

# BIO3625 F/G – Techniques in Physiology and Biochemistry

## Winter 2018

**Tutorial: BGS-1056, Tuesday 1:30pm-2:20pm**

**Lab: BGS-3065, Thursday 1:30pm–6:30pm**

**Instructor:** Dr. Alexander Timoshenko, office hours: Tuesdays, 10:30am to 12:00 (noon) or by appointment, BGS-3032. Tel.: 519-661-2111 ex. 88900, E-mail: [atimoshe@uwo.ca](mailto:atimoshe@uwo.ca)

### Prerequisites

Biochemistry 2280A; Biology 2290F/G, Biology 2382A/B; one of Biology 2601A/B, Physiology 3120 or 3140A.

“Unless you have either the requisites for this course or written special permission from your Dean to enrol in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.” (UWO Senate Regulation, October 27, 2006)

### Course Description

Organismal physiology and biochemistry are functional manifestations of gene expression patterns. This intensive laboratory course will connect the dots from genes to proteins to physiology and finally to whole organism performance in both plants and animals. Emphasis will be placed on the concepts needed to integrate between different levels of biological organization and on the acquisition of laboratory skills required for this type of study.

### Course Structure

Biology 3625F/G is a lab-based course that meets twice per week: once for a 50 min lecture/tutorial and again for a continuous 5 hour lab session. Students are expected to read the lab manual in advance, arrive to class fully informed about the day’s experiments, and be ready to spend the full class period working if needed. The course is divided into two modules: one investigating a plant system and one investigating an animal system. Each module contains an integrated series of experiments run over several weeks. The experimental data will be collected, analyzed and reported in a form of (a) individual manuscript-style midterm written assignment (plant module) and (b) oral PowerPoint group presentation (animal module). You will work in groups of 2 – 3, and reports will be prepared using whole class data.

### Evaluation

Grading will be on a traditional percentage scale. The midterm reports will be written in the style of a journal manuscript according to the “Instructions for Authors” adapted from the journal *Plant Physiology* (separate handout) and will be worth 30% of the final grade. The PowerPoint presentations will be team projects and be worth 28% of the final grade. You must keep an individual lab notebook, which will be marked two times and will be worth 8% for each module (16% total). There will be in-lab quizzes and mini assignments that will be worth 5% per module (10% total). There will be multiple-choice-question tests by the end of each module that will be worth 5% per module (10% total). The appointment at the Writing Support Centre will contribute to 1% of the final grade. Student participation in each lab will be marked based on the five grading criteria (readiness, lab safety, performance, professionalism, and engagement) and contribute to 5% of the final grade.

The due date to submit the midterm assignment and lab notebook is **Thursday March 1, 2018** in class. The lab notebooks will need to be submitted second time on **Tuesday April 10, 2018** to the Biology Department Office (BGS-2025). Late submissions of the midterm assignment and notebooks will result in 5% deductions per each day including weekends. The PowerPoint presentations will be in class on **Thursday April 5, 2018**.

### Laboratory Manual

A laboratory manual outlining all experiments will be available through the Biology 3625F/G OWL website, in PDF format. Students are expected to read the labs in advance and be ready when lab starts. A hard copy of the procedures is recommended, but tablets/laptops are acceptable. We are not responsible for damage of electronic devices due to chemical exposure or other reasons.

## Required Course Materials

1. Lab coat and safety glasses: These must be worn at all times while you are in the lab, regardless of what you are doing.
2. Hard-Bound Laboratory Notebook: Keeping a detailed, legible laboratory notebook is crucial to any research endeavour. It is the primary documentation of your experimental procedures and results. In it you can keep a narrative record of what you do each day, raw numerical data, images, and explanations of what went wrong. You should get used to documenting things as you go along, as well as taking some time at the beginning and end of the day to set out your plan and sum up what happened, respectively. It is a working document, and as such does not need to be especially neat or pretty; however, it does need to be legible so that you and others would be able to replicate exactly what you did. It should be hard-bound with numbered pages. All entries in your notebook should be in pen, with absolutely no whiteout used! Incorrect entries should simply be crossed out and the correct value written in beside it.
3. Statistical Software: With help and instruction from us you will analyze your data using a variety of statistical methods including the Student's T-test, ANOVA with and without co-variates, post-hoc multiple comparison tests, correlation and linear regression. You are free to use any statistical software you are comfortable with. However in-class data analysis and instruction will be done with SPSS, which is available in any of the [General Student Labs](#) on campus and free online at <http://myvlab.uwo.ca/>.
4. Portable Data Storage Device: Much of the data for Biology 3625F/G will be collected using computers. In order to take your data with you, you will need a USB flash drive.

