Schedule
Section 1&3: Thursdays, 1:30-5:30 pm in MSB 113-117-120.
Section 2&4: Fridays, 1:30-5:30 pm in MSB 113-117-120.
A complete lab schedule is given on the second-last page of this outline.

You are expected to attend all sessions, unless I give you special permission, which may require documentation to be submitted to the office of the Dean of Science (see The Fine Print below). You are expected to be familiar with the day’s work when you arrive. Videos giving background information will be posted to OWL in advance, along with the protocols for each lab.

To ask questions or otherwise communicate with your TA or Dr. McLachlin during the lab, Microsoft Teams is recommended. A Team will be generated for each TA including all students that TA is supervising. Please bring a laptop or other device with Teams enabled to the lab. If communication via Teams is inadequate in a given situation, direct conversation may be necessary. Maintain at least 2 metres distance between individuals as much as possible.

Instructor
Dr. Derek McLachlin, Assistant Professor
Medical Sciences Building Room 349 (office) or 127 (lab)
Telephone: 519-661-3072
E-mail: derek.mclachlin@schulich.uwo.ca

I have no set office hours this term. If you want to see me, phone me or send an e-mail and we can arrange a Zoom or in-person appointment time.

Course materials
There is no lab manual; protocols will be posted to OWL as PDFs. Each student will receive a printed copy of the protocol each week in the lab room. Students must record data in a bound notebook (but not necessarily a new one). Students should bring a lab coat and safety glasses, and wear them at all times while in the lab. Gloves and disposable face masks will be provided. Masks must be worn at all times during the lab.


Course objectives
The experiments in this course are intended to introduce you to some of the methods and equipment used in biochemical and molecular biological research, and to illustrate some of the principles taught in the biochemistry lecture courses. An important part of the research process is communicating findings. You will learn to write a laboratory report in an accepted scientific format. You will be assessed on these written reports and on your understanding of the techniques and the principles behind them.
By the end of this course, you should be able to:

1. Safely perform basic biochemical laboratory procedures such as micropipetting, spectrophotometry, gel electrophoresis, DNA purification, polymerase chain reaction, and column chromatography, and interpret the results obtained.
2. Explain the theory behind the basic biochemical laboratory procedures performed in the course, and apply these procedures to solve problems.
3. Work in a biochemistry laboratory and interact with colleagues in a professional manner.
4. Locate, understand, and evaluate papers published in the biochemical literature that relate to a topic of interest, and properly cite those papers in written work.
5. Communicate experimental results in a style and format appropriate to the primary biochemical literature.

**Methods of Evaluation**

The final grade will be assigned as follows:

- 3% based on 5 online report-writing quizzes
- 10% based on 4 assignments
- 50% based on 12 written submissions (number will depend on COVID-19 situation)
- 2% based on 2 ComPAIR tasks
- 10% professionalism and performance
- 25% final exam

A table showing due dates of submissions (except Type 2 reflective writing submissions) is on the last page of this outline.

**Online Learning Modules**

Three interactive modules have been posted to OWL: Academic Conduct, Lab Safety, and Lab Math. No marks will be given for completing the modules, but the ideas covered are testable on the final exam. Material in the Academic Conduct module is the subject of an online quiz (see below). Further, poor engagement with these modules may influence the Professionalism mark (see below).

**Report-writing Guidelines and Quizzes**

Five PDFs have been posted to OWL to explain how to approach the main sections of a scientific manuscript or lab report: Abstract, Introduction, Materials & Methods, Results, and Discussion. An additional document explains aspects of ethical responsibility. Students will complete five quizzes with multiple choice or short-answer questions based on these readings and the Academic Conduct module. Each quiz is worth 0.6% of your final mark.

