Biology 3596B – Genomics and beyond – Winter 2020

Welcome to Bio3596! My goal is to help you learn and be successful! Please, read and keep this course outline handy, because it is an official document that contains important course information.

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COURSE DESCRIPTION
A practical introduction to modern experimental approaches in genetics and molecular biology as applied to such topics as genomics (gene identification and classification), functional genomics (genome expression profiles) and bioinformatics (computational genomic analysis). The goal of this course is to give you hands-on experience with performing and evaluating genetics laboratory techniques, and writing lab reports following primary literature formats.

2 lecture/tutorial hours, 4 laboratory hours, 0.5 course
Restricted to: students with a min of 70% in Bio 2581B and Bio 2290F/G.
Restricted to yrs 3 & 4 students in HSP genetics, HSP genetics & biochem, major or minor in genetics.

Unless you have either the requisites for this course or written special permission from your Dean 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.

COURSE STRUCTURE
Biology 3596 is a lab-based course that meets twice per week: once for a 2-hour lecture/tutorial and again for a continuous 4-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 five main experiments. Each main experiment contains an integrated series of experiments that run over several weeks. At the end of each main experiment a report summarizing and integrating the results and interpretation of experiments from that main experiment will be due.

You will work in groups of 2, and reports will be prepared using either whole class data or your own.

It is mandatory to attend all labs and lectures
(-1% for each lecture missed, -10% for each lab missed without approval).

1. Laboratory Manual
A laboratory manual outlining all experiments will be available through the Biology 3596 OWL website (http://owl.uwo.ca), 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 required to be pasted in the lab notebook.

2. Course Websites:
   • http://owl.uwo.ca: Most material, including additional reading, lab results and turnitin submissions will appear on the Owl site. In addition, important announcements will be made on owl, and you are responsible for obtaining that information. The forum is also there to discuss concepts and to help each other out. I will keep tabs on discussions, but will not usually contribute to them myself.
   • Mentimeter: we will be using the Mentimeter (www.menti.com) interactive system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message.
   • Assignments will be graded on Gradescope (www.gradescope.com).

COURSE COMMUNICATION
1. Who are we?

| Lectures: | M → 3:30-5:30 in Room VAC 100 | Instructor: | Dr. Anne F. Simon |
| Labs: | → 1:30-5:30 in BGS 3065 | Office: | B&G 3022 |
| | Tu section 003 / W section 005 | Email: | asimon28@uwo.ca |

Teaching Assistants / emails
Joshua Isaacson jisaacso@uwo.ca Wes Robinson jrobi8@uwo.ca

Lab supervisor Ms. Kim Loney

The first laboratory will be held in the week of January 13th
2. **OWL usage**

Students should check OWL ([http://owl.uwo.ca](http://owl.uwo.ca)) 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. The missing of critical information due to your failure to check OWL cannot be used as a basis for appeal.

Announcements about the course will be sent to your UWO email address. It is your responsibility to keep this account in a state that allows you to receive email, and to check it regularly. As above, a failure to check your UWO email cannot be used as a basis for appeal.

3. **How to Contact the TAs or the instructor**

I encourage you to come to the TAs or myself with questions and/or comments. This can be done by appointment, or immediately before or after class, or finally by e-mail (see below details), or by posting on the discussion boards on Owl (your peers may also be able to answer your question). Please do not leave me phone messages.

4. **Email Policies**

Email hours: We usually check my emails once a day, except for weekends and holidays. We try to answer within 24 hrs, with the following limitations:

Your instructor’s and TAs’ emails should only be used for administrative purposes. In order to maximize efficiency and to allow your instructor and TAs to respond to legitimate concerns as quickly as possible, emails of the following nature will *not* be responded to:

1. Questions about course material or on how to prepare for laboratories or assignments. Such questions should be taken to the lecture or can be asked during downtimes in the labs, as they are typically answered far better and quicker in person.
2. Questions that can be answered based on the information found in this course outline. Being able to find information yourself is an important soft-skill and an employability outcome.
3. To discuss for grades or make-up exams, please make an appointment
4. If you email your instructor, you must use your Western email address and include *Bio3596* in the subject line. Messages from a non-Western account or those that do not include *Bio3596* may be blocked by the university’s anti-spam system.
5. Emails from non-UWO addresses or without *Bio3596* in the subject line will be deleted, as will emails that are impolite or written in the manner of a text message.

