

LIFS1904 Laboratory for General Biology II

Course Outline for Spring 2022

Teaching Team

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Course Description

Credit points:	1
Prerequisite:	LIFS1901 <u>or</u> Level 3 or above in HKDSE 1x Biology <u>or</u> a passing grade in AL/AS Biology
Corequisite:	LIFS1902
Exclusions:	NIL
Grading:	Pass or Fail

The course LIFS 1904, Laboratory for General Biology II, comprises four laboratory exercises. The aims of these exercises are: 1) to reinforce the materials learnt in lectures by providing related laboratory exercises; 2) to provide some fundamental hands-on experiences in laboratory work; and 3) to equip the students with practical knowledge related to applications of basic scientific principles.

The materials covered in the laboratory exercises of LIFS 1904 are simple but extensive. The students will conduct experiments on genetic studies, DNA fingerprinting, animal dissection and biochemical assays. Through this series of training, the students will be able to appreciate “*the applications of simple experiments can bring some meaningful learning experiences*”.

This is a practical course accompanying the lecture course LIFS 1902. It provides students with some basic concepts and hands-on experiences in biological investigation within some areas covered by LIFS 1902, including genetics, molecular biology and human biology. The emphasis is on the understanding and application of the scientific principles underlying the experiments.

Intended Learning Outcomes (ILOs)

On successful completion of this course, students should be able to:

1. Explain the scientific principles underlying the experimental procedures in each exercise.
2. Demonstrate basic laboratory techniques for carrying out Life Science experiments.
3. Analyze and interpret experimental data based on scientific reasoning and knowledge.
4. Abide by ethical principles in laboratory work and result presentation.

Learning Activities

1. **Pre-lab talk:** Content will be focused on basic theoretical and practical issues involved in the experiment.
2. **Practical demonstration:** Specific techniques in each exercise will be demonstrated by the instructor. Real-time or pre-recorded close-up videos will be provided for students to understand the technical details. Students will practice the techniques in different experiments after the demonstration.
3. **Laboratory exercise:** A group of three to four students will collaborate to perform the experiments. Workbench, routinely used labware and instruments will be assigned to and managed by each group of students.
4. **Bench supervision:** Each teaching assistant (TA) will provide guidance and assistance to one bench of students to ensure smooth progress. The instructor and technicians will also provide instructions and support to the class.

Course Schedule

Note that the class and laboratory sessions will be held in **different time and venue**. Students are required to attend THREE laboratory sessions on the assigned date. Absence in any laboratory session without clear explanation or justified reason may result in “FAIL” grade.

Class in LT-A (for LA1, LA2 & LA3)	Monday, 15:00 – 16:20
Course Briefing; Exercise 1: Genetic Study using Fruit Fly	14 Feb

Laboratory Sessions in Room 4160 (Lift 33)	Monday, 14:00 – 16:50
Exercise 2: Forensic Study by DNA Fingerprinting	
LA1	21 Feb
LA2	28 Feb
LA3	7 Mar
Exercise 3: Rat Dissection	
LA1	14 Mar
LA2	21 Mar
LA3	28 Mar
Exercise 4: Digestion of Protein, Carbohydrate and Fat	
LA1	4 Apr
LA2	11 Apr
LA3	25 Apr

Assessment Scheme

Students will be graded as “Pass” or “Fail” depending on their overall performance. Only the students who attended ALL laboratory sessions AND submitted ALL worksheets together with final assessment will be considered for “Pass”, unless permission was granted.

Method of Assessment	Contribution to Final Grade	ILOs to be Assessed (as listed on Page ii)
Pre-lab Quizzes	9% (3% per session)	(1) & (2)
Laboratory Performance	15% (5% per session)	(2)
Experimental Worksheets	40% (10% per worksheet)	(1), (3) & (4)
Final Assessment	36%	(1), (3) & (4)

Evaluation on Pre-lab Quizzes

Reading the laboratory manual beforehand and paying attention to pre-lab talk are good practices that facilitate the smooth progress of experiments. To encourage self-preparation and assess if students are well prepared, a pre-lab quiz will be conducted in each laboratory session right after the pre-lab talk. There are altogether **THREE pre-lab quizzes**, each contains several multiple-choice questions on experimental details and practical instructions. Each student should have your electronic device ready to take the quiz in Canvas Quizzes within the given time. The quiz is an open-book individual assessment, so students are not allowed to communicate with others during the quiz.

Evaluation on Laboratory Performance

Each student is required to attend **THREE laboratory sessions**. Absence in any session without clear explanation or justified reason may result in “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 (5% 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%
- 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. Do not eat, drink or put anything in your mouth while you are in the laboratory.
2. Wear lab coats at all times in the laboratory. Wear gloves only when handling hazardous chemicals/reagents, nucleic acids/proteins and dissection work.
3. Read the laboratory manual BEFORE coming to the laboratory. Do not perform any unauthorized experiments or improvise any procedures.

4. 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.
5. Handle reagents/apparatus carefully and switch off any equipment when not in use. Report to the instructor IMMEDIATELY for any accidents, such as cuts, burns and spillage.
6. Clean the laboratory bench with 70% ethanol BEFORE and AFTER the experiment. Do not put any unnecessary items on the bench during the experiment.
7. Do not take any equipment, consumables and reagents away from the laboratory. Dispose of different wastes in designated receptacles.
8. Wash your hands thoroughly and obtain permission from TA before leaving the laboratory.

Evaluation on Experimental Worksheets

Each student is required to submit **FOUR experimental worksheets**, one for each exercise. The template of worksheets and experimental data, if any, will be available in Canvas Assignments. The questions on worksheets cover the underlying principles of the experiments, data reporting, interpretation and statistical analysis. In each worksheet, you should fill in the Name, Student Number, Laboratory Session and Date of Submission. Moreover, you should provide answers to ALL questions in the worksheet, but there is NO NEED to prepare an extensive laboratory report with sections like Introduction and Discussion.

All submissions **MUST BE your own work**. Since academic integrity and honesty are key values at HKUST, any CHEATING (e.g. making up data) or PLAGIARISM (e.g. copying from others or external sources) will be subjected to ZERO MARKS, “FAIL” in this course and other disciplinary actions (Refer to <http://ugadmin.ust.hk/ug-guide/integrity/dishonesty.html>; <https://libguides.ust.hk/referencing/plagiarism>). Students should submit the completed worksheet in PDF format to Canvas Assignments by the next Monday. Any late submission would have 20% of final mark deducted per day after deadline. 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.

Evaluation on Final Assessment

Each student is required to submit **ONE final assessment**, which will assess the understanding on the principles and procedures of laboratory exercises, as well as the ability to analyze and present information. The format and detail guidelines will be announced in late April.