Western Science

Department of Biology

Techniques in Physiology and Biochemistry
Biology 3625G
Course Outline/Syllabus Winter 2026

1. Course Information

Course Information
Biology 3625G 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. The course is divided into two main modules. Each module contains an integrated series of experiments run over several weeks. At the end of each module there will be an in-class test, and a report from the experiments of that module will be due. At the end of the course there will be a two week group lab project.

List of Prerequisites
Biochemistry 2280A; Biology 2290F/G, Biology 2382A/B; one of Biology 2601A/B, Physiology 3120 or 3140A. Unless you have either the prerequisites for this course or written special permission from the Department of Biology to enroll in it, you may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on your academic record. This decision may not be appealed.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Christopher Guglielmo (Instructor)	cguglie2@uwo.ca	Collip 110	X81204	See below
Gabriella Orfanides (TA)	gorfani@uwo.ca	TBD	NA	See below

There will be ample time in the 5 hour lab to have discussions with the instructor and Teaching Assistant (TA). They will also be available for in person or virtual (Zoom) meetings outside of the lab and tutorial sessions by appointment. Students must use their Western (@uwo.ca) email when contacting the instructor or Teaching Assistant with the subject Bio3625. Online help will also be available through the Discussion Forum on Brightspace.

3. Course Syllabus, Schedule, Delivery Mode

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.

Topics include:

Photosynthesis
Light harvesting complexes
Chlorophyll fluorescence
Phenotypic plasticity
Animal migration
Lipid metabolism
Body composition analysis
Chromatography
Energetics and respirometry
Spectrophotometry
Enzyme assay
Statistical analysis of data

Learning Outcomes and Objectives:

From labs and tutorials student will be able to:

- Execute experimental laboratory procedures according to written and verbal directions.
- Measure accurately and precisely plant and animal morphology and physical quantities of reagents using a balance, calipers, microscope, manual and digital image analysis (e.g. Image J software), pipettes, and micropipettes.
- Explain the conceptual basis of chromatography methods, and use high-performance liquid chromatography, and gas chromatography to separate and quantify chemical species from plant and animal tissues.
- Explain the conceptual basis of chlorophyll fluorescence methods and use this technique to measure photosynthetic parameters of plants.
- Explain the conceptual basis of indirect calorimetry and use open flow respirometry to measure resting and active metabolic rates of insects.
- Use a spectrophotometer to measure metabolic enzyme activities (kinetic assay), and measure concentrations of metabolites (endpoint assay).
- Enter data accurately into a spreadsheet (excel), quality control the data, and use a statistical software package (RStudio/R) to import data and manipulate data, calculate measures of central tendency and variation, graphically plot and visualize data, and analyze data using ANOVA, ANCOVA, MANOVA, T-test, correlation, and linear regression.
- Keep and accurate and detailed laboratory notebook.
- Critically evaluate and discuss scientific publications.
- Prepare scientific manuscripts in a format suitable for submission for publication.
- work in a lab safely

Contingency Plan: This course will be delivered in-person, however in the unlikely event of any university-declared emergency, some or all of this course may be required to be delivered online, either synchronously or asynchronously. **The grading scheme will not change.** Any assessments affected will be conducted online as determined by the professor.

Schedule: The schedule of tutorials and labs is provided at the end of this document.

4. Course Materials

Lab manual: A laboratory manual outlining all experiments will be available through the Biology 3625G OWL Brightspace website. 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.

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 endeavor. 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 Students T-test, ANOVA, ANCOVA, MANOVA, post-hoc multiple comparison tests, correlation, and linear regression. Data analysis and instruction will be done with R and RStudio software, which is available free online.
4. Portable Data Storage Device: Much of the data for Biology 3625G will be collected using computers. In order to take your data with you, you will need a USB flash drive.

All course material will be posted to OWL: https://westernu.brightspace.com/

Students are responsible for checking the course OWL site (https://westernu.brightspace.com/) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class. Much material, including handouts, lab and tutorial instructions, additional reading, pictures, data and some assignments will appear on the OWL site. Use of social media group sites for the sharing of course information and discussions is not sanctioned or recommended. Your marks will be given under 'Gradebook' in OWL.

If students need assistance with the course OWL site, they can seek support on the OWL Brightspace Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Technical Requirements

If the course must be offered in online mode all students must have access to a stable internet connection, and a computer with working microphone and/or webcam. During in-person learning it is highly recommended that students bring a portable computer to lab and tutorial that can be used for data analysis.

