

Research Modules

BIOM*4420

Winter 2011

Contact Information

Course Coordinator

W. Glen Pyle, PhD, Associate Professor
Department of Biomedical Sciences
Biophysics Interdepartmental Group
Office 1646E OVC
Phone: ext. 54772
Email: gpyle@uoguelph.ca

Instructor

Tim Bast
Department of Biomedical Sciences
Office 1646E OVC
Phone: ext. 54772
Email: tbast@uoguelph.ca

Laboratories: Monday and Wednesday 2:30-5:30; Room 1691 OVC

Introduction

Physiology is the study of the body's systems under "normal" conditions. The idea of a "normal" environment is extremely difficult to define and practically impossible to illustrate. Virtually all animals are under some sort of stress at any given time, whether it is minor adjustments in cellular processes to regulate small adjustments in temperature, or biomechanical and physiological changes in response to a life-threatening situation.

The objectives of this course are multifold:

- ¹ illustrate how various biological systems function under so-called "normal" conditions
- ² investigate how different biological systems interact with each other
- ³ demonstrate how the body responds to stress
- ⁴ learn and understand various and fundamental elements of basic biomedical research

Through laboratory exercises students will be introduced to a variety of experimental and clinical techniques that are used to assess physiological function and assist in the diagnosis of pathologies. These experiments are designed to help illustrate "normal" function and demonstrate how stress causes the systems to adapt. An understanding of physiology is paramount to any career in biology, whether it is research, medicine, or teaching: it is only when we understand physiology that we can diagnose, treat, and prevent the development of disease.

Expectations – Students

- gain a true understanding of the material presented in lab, rather than amassing a collection of facts.
- be able to discuss data, explain concepts, and develop an ability to “problem solve”.
- data collection and interpretation will be done by all members of the assigned groups. While time constraints often prohibit repetition of experiments to allow each group member to experience *all* aspects of *every* lab, an equal sharing of duties through the courses is mandatory.
- students must keep all reports until after the assignment of final grades. Requests to change an inaccurate mark **must** be accompanied with the original report.
- students are expected to conduct themselves in a manner that does not disrupt other students, nor endanger the safety of others in the laboratory. Disruptive or dangerous behaviour will result in the removal of the offending student(s) from the laboratory and possibly the course.
- students should treat their fellow students and instructors with respect at all times. Abusive or disrespectful behaviour towards anyone else in the laboratory will result in punitive action ranging from a warning or grade reduction, to expulsion from the course.
- students should expect to be treated with respect by all course instructors and students. Any problems should be reported to the course co-ordinator as soon as possible. Dissatisfaction with the actions of the course co-ordinator should be reported to the chair of Biomedical Sciences (Dr. Neil MacLusky).

Instructors

- instructors will answer all technical and conceptual questions to the best of their ability. They will not answer questions posed in the laboratory manual.
- instructors will be held to the same code of conduct as students, as it relates to laboratory behaviour and safety.
- to the best of their ability, instructors will conduct all exercises such that students gain an *understanding* of the material.
- all students will be graded using the same standards and marking criteria. Dissatisfaction with a grade earned should be made known as soon as possible to the course co-ordinator. Students should expect an explanation of why they *earned* the marks they did.
- the course co-ordinator will post a list of grades periodically during the course to ensure accuracy. Students are expected to report any discrepancies as soon as possible.

Evaluation

Item	Percent of Final Grade
Laboratory Reports (5 reports)	40% (4x10%)
Research Paper	25%
Paper Proposal	5%
Peer Review of Paper	10%
TA and Instructor Evaluation of Participation	5%
Peer Evaluation of Laboratory Participation	15%

Laboratory Groups

For the first 4 regular laboratory sessions students will be randomly assigned to groups, with the groups changing each week. For the final week of assigned labs students will be allowed to form their own group. They may choose to stay in that group for their independent project, or form a new group.

Laboratory Reports

Students must submit laboratory reports as a group. Any problems with group submissions should be brought to the attention of the course co-ordinator who may permit the submission of individual reports in unusual circumstances.

Each group must submit all 5 reports to their assigned teaching assistant. Reports must be submitted by email to the course co-ordinator, and be date stamped before the start of the next lab (i.e. 2:30 pm). Reports not submitted on-time will result in a grade of '0' for that particular report. Since all reports are representative of the group's efforts, equal grades will be assigned to all members of the group, regardless of who was responsible for the various components as determined by each group. If 5 reports are submitted and the student receives a passing grade (>50%) for every report, the top 4 reports will be used to calculate the grade. If a report is not submitted, or a student earns a failing grade on any report, the final assessment will be determined by including all reports in the calculations.