**Assignments**

Students will submit four assignments. In Assignment 1 (see mCherry module) you will design primers to be used to accomplish mutagenesis of the fluorescent protein mCherry. Assignment 2 relates to literature searching strategies covered in the library-related online materials. Assignment 3 uses data acquired in Lab 1b to give you practice generating figures and tables. Assignment 4 is designed to lead you through a computer modelling analysis of the impact your chosen mCherry mutation will have on the protein’s structural flexibility.
Submit all assignments via the Assignments tab on OWL by **1:30 pm** on the date specified in the table. Assignment 3 should also be submitted to ComPAIR (see section on ComPAIR below). Late assignments will be penalized as for written submissions (see below). These assignments will not be submitted to Turnitin.

### Written Submissions

Students will submit the following pieces of writing:

<table>
<thead>
<tr>
<th>Submission</th>
<th>Due date</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflective writing (N submissions)</td>
<td>Various</td>
<td>N x 0.5%</td>
</tr>
<tr>
<td>Abstract</td>
<td>Jan 21</td>
<td>2%</td>
</tr>
<tr>
<td>Lab 1 (hemoglobin) report</td>
<td>Feb 25</td>
<td>6%</td>
</tr>
<tr>
<td>Lab 2 (enzyme kinetics) report</td>
<td>Mar 11</td>
<td>12%</td>
</tr>
<tr>
<td>mCherry mutagenesis report</td>
<td>Apr 12</td>
<td><strong>27.5 + (5 - N x 0.5)%</strong></td>
</tr>
</tbody>
</table>

Submit all assignments via the Assignments tab on OWL by **1:30 pm** on the date specified. The Abstract should also be submitted to ComPAIR (see section on ComPAIR below).

The reflective writing assignments are intended to encourage you to think about and learn from your experiences in the lab, both performing procedures and interacting with others. Type 1 reflections ask you to rate your comfort level in the lab, and are submitted at the beginning of the course, after the second lab, and at the end of the course. Type 2 reflections ask you to think about your experience in each individual lab, and are submitted shortly after each lab session. Each reflecting writing assignment is worth 0.5% of your final mark. Details are given in a separate document.

The number of Type 2 reflections will depend on how many in-person lab sessions are held, which could be 0, 1, 2, or 3, depending on decisions on in-person classes made by the university. So the value of “N” in the above table will be 2, 3, 4, or 5. If fewer than 5 reflective writing assignments are given, then the weight of the ungiven assignments will be added to the mCherry mutagenesis lab report. For example, if the university cancels all in-person classes for the term, then students should submit 2 Type 1 reflections (each worth 0.5%) and 0 Type 2 reflections. The mCherry lab report will then be worth 27.5 + 2.5 = 30% of the final course mark.

Assuming all writing reflection assignments go forward, the due dates for these assignments are given in the table below.
<table>
<thead>
<tr>
<th>Submission</th>
<th>Due date</th>
<th>Section 1</th>
<th>Section 1</th>
<th>Section 2</th>
<th>Section 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cohort A</td>
<td>Cohort B</td>
<td>Cohort A</td>
<td>Cohort B</td>
</tr>
<tr>
<td>Type 1 beginning of course submission</td>
<td>Jan 14</td>
<td>Jan 14</td>
<td>Jan 15</td>
<td>Jan 15</td>
<td></td>
</tr>
<tr>
<td>Type 1 end of course submission</td>
<td>Apr 12</td>
<td>Apr 12</td>
<td>Apr 12</td>
<td>Apr 12</td>
<td></td>
</tr>
<tr>
<td>Type 2 mCherry 2 submission</td>
<td>Feb 26</td>
<td>Mar 5</td>
<td>Feb 27</td>
<td>Mar 6</td>
<td></td>
</tr>
<tr>
<td>Type 2 mCherry 3 submission</td>
<td>Mar 12</td>
<td>Mar 19</td>
<td>Mar 13</td>
<td>Mar 20</td>
<td></td>
</tr>
<tr>
<td>Type 2 mCherry 4 submission</td>
<td>Mar 26</td>
<td>Apr 2</td>
<td>Mar 27</td>
<td>Apr 2</td>
<td></td>
</tr>
</tbody>
</table>

Marks for the lab reports will be distributed as follows:
- **Title and abstract**: 10%
- **Introduction**: 8%
- **Methods**: 4%
- **Results**: 25%
- **Discussion**: 25%
- **References**: 8%
- **Organization, grammar, style, etc.**: 20%

The reports will be marked according to a rubric, available to students via the OWL site. In addition to the rubric, the report-writing modules provide guidance on how to prepare the reports. Students may also find it helpful to consult Mimi Zeiger’s book “Essentials of Writing Biomedical Research Papers,” 2nd edition, and Angelika Hofmann’s book “Writing in the Biological Sciences,” 3rd edition.

