

## COURSE OUTLINE

LIFS 3220 Animal Physiology Laboratory (Spring 2019)

**Tutorial Sessions:** Monday 09:30 – 10:20 Rm # 2502  
Tuesday 13:30 – 14:20 Rm # 4160 (Teaching Lab.)  
**Practical Sessions:** Tuesday 14:20 – 17:20 Rm # 4160 (Teaching Lab.)

**Instructor:** Dr. Philip Y. Lam

<b>Course Grading:</b>	<b>Quizzes</b>	<b>12%</b>
	<b>Laboratory Performance</b>	<b>12%</b>
	<b>Laboratory Reports and Assignments</b>	<b>28%</b>
	<b>Written Examination</b>	<b>48%</b>

**YOU ARE REQUIRED TO ATTEND ALL THE LABORATORY SESSIONS AND SUBMIT ALL LAB REPORTS IN ORDER TO COMPLETE THE COURSE.**

### Laboratory Schedule:

<u>Week</u>	<u>Date</u>	<u>Activity</u>
<b>Experiment #1: Cardiovascular Physiology</b>		
1	11 Feb 09:30 – 10:20	Tutorial (All students)
2	12 Feb 13:30 – 14:20	Pre-lab. Introduction (Session A)
2	12 Feb 14:30 – 17:20	Session A
3	19 Feb 13:30 – 14:20	Pre-lab. Introduction (Session B)
3	19 Feb 14:30 – 17:20	Session B
<b>Experiment #2: Respiratory Physiology</b>		
4	25 Feb 09:30 – 10:20	Tutorial (All students)
4	26 Feb 13:30 – 14:20	Pre-lab. Introduction (Session A)
4	26 Feb 14:30 – 17:20	Session A
5	5 Mar 13:30 – 14:20	Pre-lab. Introduction (Session B)
5	5 Mar 14:30 – 17:20	Session B

### **Experiment #3: Reflexes & Reaction Times**

6	11 Mar	09:30 – 10:20	Tutorial (All students)
6	12 Mar	13:30 – 14:20	Pre-lab. Introduction (Session A)
6	12 Mar	14:30 – 17:20	Session A
7	19 Mar	13:30 – 14:20	Pre-lab. Introduction (Session B)
7	19 Mar	14:30 – 17:20	Session B

### **Experiment #4: Renal Function**

8	25 Mar	09:30 – 10:20	Tutorial (All students)
8	26 Mar	13:30 – 14:20	Pre-lab. Introduction (Session A)
8	26 Mar	14:30 – 17:20	Session A
9	2 Apr	13:30 – 14:20	Pre-lab. Introduction (Session B)
9	2 Apr	14:30 – 17:20	Session B

### **Experiment #5: Muscle Structure and Function**

10	8 Apr	09:30 – 10:20	Tutorial (All students)
10	9 Apr	13:30 – 14:20	Pre-lab. Introduction (Session A)
10	9 Apr	14:30 – 17:20	Session A
11	16 Apr	13:30 – 14:20	Pre-lab. Introduction (Session B)
11	16 Apr	14:30 – 17:20	Session B

### **Experiment #6: Insect Flight**

12	29 Apr	09:30 – 10:20	Tutorial (All students)
12	30 Apr	13:30 – 14:20	Pre-lab. Introduction (Session A)
12	30 Apr	13:00 – 16:50	Session A
13	7 May	13:30 – 14:20	Pre-lab. Introduction (Session B)
13	7 May	14:30 – 17:20	Session B

\*\* Date of the **Written Examination** to be announced by the ARRO.

## **TEACHING TEAM**

### **Laboratory and Tutorial Instructor**

Dr. Philip Y. Lam  
Email: ylam@ust.hk  
Telephone Ext. 8714

### **Senior Technician:**

Mr. Y.M.Wong

### **Technician:**

Mr. Samuel Cheng

Mr. Rickie Leung

## INTRODUCTION

### I. Overview of the Animal Physiology Laboratory Sessions

Welcome to the Animal Physiology Laboratory course! Physiology is an experimental science and is best studied with accompanying laboratory sessions. In the laboratory portion of this course, you will learn to handle animals and tissues, as well as set-up and use precision equipment to study physiological phenomena.

Modern physiology requires the use of precision equipment, and knowledge of how to use it is necessary for anyone who anticipates a career in experimental biology. However, the most important and powerful pieces of equipment you have at your disposal, are your eyes, your hands and your brain; Learning how to use these in a laboratory environment is what will make you a good (and perhaps even a great) scientist.