**TEACHING METHODS:**

This course is challenging and fast paced. To be successful, you must attend all lectures and read the assigned material. Do not fall behind! If after the lecture and after you study, you do not understand something, although you attended lecture and studied, please see the instructor or TAs for clarification. You also can ask me questions after lecture.

1. **Class lectures, participation, discussions and group work**

The lectures will provide background information on laboratory techniques. There is no text in this course and notes will not be distributed. Although some lecture material will be made available, this material cannot be considered to represent lecture notes. Therefore, it is imperative that students attend all lectures and construct their own set of notes. It is your responsibility to gather and review the information and to ask questions.

2. **Laboratories**

Laboratory techniques include:

- Polymerase Chain Reaction (PCR)
- Restriction Enzyme Digestion
- Agarose Gel Electrophoresis
- Polyacrylamide Gel Electrophoresis (PAGE)
- DNA extraction
- Cloning
- RNA isolation
- Reverse Transcription (RT-PCR)
- Yeast Complementation
We don’t mind if you bring your tablets/laptops to the lab so they can be used during down times. HOWEVER, we are not responsible for damage of electronic devices due to chemical exposure or other reasons.
For laboratory notes – please use your lab book. Please use a pen with ink that is NOT dissolved by water

**EVALUATION**
Marks will not be “rounded” or “curved”. Your grade is your grade.
Details of how each assignment is scored will be posted on OWL.

1. **Late Submissions**
   If you choose to submit your submissions late, you also choose to lose -20% per late day. However, you still have to submit even after five days, as all submissions are required to pass this class. Even if late, the submission needs to be a reasonable attempt and follow the set guidelines.

2. **Laboratory notebook: 15% of your grade.**
   You need to submit your lab notebook for evaluation to pass this class.
   You will need to get a lab notebook that will contain your protocols, and lab results (as explained in the lab notebook guidelines on owl). The grade will be based on your ability to obtain results, the quality of your presentation and organization, and figure labeling. **You will not receive full marks if you do not follow proper safety procedures, experimental protocols or if you do not come prepared (see lab notebook guidelines).**

3. **Assignments: 55% of your grade.**
   You Need to submit ALL of five assignments to pass the class.
   Put the experiment into context – evaluate results – explain trouble-shooting – interpret your lab results for each of the five experiments. The marks for each assignment are increasing throughout the term, based on length and difficulty of the experiment and your increased experience.
   Assignments will be submitted on **OWL through Turnitin** for plagiarism evaluation, and graded on **Gradescope** (www.gradescope.com).
4. **EST analysis: 10% of your grade.**
You need to submit this analysis to pass this class.
You will be given a unique EST sequence to analyze. Details will be provided in class and online.
EST analysis will be submitted on OWL through **Turnitin** for plagiarism evaluation.

5. **Practical in-class final examination: 20% of your grade.**
You need to pass this exam to pass this class.
The final exam focuses on your acquisition of technical skills, as well as problem solving and critical evaluation, not memorization. You will be allowed to bring the papers that have been assigned for this course, your lecture notes and your lab notebook to the exam. No laptops, phones, calculators, or any other electronic devices are allowed.

   **Format: 4 hours (regular lab length)**
   - **A practical experiment: similar to lab 1 (1\textsuperscript{st} lab):**
     You will randomly pick to perform either a PCR followed by a PAGE OR a RE Digest followed by agarose gel. You will have to design yourself the protocol, and perform the experiment individually.
     No extra time will be allowed beyond the regular 4 hours. During the waiting time, you will answer theoretical questions.
   - **Theoretical questions**
     The question section of the final exam requires you to know the theory behind the experimental techniques covered in the labs.
     The background behind the experimental techniques will be discussed during lecture sessions.
     Many of the questions you will be given will involve showing you an image or experimental results (such as a gel image you have not seen before) and you will be asked to explain these results.