Written submissions are due at **exactly 1:30 pm** on the date specified. Submit an electronic copy in PDF format via the appropriate link on the OWL site. After successful submission you should be emailed a confirmation number; record this number in case it is needed to verify your submission. The submissions (except for reflective writing assignments) will be analyzed by Turnitin. You may resubmit as many times as you like before the deadline; each submission will generate a Turnitin report that you can view.

The official time of submission will be as shown on OWL. Reports will be considered late if they are submitted after 1:30:00. Please do not wait until the last moment to submit your file, because the OWL site may be sluggish. Late submissions will be penalized 10% (e.g., a mark of 80% will count as 70%) if submitted within 24 hours of the deadline, 20% if submitted 24 to 48 hours after the deadline, and 30% if submitted 48 to 72 hours after the deadline. Reports submitted more than 72 hours after the deadline will receive a mark of 0%.

**ComPAIR**
ComPAIR is peer assessment software developed at the University of British Columbia (see [https://compair.open.ubc.ca/](https://compair.open.ubc.ca/)). After you submit your work to ComPAIR via OWL, you will be presented with three anonymous pairs of work submitted by your peers. For each pair, you will be asked to assess which submission is better based on criteria provided through the software. You will provide anonymous feedback for each answer, and will be able to view feedback provided by your peers. Detailed instructions are posted in a separate document on OWL.
You will use ComPAIR for two submissions: Assignment 1, and the Abstract. Completing the ComPAIR tasks for each of these submissions will be worth 1% (for a total of 2% of your final mark). For each submission, you will earn 0.2 marks for submitting, 0.6 for completing three comparisons (including comments for your peers), and 0.2 for writing a reflective statement.

When writing feedback for your peers, please be respectful. Criticism should be constructive and not insulting or mean-spirited. Feedback deemed inappropriate may affect your professionalism mark.

**One-Time 24-Hour Extension**
Each student will be granted a 24-hour extension for *any one* of the pieces of work described above, of the student’s choosing. No reason needs to be provided; simply email me and your TA stating that you want to use your 24-hour extension. The named piece of work will be accepted without penalty as long as it is submitted within 24 hours of the original deadline.

**Revised deadlines for self-reported absences**
If a student misses a deadline because of a self-reported absence, then the revised deadline for the relevant piece(s) of work will be 48 hours after the end of the accommodation period.

**Professionalism and performance**
This mark includes, but is not necessarily limited to, attendance, being on time, preparedness, proper keeping of a lab notebook, integrity, respect for others, attention to and participation in what is going on in the lab, participation in clean-up, proper attire, and general lab technique. In the event that no labs are held, a professionalism grade will still be assigned based on evidence of the quality of your interactions with your peers, the TA, and the course coordinator.

**Exam**
The final exam will be conducted remotely, without the use of remote proctoring software. The exam will be based on all aspects of the course. Questions could be multiple choice, calculations, or short answer. Sample questions will be available before the exam.

**Statement on 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: [http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

Even though you are working in pairs, lab reports must be prepared independently and must be original. Plagiarism is a scholastic offence and is defined as “The act or an instance of copying or stealing another’s words or ideas and attributing them as one’s own.” (Excerpted from *Black’s Law Dictionary*, West Group, 1999, 7th ed., p.1170.) This applies to all lab reports and all components of the reports (e.g., graphs or diagrams). Even though partners share photographs of gels, each student must label them individually. Plagiarism will result in a mark of zero for that report, and will also affect your professionalism mark. In addition, information related to the academic offence will be kept on record in the Office of the Associate Dean for Basic Medical Sciences Undergraduate Education.
The web pages listed below should help you understand what constitutes plagiarism, and how to avoid inadvertent plagiarism. Note, however, that in scientific writing, direct quotations from another’s work are used *very rarely*, and only if there is a compelling reason. If it is possible to state the same idea in different words, you should not use a direct quotation.