Stable internet connection

Laptop or computer with webcam

Working microphone

5. Methods of Evaluation

Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

Lab reports	25% per module = 50%
Lab notebook	= 10%
Pre-lab quizzes	3% per module = 6%
Tutorial tests	10% per module = 20%
Group Report Project	= 10%
Participation and engagement	2% per module = 4%
Total	100%

Grading will be on a traditional percentage scale. The reports will be written in the style of a journal manuscript according to the "Instructions for Authors" (separate handout) and each report will be worth 25% of the final grade (50% total). You must keep an individual lab notebook, which will be worth 10% of the final grade. There will be in-lab quizzes that will be worth 3% per module (6% total). There will be multiple choice/short answer tests at the end of each module that will be worth 20% of the final grade. There will be one group report project in class that will be worth 10% of the final grade. Student participation and engagement in the lab and tutorial will be marked based on the four criteria (attendance, readiness, professionalism, safety, and performance) and will contribute 4% of the final grade.

Module tests will be given in tutorial on **Tuesday February 24, 2026** and **Tuesday March 24, 2026.** The group report project will be written in lab on **Thursday April 2, 2026**. The deadline to submit the Module 1 report is **Tuesday March 3, 2026 at 11:55 pm (23:55)**. The due date to submit the lab notebook is **Tuesday April 7, 2026** in tutorial. The Module 2 report is due **Thursday April 9, 2026 at 11:55 pm (23:55)**. The due dates for the lab notebook and reports are fixed and will not be changed. **Attendance in the lab and tutorial is required and expected. Each unexcused absence from lab will result in a 5% deduction from the report for that module (i.e. 1 unexcused absence = maximum mark of 95% for the module report). If you are unable to attend lab or to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.**

Submitting lab reports: To submit your lab report, perform the following actions by the deadline:
1. Lab reports must be submitted as .doc, .docx or .pdf files (not as images or other files that cannot be checked by Turnitin software). Please name the files: yoursurnameyourinitialassignment.doc(x). For example, GuglielmoCreport1.docx. **To receive credit, the submitted document must have a title page with a title, your full name, date and name of the course.**

2. Submit your electronic copy to OWL Assignments, via the link provided on Bio.3625 OWL Brightspace. If there is a software problem or you note an error before finalizing the submission you will be allowed to resubmit the lab report by contacting the Teaching Assistant or Instructor. **Note that if you fail to submit your lab report to OWL the instructor will consider your work 'not submitted' and you will receive a mark of zero for the assignment.**

Use of Generative AI Tools
Generative AI tools (e.g., ChatGPT, Copilot, Gemini) are **prohibited** for content creation of any form (e.g. text, figures, tables, code) for any work handed in for credit in this course. If it is suspected by the instructor that a written assignment has been written using generative AI, the student will be contacted to set up an appointment to meet with the instructor to review the report. Alternatively, the student can voluntarily rewrite the sections in question and receive a late penalty of 5% per day.

General information about missed coursework
Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs,* posted on the Academic Calendar: https://uwo.ca/univsec//pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:
https://registrar.uwo.ca/academics/academic_considerations/
All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this and, therefore, always require formal supporting documentation:

- The Group Report Project
- Module tests 1 and 2

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

Evaluation Scheme for Missed Assessments
Generally, missed assignments and tests will not be reweighted to other parts of the course. There will be no makeup tests. With appropriate accommodation if module tests or the group report are missed, the course grade will be reweighted using all of the other graded components. Report and notebook deadlines will be extended in accordance with direction from the Academic Counselling Office. Unless official accommodation is provided directing otherwise, written assignments will only be accepted for 20 days after the deadline (when the accrued 5% daily penalty exceeds the value of the assignment). Students with appropriate accommodation can take their module tests through the accommodated exam service.

Essential Learning Requirements
Even when Academic Considerations are granted for missed coursework, the following are deemed essential to earn a passing grade.

- Both module reports must be handed in to pass the course. Since the course is designated as an "essay course" (i.e., with a suffix of G), to satisfy the Senate requirement students must demonstrate "some minimal competence in essay writing" in order to pass the course. Therefore, the combined mark on the lab reports must exceed 50% in order to pass the course. If it does not the highest mark you can achieve is a 45%.

Coursework with Assessment Flexibility
By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

Deadline with a No-Late-Penalty Period
Written Assignments. Students are expected to submit each of the module report by the deadline listed. Should extenuating circumstances arise, students do not need to request Academic Consideration and they are permitted to submit their assignment up to 48 hours past the deadline without a late penalty. Should students submit their assessment beyond 48 hours past the deadline, a late penalty of 5% per day will be applied retroactive to the deadline. Academic Consideration requests may be granted only for extenuating circumstances that started before the deadline and lasted longer than the No-Late-Penalty Period (48 hours).

6. Additional Statements

6.1 Religious Accommodation
When a recognized religious holiday or observance conflicts with an examination, test, or other scheduled academic obligation, students must request accommodation via the University's Student Absence Portal (SAP). This request should identify the conflict and specify which course component(s) (e.g. test, midterm, exam) are affected.

Students are encouraged to submit the SAP request as early as possible, but no later than two weeks before any examination, or one week before any mid-term test or quiz, to allow sufficient time for adjustment.