Laboratory reports should be concise and complete, answering all questions posed in the laboratory manual. Marks will be earned for correctly answering questions, interpreting data and explaining discrepancies between reported and expected results. Grades will be deducted for excessive spelling and grammatical errors, and the inclusion of extraneous information.

Research Paper

Each group must submit a paper based on their own independent research project. Each study should be unique and must follow the format of a typical journal article (see below). In the event that a project is conducted without the express written approval of the course co-ordinator, a grade of '0' will be assigned for the report, regardless of whether the project is acceptable or not.

Papers should be approximately 20 type written pages (not including title page or references). All submissions must be double spaced, 2.5 cm margins, 12 point font. Complete

term papers must be submitted by email before 4:30 pm on Friday, March 25. Late papers will receive a grade of '0'.

The outline and grading criteria for all research papers is as follows:

Outline

Abstract – A summary of the research paper (no more than 250 words)

Introduction – typically 3 or 4 paragraphs briefly justifying the study, its purpose, and hypotheses.

Materials and Methods – succinctly describe the methods and materials used for the study.

Results – a concise description of the results

Discussion – briefly restate the findings of the study. Subsequent paragraphs should discuss the findings in relation to published studies.

N.B. Instructions on the format of a research paper can be found at http://www.the-aps.org/publications/i4a/prep_manuscript.htm. Failure to follow these instructions will result in a reduction in the grade awarded.

Content – 50%

- coherent discussion of physiological or pathophysiological mechanisms
- arguments/statements based on actual data from current study and previously published work
- inclusion of data from primary studies
- logical arguments supported by stated findings
- address controversial and/or contradictory studies
- conclusion supported by arguments/statements included in the paper

Style – 10%

- spelling
- grammar
- punctuation
- writing style (flow of paper, logical structure, etc.)

Experimental Design – 25%

- experiments address the question/hypothesis
- appropriate methods
- sufficient sample size

Creativity – 10%

References – 5%

- correct style (Canadian Journal of Physiology and Pharmacology; see the Journal's Instructions to Authors for more information)
- reliance on mostly primary sources (peer reviewed original research articles, not review papers)

Paper Proposal

Each group must submit a proposal of their independent research project by Friday, February 18. The proposal must be date stamped by 4:30 pm.

Final proposals will be graded. It is suggested that ideas be run by the co-ordinator before a final proposal is submitted. The course co-ordinator will not review any proposals after

Friday, February 18. If an acceptable proposal is not submitted before the deadline, a grade of '0' will be awarded for the group.

Peer Review of Paper

Each term paper will be reviewed by at least one group. Students are expected to evaluate the paper using the same criteria listed above. Reviews should be completed using the modified APS Review Form and are to be submitted by email no later than 4:30 pm on Friday, April 1. Reviews should be a constructive critique of the term paper, outlining both the positive and negative aspects. All comments should be professional in nature. The evaluations assigned by peer reviewers will not influence the grade given to the paper. An "anonymous" copy will be returned to the author of the term paper. A grade will be assigned to the review that reflects its thoroughness, conciseness, accuracy, and professionalism.

Manuscript reviews for scientific journals are typically done privately, with the reviewers remaining anonymous to the authors of the paper. This tradition is to be followed in this class: any discussion of a paper outside the group members assigned to the review is not acceptable and is considered misconduct. Repercussions can range from a warning to a reduction in grade assigned to the group or individual members.

Evaluation of Laboratory Participation

It is expected that all students will contribute equally to the work of the group. Peer assessment will be done throughout the course of the semester. With the submission of each laboratory report it is expected that each student will provide a score out of 5 for each member of their group (excluding themselves), along with 1 or 2 sentences assessing peer participation. These assessments are to be emailed to the course co-ordinator by the same deadline provided for the laboratory report. These comments are confidential and should not be shared with the peers. Scores will be averaged and reported back to the student so that any concerns can be addressed as they arise. While general comments may be shared with the student, the course co-ordinator will not reveal the source of the comments or the specific content of the assessment. The total value of this assessment is 10% (equally distributed across all labs).

With the submission of the paper review students should also provide a peer assessment of their group members, as it pertains to their work on the independent project only. Again, a score out of 5 is provided, along with some comments justifying the score. Peer participation in the research project will count for 5% of the final grade.