**Rounding of marks**

Final grades in this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be rounded to the nearest integer (e.g., 74.4 becomes 74, and 74.5 becomes 75). Marks WILL NOT be bumped to the next grade or GPA level (e.g., 84 will NOT be bumped up to 85). The mark attained is the mark you achieved and the mark assigned; requests for mark “bumping” will be denied, in accordance with Bachelor of Medical Science Undergraduate Education policy.

**This course is supported by the Science Student Donation Fund.**

If you are a BSc or BMSc student registered in the Faculty of Science or 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 paperwork in the Faculty of Science Dean’s Office. 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 your department or email the Science Students’ Council: ssc@uwo.ca.

**The Fine Print**

**Prerequisites:** Biochemistry 3381A and 3382A

**Absence from Course Commitments**

[Policy on Academic Consideration for Student Absences](#)

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-reported absence** or via the **Academic Counselling** unit. Students have two self-reports to use throughout the academic year; absence from course commitments including tests, quizzes, presentations, labs, and assignments that are worth 30% or less can be self-reported. Self-reported absences cover a student for 48 hours (yesterday + today or today + tomorrow). Your instructor will receive notification of your consideration; however, you should contact your instructor immediately regarding your absence. Students are expected to submit missed work within 48 hours of the end of the 48-hour period. Please review details of the university’s policy on academic consideration for student absences.

If you have used both their self-reported absences or will miss more than 48 hours of course requirements, a **Student Medical Certificate (SMC)** should be signed by a licensed medical or mental health practitioner and you should contact academic counselling. Academic Counselling will be operating virtually this year and can be contacted through the Help Portal accessible at [https://www.uwo.ca/sci/counselling/](https://www.uwo.ca/sci/counselling/).

**Accommodation for Religious Holidays**
The policy on Accommodation for Religious Holidays can be viewed [here](#).
Special Examinations
A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents. To provide an opportunity for students to recover from the circumstances resulting in a Special Examination, the University has implemented Special Examinations dates. These dates as well as other important information about examinations and academic standing can be found here.

Academic Offenses
“Scholastic offences are taken seriously, and students are directed here to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence.

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 Accessible Education (AE) at 661-2111 x 82147 for any specific question regarding an accommodation or review The policy on Accommodation for Students with Disabilities.

Correspondence Statement
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. You can read about the privacy and security of the UWO email accounts here.

Turnitin and other similarity review software
All assignments will be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. Students will be able to view their results before the final submission. 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 Western University and Turnitin.com.

The following links provide information about support services at Western University.

- Academic Counselling (Science and Basic Medical Sciences)
- Appeal Procedures
- Registrarial Services
- Student Development Services
- Student Health Services

The Department of Biochemistry recognizes diversity of identity and experience as a source of strength that promotes excellence, innovation, flexibility and adaptability in our discipline. We embrace, nurture, value and celebrate this diversity.
Labs are held in room MSB M113-117-120 from 1:30-5:30 pm. In the absence of unusual circumstances, students are expected to attend all lab sessions in person. Any or all labs may have to be cancelled because of decisions about in-person classes made by the university.