The SAP request serves as official notification to both the course instructor and the Academic Advising Office, in accordance with University policy:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

The Faculty of Science considers religious accommodations as scheduling conflicts. Instructors should provide either a make-up exam or an earlier sitting of the same exam to accommodate the student.

For more information on recognized religious holidays, please visit the Diversity Calendar posted on the Equity, Diversity & Inclusion website - https://www.edi.uwo.ca

6.2 Academic Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

6.3 General Academic Policies
The website for Registrar Services is https://www.registrar.uwo.ca/.

Use of @uwo.ca email: In accordance with policy, https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf, the centrally administered e-mail account provided to students will be considered the individual's official university email address.

It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

Requests for Relief (formally known as "appeals")

Policy on Request for Relief from Academic Decision:
https://uwo.ca/univsec//pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf

Procedures on Request for Relief from Academic Decision (Undergraduate):
https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf

6.4 Scholastic Offences

Policy on Scholastic Offences:
https://uwo.ca/univsec//pdf/academic_policies/appeals/scholastic_offences.pdf

Procedures on Scholastic Offences (Undergraduate):
https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf

Plagiarism: 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). 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.** If you have any questions about what constitutes plagiarism or how to properly cite references, ask the instructors before handing anything in. Plagiarism in lab reports or cheating in exams will be viewed as academic offenses and dealt with as such. Penalties range from severe mark reduction, to failure of the course, or expulsion from the University. More information on academic integrity is available via the plagiarism links on OWL. Common sources of plagiarism include making use of a previous year's report and deliberately or inadvertently copying it, large similarities arising from lab partners working together, and (most commonly) overt copying of someone else's report, with or without their permission. In cases of plagiarism, both the copier and copy-ee will be penalized, and you are thus advised to guard the text of your lab report closely. Please bear in mind that turnitin.com does not conduct analyses for within-course plagiarism until after the deadline has expired, and that previous years' lab reports are stored in the turnitin.com database.

Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the possession of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, and wireless earbuds or headphones.

Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at your desk, on your person, or within reach during an assessment will be treated as a *scholastic offence*, even if the device is not in use.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is your responsibility to review and comply with these expectations.

Use of Generative AI Tools

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is **not permitted** in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations.

Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a **scholastic offence**.

If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is prohibited. It is your responsibility to seek clarification before using any AI tools in academic work.

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).

In the event of a health lockdown, tests in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

https://remoteproctoring.uwo.ca.

6.5 Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, requests for relief, exam conflicts, and many other academic-related matters: https://www.uwo.ca/sci/counselling/.

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced GBSV (either recently or in the past), you will find information about support services for survivors, including emergency contacts, at:

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. If you have any questions regarding accommodations, you may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

Learning-skills counsellors at Learning Development and Success (https://learning.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, 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.

Additional student-run support services are offered by the USC, https://westernusc.ca/services/.

This course is supported by the Science Student Donation Fund. If you are a student registered in the Faculty of Science or the Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Advising site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.

Week	Tutorial	Laboratory
Module 1 Moth Migration		
Wk1: Jan 6/8	Introduction to the course, the moth module, and first lab	Moths: morphometrics, body composition, and reproductive development.
Wk2: Jan 13/15	Fatty acids and their analysis; Paper discussion	Fatty acid analysis of storage and muscle membrane lipids (gas chromatography)
Wk3: Jan 20/22	Intro to data analysis with R	Flight muscle citrate synthase and stereology (Dr. Mhatre).
Wk4: Jan 27/29	Muscle aerobic capacity; Paper discussion.	Two concurrent experiments: - Lipid mobilization in flight - Resting and flight metabolic rates.
Wk5: Feb 3/5	Metabolic fuels and flight; Paper discussion; Data analysis.	Two concurrent experiments: - Lipid mobilization in flight - Resting and flight metabolic rates.
Wk6: Feb 10/12	Data analysis, report guidelines and consultation.	Data Analysis for Report 1
Wk7: Feb 16 - 20	**Reading Week, No Classes**	
Module 2 Barley Chlorophyll B Mutant		
Wk 8: Feb 24/26	Module 1 test (10%), Introduction to barley module	Three concurrent experiments: - Pigment analysis (HPLC) - Chlorophyll fluorescence - Photosynthesis
Wk 9: Mar 3/5	HPLC and Chlorophyll Fluorescence Report 1 due	
Wk 10: Mar 10/12	Photosynthesis and photoinhibition	
Wk 11: Mar 17/19	Data Analysis	Data analysis for Report 2
Group Project Lab		
Wk 12: Mar 24/26	Module 2 test (10%), Intro to avian lab	Avian body composition and fatty acid analysis
Wk 13: Mar 31, Apr 2	Literature and data analysis	Group report project – in class (10%)
Wk 14: Apr 7/9	Lab notebook due	Report 2 due