If a dispute over peer evaluation arises, the course co-ordinator will make a final decision regarding the accuracy of the grades. It is expected that if an unusually low grade is to be given that the course co-ordinator be made aware of the actions precipitating this score as they occur. The course co-ordinator reserves the right to over-ride unjustifiable evaluations, whether they are overly positive or negative. Instructors will also evaluate each student based on their work within the laboratory. Any dispute over these marks may be addressed with the course co-ordinator.

Laboratory Safety

All participants in this laboratory course (including instructors and teaching assistants) are expected to conduct themselves in a manner that ensures a safe working environment.

Failure to adhere to the safety guidelines will result in removal from the laboratory and/or expulsion from the course. Below is a partial list of safety measures:

1. Identify all exits and be aware of the evacuation route in case of fire.
2. Careful handling of all equipment is essential at all times. If uncertain about the protocol for use, please ask for assistance before operating the equipment.
3. "Horse play" such as running, bumping, and shoving can damage equipment and/or injury other members of the course. These activities will not be tolerated.
4. If you injure yourself during the course of the lab, please notify one of the instructors.

For a more complete list of laboratory safety, please see www.uoguelph.ca/ehs. If you suffer from a medical condition that prevents or limits your participation in any lab, please notify the course co-ordinator. Several experiments require that the subjects undertake stressful tasks (i.e. exercise). If you suffer from any condition that would be exasperated by these tasks (i.e. asthma, cardiovascular disease, pregnancy, etc.), you should not participate as a test subject.

University Policies

Safety in the laboratory is a priority at all times. In order to ensure safety of all participants, the safety procedures/guidelines provided by the instructor must be followed. It is the responsibility of each student to attend any safety orientation that is provided. Please read the information regarding [lab safety](#) and etiquette in your Laboratory Manual. Also, make yourself aware of the MSD sheets. If you injure yourself during the lab and require medical attention, please notify one of the instructors.*

Students will be asked to complete a questionnaire on instructors' teaching competence during the last two weeks of classes. This is part of information required by the University of evaluate faculty performance for purposes of Tenure, Promotion and Selective Increases. Administered by a third party rather than the instructors, these evaluations will be delivered to the respective instructors ONLY after the final grades have been submitted to the Registrar's Office. Note: only the numerical ratings from the form will be made available to the Chair for administrative purposes — the Chair will NOT see any comments that are written on the evaluation forms.

Note: The University of Guelph takes a very serious view of Academic Misconduct. Included in this category are such activities as cheating on examinations, plagiarism, misrepresentation, and submitting the same material in two different courses without written permission. Students are expected to be familiar with the section on Academic Misconduct in the Undergraduate Calendar and should be aware that expulsion from the University is a possible penalty.

The course co-ordinator for this course has a ZERO TOLERANCE policy for plagiarism in any form. Any element of student work found to be plagiarised will result in disciplinary action. It is the responsibility of the student to understand what constitutes academic misconduct. Any justification for academic misconduct based on a lack of understanding about this concept is unacceptable.

* The Vice-President's office REQUIRES that course outlines include "due diligence" wording for all courses involving lab work contain detailed requirements as to safety. The statement listed above is the minimum a course outline should state for a course involving lab work AND it does not include a list of specific consequences tuned to specific violations. An instructors should be prepared to require a student, who explicitly refuses to follow laboratory safety policy and thereby endangers others, to leave the lab, and should involve the department chair at the earliest possible juncture.

Feedback

This laboratory course is in itself an on-going experiment. Each year the instructors and course co-ordinator continually update experiments – adding new sections, deleting old ones – and modify the course text. Although we strive to work through our own initiatives, student feedback has been an instrumental tool for change in the past, and we expect that this will continue as long as this course is offered.

We invite and expect all forms of student feedback regarding this course, its instructors, and laboratory manual. Both positive and negative comments are welcome: however, all suggestions, comments, and opinions should be constructive. A long list of complaints without a suggestion as to how the problems may be rectified is not as likely to be accepted as is a list of well thought-out remedies. Feedback may be offered at any time during the course, either informally through conversation or in a more structured manner. If you would like specific feedback on your comments, they must include some manner of identification (student ID, email address, etc.). Anonymous feedback is acceptable. Comments, suggestions, compliments, and concerns can be submitted by email (gpyle@uoguelph.ca), telephone (Glen Pyle, x54772), or in person (1646E OVC).