<table>
<thead>
<tr>
<th>Section 001 Cohort A</th>
<th>Section 001 Cohort B</th>
<th>Section 002 Cohort A</th>
<th>Section 002 Cohort B</th>
<th>Lab Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 28 1:30 pm</td>
<td>Jan 28 3:30 pm</td>
<td>Jan 29 1:30 pm</td>
<td>Jan 29 3:30 pm</td>
<td>Lab 1a – Pipette Use</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lab 1b – Spectrum of Oxyhemoglobin</td>
</tr>
<tr>
<td>Feb 4</td>
<td>Feb 11</td>
<td>Feb 5</td>
<td>Feb 12</td>
<td>mCherry 1 – Mutagenic DNA Amplification</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Lab 2 – Enzyme Kinetics</td>
</tr>
<tr>
<td>Feb 18</td>
<td>Feb 18</td>
<td>Feb 19</td>
<td>Feb 19</td>
<td>Reading Week</td>
</tr>
<tr>
<td>Feb 25</td>
<td>Mar 4</td>
<td>Feb 26</td>
<td>Mar 5</td>
<td>mCherry 2 – Transformation</td>
</tr>
<tr>
<td>Mar 11</td>
<td>Mar 18</td>
<td>Mar 12</td>
<td>Mar 19</td>
<td>mCherry 3 – Plasmid Purification for Sequencing</td>
</tr>
<tr>
<td>Mar 25</td>
<td>Apr 1</td>
<td>Mar 26</td>
<td>TBD*</td>
<td>mCherry 4 – Protein Purification</td>
</tr>
</tbody>
</table>

* Because April 2 is a holiday, we will try to arrange for students to perform this lab earlier in the week.
**Report and Assignment Submission Schedule**  
*Biochemistry 3380G - 2021*

<table>
<thead>
<tr>
<th>Task</th>
<th>Due Date: Section 001</th>
<th>Due Date: Section 002</th>
<th>Return Date: Section 001</th>
<th>Return Date: Section 002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic conduct module</td>
<td>Jan 14</td>
<td>Jan 15</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Five report-writing quizzes</td>
<td>Jan 14</td>
<td>Jan 15</td>
<td>Jan 21</td>
<td>Jan 22</td>
</tr>
<tr>
<td>Reflection 1-1</td>
<td>Jan 14</td>
<td>Jan 15</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Assignment 1: mCherry primers</td>
<td>Jan 21</td>
<td>Jan 22</td>
<td>Jan 28</td>
<td>Jan 29</td>
</tr>
<tr>
<td>Assignment 2: Literature searching</td>
<td>Jan 21</td>
<td>Jan 22</td>
<td>Jan 28</td>
<td>Jan 29</td>
</tr>
<tr>
<td>Abstract</td>
<td>Jan 21</td>
<td>Jan 22</td>
<td>Jan 28</td>
<td>Jan 29</td>
</tr>
<tr>
<td>ComPAIR: Abstract</td>
<td>Jan 28</td>
<td>Jan 29</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Lab safety module</td>
<td>Jan 28</td>
<td>Jan 29</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Lab math module</td>
<td>Jan 28</td>
<td>Jan 29</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Assignment 3: Lab 1</td>
<td>Feb 4</td>
<td>Feb 5</td>
<td>Feb 11</td>
<td>Feb 12</td>
</tr>
<tr>
<td>ComPAIR: Assignment #3</td>
<td>Feb 11</td>
<td>Feb 12</td>
<td>—</td>
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</tr>
<tr>
<td><strong>Reflection 1-2</strong></td>
<td><strong>Feb 25</strong></td>
<td><strong>Feb 26</strong></td>
<td>—</td>
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</tr>
<tr>
<td>Hemoglobin report</td>
<td>Feb 25</td>
<td>Feb 26</td>
<td>Mar 4</td>
<td>Mar 5</td>
</tr>
<tr>
<td>Enzyme kinetics report</td>
<td>Mar 11</td>
<td>Mar 12</td>
<td>Mar 18</td>
<td>Mar 19</td>
</tr>
<tr>
<td>Assignment 4: mCherry modelling</td>
<td>Mar 25</td>
<td>Mar 26</td>
<td>Apr 1</td>
<td>Apr 1</td>
</tr>
<tr>
<td>Reflection 1-2</td>
<td>Apr 12</td>
<td>Apr 12</td>
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<td>—</td>
</tr>
<tr>
<td>mCherry report</td>
<td>Apr 12</td>
<td>Apr 12</td>
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</tr>
</tbody>
</table>

*Due dates for Type 2 reflections are not indicated on this table; see Written Submissions section for due dates. Each student will be granted a 24-hour extension for any one submission of the student’s choosing.*