Biology 4998E (Synthetic Biology)
Course Outline

1. Course Information

Course name: Biology 4998E (full year; Fall and Winter semesters)
Prerequisite(s): Biology 3596A/B and Biochemistry 3392F/G.
Pre- or Corequisite(s): Science 3377A/B.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) to enroll 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.

Mode of delivery: The expected delivery method of this course is in person.

All course material will be posted to OWL Brightspace: http://westernu.brightspace.com/d2l/home. Any changes will be indicated on the OWL Brightspace site and discussed with the class. If students need assistance, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Google Chrome or Mozilla Firefox are the preferred browsers to optimally use OWL Brightspace.

2. Instructor Information

Instructor	Email	Office	Office hours
Dr. Michael Pyne	mpyne3@uwo.ca	BGS 2080	By appointment
Dr. Anne Simon	asimon28@uwo.ca	BGS 3022	By appointment

Office hours: Available upon request (in-person or Zoom)

Contact: If you have general questions about course content or assignments, please post them to the appropriate topic in the OWL forum. You can elect to be notified about new posts by email: from the Forum tab, click on "Watch" near the top, and update your settings.

To contact your instructors directly, please use OWL Brightspace messenger or email. You can have your OWL messages forwarded to your email: from the Messages tab, click on "Settings" near the top, click "Yes" for Auto Forward Messages, and type in your email address. If you need to contact the instructors via email (mpyne3@uwo.ca or asimon28@uwo.ca), please put "Bio4998" in the subject line. Messages from a non-Western account or those that do not include Bio4998 may be blocked by the university's anti-spam system.

Messages will be answered within 48 hours, excluding weekends. Typically, forum posts will be addressed first, followed by OWL messages, and then emails.

3. Course Description/Syllabus

In the first half of the course (Fall semester), students will develop original project proposals in Synthetic Biology through group and peer workshops. During the second half of the course (Winter semester), students will vote and execute one of the project proposals (voted by the class).

Learning objectives

Upon successful completion of the course, the student will be able to:

1) Create a novel, plausible, and ethical proposal for development of a microorganism or biological system with purpose-built characteristics;

2) Present a synthetic biology proposal, including background/rationale, methodology, timeline, and budget, and the outcomes of synthetic biology research to a variety of audiences, orally and in writing;

3) Incorporate feedback received from others into an improved project proposal;

4) Plan a research strategy aimed at completing a synthetic biology project using available resources within a specified time and with a specified budget;

5) Perform synthetic biology experiments focused on DNA assembly using Golden Gate cloning and/or homologous recombination, and interpret their results;

6) Identify and use effective troubleshooting strategies

Contingency plan for an in-person class pivoting to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, synchronously at the times indicated in the timetable. Any remaining assessments will also be conducted online as determined by the course instructors.

Tentative Schedule (see next page)

Tentative Schedule (Assessment deadlines are approximate and subject to change)

Week	Topics / Activities	Deadlines
1	Course introduction Brainstorming activity View and discuss project examples Choose a project team	
2	Genetic parts and assembly methods View and discuss project examples	
3	Lab Safety and Training Narrow down proposal ideas Refine project topic (incl. parts and assembly method)	
4	Refine methods Estimate timeline for completion Assembly methods (Golden Gate + MoClo)	
5	Refine methods Estimate timeline for completion	
6	Refine methods Estimate timeline for completion	
7	Proposal presentations and feedback	**3 min proposal pitch (5%)**
8	Incorporate feedback, detailed experimental planning	
9	Detailed experimental planning (reagents, controls, etc.)	**Proposal report 1 (10%)**
10	******No class******	
11	Detailed experimental planning	
12	Detailed experimental planning ***Vote for proposal to execute***	**Proposal presentation 2 (15%)**
13	Detailed experimental planning	
14	Detailed experimental planning	**Proposal report 2 (15%)** **Instructor evaluation (5%)**
15	******No class******	
16	******No class******	
17	******No class******	
18	Presentation of the selected project Start synthetic biology experiments	
19	Synthetic biology experiments	
20	Synthetic biology experiments	
21	Synthetic biology experiments	
22	Synthetic biology experiments	**Outline of selected project (5%)**
23	Synthetic biology experiments	
24	******No class******	
25	Synthetic biology experiments	**Progress report (5%)**
26	Synthetic biology experiments	
27	Synthetic biology experiments	
28	Synthetic biology experiments	
29	Synthetic biology experiments	**Public presentation Biology Day Saturday TBD (15%)**
30	Synthetic biology experiments	
31	Synthetic biology experiments	**Lab notebook (5%)**
32	***No class*** → **Written Thesis (15%), Instructor evaluation (5%)**	

4. Course Materials

Learning materials will be posted to the course OWL Brightspace site. During the first term, students should bring a laptop computer or tablet to class, if possible. During the second term, each student **must** have a lab coat, safety glasses, and laboratory notebook. Students who arrive without proper lab attire (lab coat, safety glasses, long pants, close-toed shoes, long hair tied back) may be denied entry to the lab.

Students should check OWL Brightspace (http://westernu.brightspace.com/d2l/home) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL Brightspace on a regular basis.