**Of note: University-wide grade descriptors:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>90-100</td>
<td>One could scarcely expect better from a student at this level</td>
</tr>
<tr>
<td>A</td>
<td>80-89</td>
<td>Superior work which is clearly above average</td>
</tr>
<tr>
<td>B</td>
<td>70-79</td>
<td>Good work, meeting all requirements, and eminently satisfactory</td>
</tr>
<tr>
<td>C</td>
<td>60-69</td>
<td>Competent work, meeting requirements</td>
</tr>
<tr>
<td>D</td>
<td>50-59</td>
<td>Fair work, minimally acceptable</td>
</tr>
<tr>
<td>F</td>
<td>below 50</td>
<td>Fail</td>
</tr>
</tbody>
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**LEARNING EXPECTATIONS**

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<th>Specific Learning Outcomes Students will:</th>
<th>Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide breadth of knowledge of basic principles and concepts</td>
<td>Master a wide range of basic concepts in behavioural genetics</td>
<td>Tutorial annotations and quizzes</td>
</tr>
</tbody>
</table>
| Provide depth within specialized areas | Acquire in deep understanding and advanced knowledge of a range of specialized areas in behavioural genetics and obtain detailed understanding of:  
   - the methods used to determine the extent of the role of genetics in behaviour  
   - how behaviour is controlled both by environment and genetics  
   - Including notions of neurobiology and epigenetics | Lecture quizzes, mid-term and finals |
| Provide an understanding of experimental design and methodology | Become familiar with the experimental approaches of selected topics in behavioural genetics | Lecture quizzes, mid-term and finals |
| Develop approaches for integration of contemporary information | Describe examples of studies demonstrating the relevance of behavioural genetics to understand human disorders | Lecture quizzes, mid-term and finals |
| Encourage critical thinking and hypothesis building | Determine how specific experimental findings support basic concepts as well as considering alternative interpretations of the findings | In-class exercises, oral presentations, mid-term, final |
| Provide opportunities to develop communication skills | Develop skills in reading scientific literature  
   Develop oral communication skills  
   Develop research skills through the use of research journal, and internet database | Tutorial presentations and quizzes |
IMPORTANT LEGALITIES

1. **Turnitin**
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).

If you haven’t come across it yet, turnitin.com is a commercial software anti-plagiarism tool that checks the text of your submission against the work of your classmates, the turnitin.com database (previous assignments submitted to turnitin.com) and the entire internet. 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. This means that if you copy things from the internet or your classmates, you will be caught. Please be aware that turnitin.com is clever enough to detect plagiarism where a few words are changed in an attempt to make the passage “different”.

2. **Academic offences.**
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: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

3. **Posting of Marks and Appeals**
All marks will be posted regularly to the class OWL website. **All appeals** must be submitted in writing to the instructor **within two weeks of the mark being posted** with a clear explanation of the reason for the appeal. Exams or assignments written in pencil may not be appealed. The instructor may re-grade all or part of the exam or assignment to look for additional errors which may lower or raise the final mark.

4. **Missed Course Components: Absence from Lecture, Laboratories or Final Exam**

   • **Policy on Accommodation:**
     If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek approval for the absence as soon as possible. Approval can be granted either through a self-reporting of absence or via the Dean’s Office/Academic Counselling unit of your Home Faculty. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at scibmsac@uwo.ca. For further information, please consult the university’s policies:
     
     **Policy on academic consideration for student absences:**
     https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf
     
     **Policy on Accommodation for Religious Holidays**
     www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf
     
     **Policy on Accommodation for illness:**
     https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf
     
     We will accommodate an approved absence by changing the weight of the missed lab component, or provide a reasonable extension for the submission of an assignment.

   • **Laboratory:** missing a laboratory with no explanation and no approval will lead to -10% of your final course grade (also known as course mark, final grade, for example if you obtained a course grade of 75% but missed 1 lab without explanation: 65% will be the final course grade).

   • **Lecture:** similarly, missing a lecture with no explanation and no approval will lead to -1% of your final course grade.

   • **Final examination:** If you miss the Final Exam, please contact your faculty’s Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam).
The department will provide ONE make-up test that may be written with the authorization from the Associate Dean, Faculty of Science.

The date of the make-up for the final practical will be determined based on students availability, and will take place during the final exam weeks.

- You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (see https://registrar.uwo.ca/academics/examinations/exam_conflicts.html).