You will be a member of a team of 4-5 individuals. It is suggested that specific jobs be assigned during each experiment, and that each member of the team rotates through these jobs during the course of an experiment. For example, for a given experiment one person on the team may be primarily responsible for the surgical or specimen preparation, another for the instrumentation, and a third for the data keeping etc.

It is important that you read the relevant section of this Laboratory Manual BEFORE turning up for a laboratory session. This will help you decide on your respective jobs before you begin the experiment, otherwise you may find yourself running out of time before the experiment is completed.

The successful pursuit of scientific objectives almost always involves good organization and teamwork. So work together as a team. Do not rush into experiments before thinking about what you as a team have to do first.

You will be organized into lab teams at the teaching lab. The numbers in each team will depend on the total number of students who take the course. For LIFS 3220, there may be between 4 to 5 students per team. Each laboratory session will be run twice on consecutive Thursdays. Your group will be allocated to either Session A or Session B. Refer to the Laboratory Schedule which indicates the relevant dates for Sessions A and B.

Before each new experiment, there will be a tutorial for the entire class explaining the background principles of each experiment, the expected results and the guideline for lab report writing. In addition to the tutorial, a pre-lab introduction will be held before the start of each laboratory session to further explain the practical information about the experiment, students are also required to present their preparation works for the experiment.

You and your team will be assigned to a workstation in the Teaching Laboratory. For each experiment, your workstation will be equipped with the necessary instruments and materials.

One Teaching Assistant (TA) will look after one to two teams in each session. Your TA is there to help you. Be inquisitive. Ask questions. TAs will also evaluate your Laboratory Reports and Laboratory Performance for each experiment.

Your Laboratory Performance in the Animal Physiology Laboratory is an essential component of the Animal Physiology Course. It will count for up to 12% of your overall grade. Apart from the written Laboratory Examination, you will also be continually assessed on the quality of your Laboratory Performance and Reports. Following a Laboratory Session, you will be allowed one week to compile your Laboratory Report. Usually, they will be returned at the next Laboratory Session attended. TAs will grade your Reports, which will count for up to 28% of your overall grade.

Because of the unique nature of doing experiments with living material, a great deal of variability occurs in how much "hard" data is collected from each experiment. The collection of data is NOT the prime objective of the Animal Physiology Laboratory Sessions. The prime objective is to develop your skills as a bench-top scientist.

How you apply yourself in the pursuit of a defined scientific objective (after all, this is what an experiment really is); how you interpret what results you do obtain (even if they are negative ones); and finally, how you report on the experiment undertaken, are the things you will be judged on.

## II. Objectives and Course Learning Outcomes of the Animal Physiology Laboratory Sessions

### **Objectives**

This course is aimed to help you to acquire various basic laboratory techniques in physiology, to develop powers of observation and data recording in order to test basic physiological principles. This course also helps you to develop analytical and report writing skills by conducting experiments, and presenting them in a formal laboratory report format. In addition, students will have opportunities to collaborate with others, working in a team in conducting an experiment.

### **Course Learning Outcomes**

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

1. Apply various basic laboratory techniques in physiology to handle animals and tissue.
2. Set up and use precision equipment to study physiological phenomena.
3. Critically observe, qualitatively and quantitatively analyze, and apply physiology knowledge to interpret experimental data.
4. Write formal laboratory reports in a scientific paper format.
5. Work and coordinate effectively in a group to accomplish laboratory-based tasks.
6. Operate ethical laboratory practices such as safety and environmental protection.
7. Evaluate and design laboratory experiments, interpret experimental data and write up the results in accordance with appropriate scientific conventions.

## III. Course Grading

The grades for this course will be determined as follows:

<b>Assessment Tasks</b>	<b>Contribution to Final Grade (%)</b>	<b>Learning Outcomes to be Assessed</b>
Quizzes	12%	(1), (2), (3) & (7)
Laboratory Performance / Presentation	12%	(1), (2), (5) & (6)
Laboratory Reports and Assignments	28%	(3), (4) & (7)
Written Examination	48%	(1), (2), (3) & (7)

### **Attendance**

You are required to attend ALL THE LABORATORY SESSIONS in order to complete the course. Proof of legitimate absence must be provided to your instructor and prior permission from your instructor is required to change the laboratory session.