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

5. Methods of Evaluation & Grading

The overall course grade will be calculated as follows (***due dates subject to change***):

First term 50%			
3 min proposal pitch 1	5%	(due Oct 16)	Learning objectives 1,2
Proposal report 1	10%	(due Oct 30)	Learning objectives 1,2
Proposal presentation 2	15%	(due Nov 20)	Learning objectives 2,3,4
Proposal report 2	15%	(due Dec 4)	Learning objectives 2,3,4
Instructor evaluation	5%		
Second term 50%			
Outline of project	5%	(due Feb 4)	Learning objectives 5,6
Progress Report	5%	(due Feb 25)	Learning objectives 5,6
Lab notebook	5%	(due Apr 8)	Learning objectives 5,6
Written Thesis	15%	(due end of semester)	Learning objectives 5,6
Public Presentation (judging panel)	15%	Saturday Biology Day TBD	Learning objectives 1,2
Instructor evaluation	5%		

The lab notebook and instructor evaluation are individual assessments. All other assignments will be completed in teams. Your grade for each team assignment might be adjusted according to a peer evaluation factor (TBD). The instructor evaluation is based on each student's performance during class.

Written assignments will be submitted to Turnitin (see statement in policies below). Students will have unlimited submissions to Turnitin before the deadline.

Use of Generative AI Tools:
As a capstone research course, students in Bio 4998 are prohibited from relying on generative AI tools (e.g., ChatGPT, Copilot, Gemini, Claude) to generate ideas for their coursework or assessment. It is imperative that students learn to access current literature to generate novel and creative projects. However, these tools are permitted to get feedback on your proposals or to "bounce ideas off it". Students must communicate their own ideas. If you are in doubt as to what would be an ethical usage of Generative AI, please complete the tutorial below.
https://teaching.uwo.ca/teaching/assessing/academic-integrity.html

Each student is expected to contribute substantially to all group assignments, including project design, lab experiments, presentations, and reports. A contribution section is required for all assessments to describe each of the students' roles, as well as acknowledge the use of generative AI, including Grammarly.

Instructors might use generative AI (e.g., Gradescope, Copilot) for grading.

Rubrics will be used to evaluate assessments and will be posted with the instructions. After an assessment is returned, students should wait 24 hours to digest feedback before contacting their evaluator; to ensure a timely response, reach out within 7 days.

Due to the focus on group work and hands-on skills, attendance is mandatory for all classes/laboratories, except in exceptional circumstances (see **section 6**). Students who miss more than two classes per semester may have to make up academic components the next time the course is offered.

Please note the university-wide grade descriptors:

A+	90-100	One could scarcely expect better from a student at this level
A	80-89	Superior work which is clearly above average
B	70-79	Good work, meeting all requirements, and eminently satisfactory
C	60-69	Competent work, meeting requirements
D	50-59	Fair work, minimally acceptable
F	below 50	Fail

According to university policy, a final grade ending in .45 or above will be rounded to the next highest number (e.g. 78.45 becomes 79, while 78.44 becomes 78). Grades will not be rounded up beyond this policy for any reason.

Grades for specific course evaluations will be posted regularly to the course OWL Brightspace site. Appeals of specific graded items must be submitted in writing to the instructor(s) within two weeks of the grade posting with a clear explanation of the reason for the appeal. The instructor(s) may re-grade all or part of the assignment to look for additional errors which may lower or raise the final grade.

6. Student Absences

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://www.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.

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
All assignments are due by the end of day (11:59 PM) unless otherwise specified. Late assessments without a self-reported absence or without approval from Academic Counselling will be penalized 20% per late day (including holidays and weekends), or part thereof. Late assessments with self-reported absences should be submitted within 24 hours of the end of the 48-hour period. If a student is absent from a group presentation with approval, the presentation may be rescheduled or the grade re-weighed to other course components, at the discretion of the instructors. When remaining group members present without the absent member, the adverse effect on the group will be considered when grading the presentation.

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

- a passing grade on all project proposals and project reports (lab reports) to satisfy the Senate requirement that students must demonstrate "some minimal competence in essay writing" in order to pass the course.

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

https://multiculturalcalendar.com/ecal/index.php?s=c-univwo

7. EDI statement

The pronouns used by Dr. Michael Pyne are he/him. The pronouns used by Dr. Anne Simon are she/her. Please communicate with your instructors to be sure that they know your correct name and/or pronouns.

8. Land acknowledgement

We acknowledge that Western University is located on the traditional lands of the Anishinaabek, Haudenosaunee, Lūnaapéewak and Attawandaron peoples, on lands connected with the London Township and Sombra Treaties of 1796 and the Dish with One Spoon Covenant Wampum. This land continues to be home to diverse Indigenous peoples (e.g. First Nations, Métis and Inuit) whom we recognize as contemporary stewards of the land and vital contributors of our society.

More information about Indigenous Services (https://indigenous.uwo.ca/) and this Land Acknowledgement (https://communications.uwo.ca/comms/land-acknowledgement/) are available.

9. Accommodation and Accessibility

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The Academic Accommodation for Students with Disabilities policy can be found at:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf

10. Academic Policies

The website for Registrarial Services is http://www.registrar.uwo.ca

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 e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Students must write their papers in their own words and properly cite ideas that are not their own.

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/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

Review Biology 2290 learning outcomes. You are expected to know what plagiarism is at this stage of your program.

Turnitin ***aids*** in identifying 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).

Western students are expected to follow the Student Code of Conduct. Additionally, the following expectations and professional conduct apply to this course:

- All course materials created by the instructors or the students are copyrighted and cannot be sold/shared without explicit permission from the authors
- Recordings are not permitted (audio or video) without explicit permission
- Permitted recordings are not to be distributed

10. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: https://www.uwo.ca/sci/counselling/

Please contact the course instructors if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

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/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.

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

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