## Plagiarism

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[http://www.uwo.ca/univsec/handbook/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf)

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>). Plagiarism is a major scholastic offence with penalties up to and including expulsion. Students must write their assignments in their own words. Whenever an idea, or a passage, is taken from another author, the debt must be acknowledged by using proper referencing such as footnotes or citations. Quotation marks should be used whenever a phrase, sentence or passage is copied verbatim; rewording or paraphrasing another's idea requires a citation only. Generally, however, direct quotes are not used in scientific writings. We encourage you to discuss the research data freely with classmates. However, work turned in for evaluation (text, figures, tables) must be yours alone. Do not copy from each other, the laboratory manual, journal articles, books, websites or any other sources, and do not cite web site addresses as primary sources. **This especially means that all sections of your reports must be written and/or made by you alone including methods, results, figures, and tables.** The minimum penalty for an assignment that contains plagiarized material will be a grade of zero on that assignment, and all incidents of plagiarism will be investigated by the Department of Biology. Plagiarism checking software (Turnitin) will be used on all major written assignments. Lab reports must be submitted for checking through the OWL website for Biology 3625F/G. If you have any questions about what constitutes plagiarism or how to properly cite references, ask the instructors before handing anything in.

## Absences

**Attendance in the lab and tutorial is mandatory. Completion of all lab exercises is mandatory. Each unexcused absence from the lab will result in a 5% deduction from mark for that module (i.e. 1 unexcused absence results in a maximum possible mark of 95% for the module report).** Absences whether planned or otherwise, will be dealt with on an individual basis. However, if you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the

student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. For further info please see: [www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_illness.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf)

Other important websites: <http://www.registrar.uwo.ca/> and <http://westernusc.ca/services/>

### Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

### Mental Health

Students who are in emotional/mental distress should refer to Mental Health@Western for a complete list of options about how to obtain help: <http://www.uwo.ca/uwocom/mentalhealth/>.

### Learning Skills Services

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

### Schedule of Biology 3625G (Techniques in Physiology and Biochemistry) W2018 classes

Week	Tuesday Tutorials (1:30pm to 2:20pm)	Thursday Laboratory (1:30pm to 6:30pm)
<b>Plant Module</b>		
Week1: Jan 9/11	Orientation and the first lab overview (photosynthetic pigments).	Isolation and identification of photosynthetic pigments (paper chromatography, spectrophotometry).
Week2: Jan 16/18	Assignments of rotation labs. HPLC and chlorophyll fluorescence.	Three concurrent experiments: - Pigment analysis (HPLC)
Week3: Jan 23/25	Electrophoresis labs.	- Chlorophyll fluorescence
Week4: Jan 30/Feb 1	Midterm paper guidelines.	- Isolation of thylakoids; "green" gels
Week5: Feb 6/8	HPLC data analysis.	Analysis of photosystem II proteins by SDS-PAGE. Data analysis.
<b>Animal Module</b>		
Week6: Feb 13/15	Module test #1 (5%). Introduction to animal module.	Moths: morphometrics, body composition, and reproductive development.
Week7: Feb 19-23	<b>Spring reading week, no classes</b>	
Week8: Feb 27/ March 1	Fatty acids and their analysis. Data analysis.	Fatty acid analysis of storage and muscle membrane lipids (gas chromatography). Midterm paper and notebooks due (38%)
Week9: Mar 6/8	Metabolic fuels and flight. Data analysis.	Two concurrent experiments: - Lipid mobilization in flight
Week10: Mar 13/15	Data analysis and statistics.	- Resting and flight metabolic rates
Week11: Mar 20/22	Muscle aerobic capacity. Data analysis.	Flight muscle citrate synthase and stereology; data analysis and statistics. - Assignment of presentation topics.
Week12: Mar 27/29	Data analysis, Module test #2 (5%)	No lab unless more data analysis needed
Week13: Apr 3/5	Presentation consultation	PowerPoint presentations (28%).
Week14: April 10	Notebooks due (8%)	Classes end