- If you are a Science student, the Academic Counseling Office of the Faculty of Science is located in WSC 140, and can be contacted at 519-661-3040 or scibmsac@uwo.ca. Their website is http://www.uwo.ca/sci/undergrad/academic_counselling/index.html.

- A student requiring academic accommodation due to illness must use the Student Medical Certificate (https://studentservices.uwo.ca/secure/medical_document.pdf) when visiting an off-campus medical facility. For further information, please consult the university’s medical illness policy at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

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

STATEMENT ON THE USE OF ELECTRONIC DEVICES:
No electronic devices (including but not limited to laptop computers, cell phones, iPods, etc...) will be allowed during examinations.

6. SUPPORT
- 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 Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodation.

  Policy on Accommodation for Students with Disabilities
  www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf

- Study / Life Balance:
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.uwo.ca/uwocom/mentalhealth/ for a complete list of options about how to obtain help.

7. Other Useful Links:
Registrarial Services: http://www.registrar.uwo.ca

Services provided by the University Students' Council: http://westernusc.ca/services/.
<table>
<thead>
<tr>
<th>Week of</th>
<th>Lectures</th>
<th>Assignments</th>
<th>Lab</th>
<th>Experiments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 6</td>
<td>Introduction</td>
<td>NO LAB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan 13</td>
<td>How/when to do most common techniques?</td>
<td>Lab 1 Intro lab</td>
<td>Exp 1: Murder mystery</td>
<td>Pipette test PCR, Digest Agarose Gel Swab</td>
</tr>
<tr>
<td>Jan 20</td>
<td>How to do forensic genotyping? (DNA extraction, Polymorphic markers, PAGE gels)</td>
<td>Lab 2 1st Assignment due</td>
<td>Exp 1: Murder mystery DNA extraction Agarose gel, PCR</td>
<td></td>
</tr>
<tr>
<td>Jan 27</td>
<td>What are ESTs? Where is the sequence from? EST assignment Discuss 1st assignment</td>
<td>Lab 3 EST sequence received</td>
<td>Exp 1: Murder mystery PAGE PCR</td>
<td></td>
</tr>
<tr>
<td>Feb 3</td>
<td>Research: Using model systems Light-sensitive pathway in Arabidopsis</td>
<td>Lab 4</td>
<td>Exp 1: Murder mystery Exp 2: Gene expression RNA extraction Plant pictures</td>
<td></td>
</tr>
<tr>
<td>Feb 17</td>
<td>READING WEEK</td>
<td></td>
<td></td>
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<tr>
<td>Feb 24</td>
<td>How/why to do cloning? (plasmids, vectors, cloning, etc.) Discuss 2nd Assignment</td>
<td>Lab 6 EST sequence due</td>
<td>Exp 2: Gene expression PAGE Digest, Agarose Isolation Ligation Transformation Pick and re-streak colony</td>
<td></td>
</tr>
<tr>
<td>March 2</td>
<td>Cloning continued</td>
<td>Lab 7</td>
<td>Exp 3: Cloning</td>
<td>Exp 4: yeast</td>
</tr>
<tr>
<td>March 9</td>
<td>How can we tell if a mutation is in a known gene? Yeast experiment, genetic screens</td>
<td>Lab 8 3rd Assignment due</td>
<td>Exp 3: Cloning Exp 4: yeast</td>
<td>Pick a colony Yeast mating Miniprep DNA Complementation analysis Start β-galactosidase assay</td>
</tr>
<tr>
<td>March 16</td>
<td>Yeast complementation Discuss EST assignment</td>
<td>Lab 9</td>
<td>Exp 3: Cloning</td>
<td>Exp 4: yeast</td>
</tr>
<tr>
<td>March 23</td>
<td>Guest lectures TAs Discuss 3rd Assignment</td>
<td>Lab 10</td>
<td>Exp 3: Cloning</td>
<td>Exp 4: yeast Digest – Agarose Gel Score results</td>
</tr>
<tr>
<td>March 30</td>
<td>Guest presentation and discussion panel: Patricia Mason and Lauren Starr careers in science</td>
<td>Lab 11</td>
<td>Lab practical Final Exam</td>
<td>PCR – PAGE OR RE Digest – agarose + theoretical questions</td>
</tr>
<tr>
<td>April 7</td>
<td>4th and 5th Assignment due</td>
<td>Lab notebook to be graded</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>