## Quizzes

A good practice always is to study the laboratory manual before you come into the laboratory. Good preparation is encouraged and is assessed by quizzes, which are held at the tutorials. The quizzes are on sudden and random basis, and will consist of multiple-choice questions, assessing you on the experimental details and theory of that laboratory session.

## Laboratory Performance

During the practical period, you are required to know clearly what you are doing and why you are doing it, in order to accomplish the task(s) efficiently. Good laboratory performance is encouraged and it will be assessed by your Teaching Assistant (TA). The following is a general guideline of the assessment:

- The marks of lab performance are going to the general performance of all the team members during the 6 lab sessions, i.e. 2% per session. The assessment will be focused on the following areas:
  1. Understanding of tasks listed and motivation to accomplish the tasks;
  2. Presentation of experimental procedures;
  3. Communication with group members;
  4. Timing of experiments;
  5. Analysis/ interpretation of the results obtained and understanding of problems with experiments, if they arise;
  6. Clean up the bench after the experiment.

**\*\*Note:** *Punctuality* is very important in the laboratory course, because if you are late, you not only waste your time, but other student's. You will also disturb others when you go into the laboratory after the class begins. Therefore, please arrive at the lab on time. Names of late students will be recorded by TA and marks from laboratory performance will be deducted.

#### IV. Writing Laboratory Reports

It is essential in science to keep a good record of your experimental results. We would like you to adhere to the following format for writing a Laboratory Report. Like any piece of scientific research, a laboratory exercise is not finished until the data have been recorded, analyzed, presented and discussed. Your Laboratory Report should follow the basic outline of a scientific paper. This is to develop skills that may prove to be very useful later in your careers.

Please emulate the following format:

**1. Title and Author.** Give the number and title of the Experiment, your name, your partners' names (i.e., your co-authors of this piece of experimentation), your group no., your session no. and the date of the laboratory session. This is an example for you as reference:

Course code: LIFS 3220  
Course name: Animal Physiology  
Student name: Chan Siu Ming  
Student ID: 20168888  
Session/ Group no.: A1  
Date of experiment: 12 Feb 19  
Experiment #1: Cardiovascular Physiology  
Lab partners: xxx, yyy and zzz

**2. Introduction.** A short paragraph stating the background and objectives of the experimentation.

**3. Procedures (or sometimes referred to as Materials and Methods).** A reference to your laboratory manual should be sufficient, but any alterations in the procedures laid out in the manual should be carefully detailed. Mention both special problems that arose during the experiments as well as any special precautions that were found necessary to take. **This section should be sufficiently complete to enable someone else to repeat exactly your reported experimental procedures, without repeating your errors.**

**4. Results.** All observations made during the experimental period and not described in the previous section should be presented in this section. Include "raw" data from your original lab notes, and averaged, calculated or derived data from this raw data. The latter may be in the form of tables or graphs. Always state the units your data is measured in. Traces from the PowerLab/410 recording unit should be included in your report with complete and clear notations. Label them as Fig. 1, Fig. 2, etc for ease of reference

**5. Figures:** Draw large, well labelled figures when required. Remember to include a scale bar to provide real dimensions.

**6. Discussion:** In this section you will discuss your results, explaining the significance of what you have observed, and your conclusions. Try to explain negative findings and comment

on sources of error in, and merits of, the procedures used. Draw attention to similarities and differences between your results and those of other researchers. Point out the relevance of your conclusions to the life processes of the animal studied. It is essential to address the questions raised in this Laboratory Manual for each experiment, and to consult your course instructors, TAs, texts and reference material, in the preparation of this section.

**7. References:** If you consult any references during the preparation of your Laboratory Report (something we most certainly encourage!), please use a conventional style for these citations.

**\*\* You are required to use the format listed below for citations in the report and in the reference section:**

### I. Citation formats within the text

*Examples from Boric et al., 2008 (the Journal of Neuroscience):*

- It is widely held that encoding new memories involves adjustments in the strength of connectivity in neural circuits through mechanisms of synaptic plasticity like long-term potentiation (LTP) and long-term depression (LTD) (Bliss and Collingridge, 1993; Bear, 1999)
- Moore et al. (1993) first reported an age-related decrease in LTP at CA1–CA3 synapses...

