you will receive "FAIL" in the course and other disciplinary actions.** (Refer to <http://ugadmin.ust.hk/ug-guide/integrity/dishonesty.html>; <https://libguides.ust.hk/referencing/plagiarism>)

Note that plagiarism includes but is not limited to:

- copying sentence, paragraph, or figure prepared by a graph or figure prepared by others;
- reading the write-up from another student and using it as the basis for your own writing;
- working together with a partner on writing, thus resulting in two highly similar write-ups;
- failing to give credit (a properly formatted citation and reference) for any facts or ideas which are not originated from yourself.

Guidelines on Laboratory Report

It is essential in science to keep a good record of your experimental results and you will learn the required skills of writing a proper laboratory report throughout this course. All the essential components of a full laboratory report are expected, including:

- **Introduction** – A concise paragraph stating the objectives of the experiment.
- **Methodology** – Simply put down the page numbers of the lab manual regarding the procedures. State the changes clearly if you modified any steps.
- **Results** – A clear record of the data collected by your group in proper format (e.g. table, chart or figure with proper title and labels)
- **Discussion** – Explain and interpret your results. Provide rational reasons for any negative result or experimental error.

Guidelines on Worksheet

Questions for the worksheets will be posted on Canvas. Students should indicate the question number clearly and provide an answer to each question. **DO NOT COPY** the questions to your submission, as it would result in an abnormally high similarity percentage by Turnitin review.

Laboratory Performance

Students are required to attend SEVEN regular laboratory sessions. Absence in any session without a clear explanation or justified reason may result in a “FAIL” grade. The performance of students in each session, including practical performance, discipline, and laboratory safety, will be assessed individually and on a group basis. Full marks (2% per regular laboratory session) will be given if all criteria are satisfied. The assessment will focus on:

- Motivation to accomplish the experimental tasks
- Understanding and proper execution of the experimental procedures
- Effective communication with group members and instructors
- Completion of experiments in a timely manner
- Tidiness of the bench after experiments

In addition, marks will be **DEDUCTED FROM THE TOTAL SCORE** each time when the following rules are broken:

Attendance

- Attend the laboratory sessions for the ENTIRE duration, except when permission is granted. 3%
- Attend follow-up sessions if needed. 2%
- Come ON TIME for any sessions. 1%

Dress Code

- Wear proper clothing to ensure your lower body is fully covered (i.e. no shorts, short skirts, open-toe shoes/sandals) and minimize potential injuries. 1%
- Wear lab coats at all times and wear gloves when needed as protection against potential hazards. 1%
- Tie up long loose hair securely to avoid contacting with open flame, chemicals and etc. 1%

Performance

- Follow lab instructions and safety precautions carefully and accurately. 1%

Safety Precautions

Working in a laboratory may expose one to potentially dangerous tools and hazardous reagents. Therefore, students need to exercise discipline and caution to ensure the experiments are conducted under the best and safest conditions. Violation to any of the following rules will result in mark deduction in the laboratory performance.

1. Wear lab coats AT ALL TIMES in the laboratory and wear gloves when handling bacterial cultures, hazardous chemicals/reagents, nucleic acids or proteins.
2. Read and understand the laboratory manual BEFORE coming to the laboratory. Do not perform any unauthorized experiments or improvise any procedures.
3. Do not operate any equipment until properly instructed. Seek advice if you are unsure about any procedures, the operation of equipment, or the handling of apparatus.
4. Handle the reagents carefully and switch/turn off any equipment when not in use (e.g. microscope and Bunsen burner).
5. Report to the instructor IMMEDIATELY for any accidents, such as cuts, burns and spillage of culture/reagents.
6. Clean the laboratory bench with 70% ethanol BEFORE and AFTER the experiment. Do not put any unnecessary personal items on the bench during the experiment.
7. Do not eat, drink or put anything in your mouth while in the laboratory.
8. Clearly label all samples with your group number and sample name BEFORE submission.
9. Rinse your own apparatus and dispose of different wastes in designated receptacles (e.g. discard tubes with bacterial culture in a Biohazardous Waste bag). Do not take any equipment, consumables, and reagents away from the laboratory.
10. Wash your hands thoroughly and obtain permission from TA before leaving the laboratory.