### II. Reference section

***Journal article: author(s), year of publication, article title, journal title, volume and page number(s). Examples:***

- Bear MF (1999) Homosynaptic long-term depression: a mechanism for memory? Proc Natl Acad Sci U S A 96:9457–9458.
- Bliss TV, Collingridge GL (1993) A synaptic model of memory: long-term potentiation in the hippocampus. Nature 361:31–39.
- Moore CI, Browning MD, Rose GM (1993) Hippocampal plasticity induced by primed burst, but not long-term potentiation, stimulation is impaired in area CA1 of aged Fischer 344 rats. Hippocampus 3:57–66.

***Book: author(s), year of publication, book title, edition and publisher. Example:***

- Sambrook J, Russel DW (2001) Molecular cloning: a laboratory manual, 3rd Ed. Cold Spring Harbor, NY: Cold Spring Harbor Laboratory.

***Chapter in a book: author(s), year of publication, chapter title, book title, editor, page number(s) and publisher. Example:***

- Stent GS (1981) Strength and weakness of the genetic approach to the development of the nervous system. In: Studies in developmental neurobiology: essays in honor of Viktor Hamburger (Cowan WM, ed), pp288-321. New York: Oxford UP.

**Web site: author(s), date, article and publication title, a URL. Example:**

- Donacki, N. (2004) *Aseptic Technique*. In: Protocol Online. Available:  
<http://www.protocol-online.org/prot/Protocols/Aseptic-Technique-1912.html>.

**\*\* Note: The references (in a combination with journal articles, books, websites, etc) should be listed in alphabetical order of the first author's surname in the "Reference" section. (Bonus marks will be given to citation written according to the format and requirements listed here.)**

### **Laboratory report submission and penalties**

#### ***Submission dates***

- You should submit the "laboratory write up" (reports or worksheets) on the following dates at specified locations.

Laboratory	Format of Lab Write-up	Submission Date / Location
1	Laboratory Report	(Session A) 19 Feb / Laboratory (Session B ) 26 Feb / Laboratory
2	Laboratory Report	(Session A) 05 Mar / Laboratory (Session B ) 12 Mar / Laboratory
3	Worksheet	(Session A) 19 Mar / Laboratory (Session B ) 26 Mar / Laboratory
4	Laboratory Report	(Session A) 02 Apr / Laboratory (Session B ) 09 Apr / Laboratory
5	Laboratory Report	(Session A) 16 Apr / Laboratory (Session B ) 23 Apr / Laboratory
6	Worksheet	(Session A) 07 May / Laboratory (Session B ) 14 May / Laboratory

**Note:**

#### ***Late submission penalty***

- Marks will be deducted for late submissions: ***10% of the final mark per day after the deadline.***

### *Format*

- All laboratory reports must be submitted in **MS-Word format** and must conform to the format described above with *a font size of 12 point, margin size of at least 1.5 cm, and a spacing of 1.5 lines.*

### *Report writing*

- Every report **MUST BE** your own work. It is essential that you write the reports **IN YOUR OWN WORDS**. If you have used the ideas of someone else, you should give in-text citation and a reference list to acknowledge the author(s). **YOU MUST NOT COPY** from your friends, from the manual, from the lecture notes, from a previously submitted report, from the text book or from the internet.
- Academic integrity and honesty are key values at HKUST (for details, please visit <http://www.ust.hk/vpaa0/ug-guide/integrity/index.html> ). Any student who is found to have committed plagiarism, i.e. presenting work which is not their own and originates from other sources as if it is their own, will receive **ZERO MARK** for that lab report.

**If you are found to have committed plagiarism in more than one report, you will receive a “fail” in the course with an X recorded in your transcript. For details, please visit <http://www.ust.hk/vpaa0/integrity/student-5.html> .**

Plagiarism includes but is not limited to:

- *reporting data that is not from your own or your group unless you have specific permission from your instructor to do so;*
  - *using a graph or figure prepared by another student in your lab report;*
  - *asking another student to let you read his or her lab report and then using what he or she has written as the basis for your own report writing;*
  - *working together with a partner on writing the reports, resulting in two identical or very similar reports;*
  - *failing to give credit (a properly formatted citation and reference) for any facts or ideas which are actually not originated from your own;*
  - *making up or adjusting data;*
  - *written description(s) or explanation(s) that are not your own.*
- **Online resources:**
    - The website of English Grammar Guide (the EGG):  
[http://learning.cl3.ust.hk/english-grammar-guide/English\\_Grammar\\_Guide.htm](http://learning.cl3.ust.hk/english-grammar-guide/English_Grammar_Guide.htm)  
Note: You can find the resources of “Proper Academic Citation and Avoiding Plagiarism” by inputting or searching “Plagiarism” in the keyword list