Course Description and Goals: Biochemistry is the study of the molecules of life and centers on four key groups of biomolecules: proteins, lipids, carbohydrates and nucleic acids. Students will learn about the structure and function of these key biomolecules, the mechanics by which the cellular machinery is supplied with energy, and how the genetic material is converted to functional information. Students will also learn the techniques of recombinant DNA technology and bioinformatics that have profoundly changed how we study and use cell functions.

Biochemistry 2280A/2288A Outcomes

Upon completion of the course students should be able to:
1. Demonstrate basic knowledge about the structure, roles, and functions of the different classes of biomolecules.
2. Provide examples where defects in biochemical processes result in disease, and predict potential outcomes of biochemical defects.
3. Describe the central pathways that provide living organisms with energy, and the regulation of these pathways.
4. Detail information flow in living systems and mechanisms that regulate the expression of genetic material.
5. Formulate an approach to clone and express a gene of interest in bacteria.
6. Obtain and interpret scientific information from literature, databases and oral presentations.
7. Explain scientific concepts in a way that can be understood by a general audience.

2288A Prerequisites
Bio 1290B, and Chem 1301A/B, and Chem 1302A/B as well as registration in a senior year of a Foods and Nutrition module.

The 2280 Course Office is room C5 on the ground level of the MBL building, described on the campus map as Molecular Bio Lab, it is located between the Medical Sciences and Kresge buildings. Office hours are Monday to Friday 10:00 am - 12:00 and 1:00 pm – 2:30.
Dr. Brian Dempsey is the Biochemistry Education Coordinator and handles course administration.
Email: brian.dempsey@uwo.ca Phone: 519-661-3362

Each professor has drop-in office hours. These office hours start the week that the professor begins lecturing. Dr. Derek McLachlin is the 2288A Course Coordinator.

Dr. Michael Boffa, MBL C5 on Thursdays 1:00 – 3:00 pm.
Dr. Ilka Heinemann, MSB 358 on Thursdays 1:00 – 3:00 pm.
Dr. Derek McLachlin, MSB 349 on Thursdays 1:00 – 3:00 pm.

Tutorials will be held before the midterm and final exams. Times and locations will be announced on OWL.

Students can get help with course material by participating in the Biochem 2280_2288 Forum available through OWL. Students' names are not visible to other students. Professors and TAs respond to the postings. Please keep your interactions friendly and respectful.
Required Textbook: *Essential Biochemistry, Fourth Edition* – Charlotte Pratt & Kathleen Cornely, by Wiley Inc. Available at the campus book store. Refer to the “Readings and Modules” chart on OWL for the required readings for each topic.

Course notes for each topic as well as interactive online modules are available on OWL. **To access the material on OWL, you must achieve a perfect score on an OWL quiz relating to this syllabus.** This quiz does not count toward your mark, and you can repeat it as many times as necessary. An optional **course package** may be purchased from The Book Store at Western. The package includes the course notes, a large number of practice exam questions and answers, and some supplemental study materials. Course material produced by faculty is copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws.

### 2019 Lecture Schedule

**Lectures are subject to change, and section seating is not interchangeable.**

All lectures are in NCB 101.  
**SECTION 001:** Mon., Wed., Fri. 2:30 – 3:30 pm  
**SECTION 002:** Tues., Thurs., Fri. 3:30 – 4:30 pm

<table>
<thead>
<tr>
<th>Section 001</th>
<th>Section 002</th>
<th>Topics</th>
</tr>
</thead>
</table>
| **Dr. Michael Boffa - 9**  
M   W   F  
6 Sept.  
9 11 13  
16 18 20  
23 25 | **Dr. Michael Boffa - 9**  
T   Th   F  
5   6 Sept.  
10 12 13  
17 19 20  
24 | 1. Fundamental concepts of Biochemistry  
2. Amino Acids and Ionization  
3. Protein Structure and Analysis  
4. Protein Function  
5. Enzyme Catalysis |
| **Dr. Ilka Heinemann - 11**  
M   W   F  
27 Sept.  
30 2 4 Oct.  
7 9 11  
16 18  
21 23 | **Dr. Ilka Heinemann - 11**  
T   Th   F  
26 27 Sept.  
1 3 4 Oct.  
8 10 11  
X 17 18  
22 | 6. Nucleic Acid Structure  
7. DNA Replication  
8. DNA Repair  
9. Molecular Basis of Cancer  
10. Prokaryotic Transcription  
11. Eukaryotic Transcription  
12. RNA Processing  
13. Translation |
| **No lecture Oct. 14!** | **No lecture Oct. 15!** | |

**Midterm test: Topics 1-13, November 2 from 4:00 – 7:00 pm**

| Dr. Derek McLachlin-11 | Dr. Derek McLachlin-11 |  
M   W   F  
X   X   X  
11 13 15  
18 20 22  
25 27 29  
2 4 Dec.  
No lectures Oct. 25-Nov. 1! | T   Th   F  
X   X   X  
12 14 15  
19 21 22  
26 28 29  
3 X Dec.  
No lectures Oct. 24-31 or Dec. 5! | 14. OWL Modules – No Class (4 lectures)  
15. OWL Modules – No Class  
16. Lipids and Biological Membranes  
17. Carbohydrate Structure  
18. Fundamental concepts in metabolism  
19. Carbohydrate Metabolism  
20. Citric Acid Cycle  
21. Oxidative Phosphorylation  
22. Lipid metabolism  
23. Summary of Energy Metabolism |

**Final exam: Topics 14-23, Date TBD (set by Registrar)**

The final exam is NOT cumulative  
DO NOT book travel plans until after the date of the final exam has been set.
Topics 14 and 15: Topics 14 and 15 are different between Biochem 2280A and 2288A. From October 25 to November 1 (section 001) and October 24 to October 31 (section 002), Dr. McLachlin will lecture on topics relevant only to 2280A students. Biochem 2288A students are not expected to attend these lectures. Alternate material for 2288A students is explained via modules available via the OWL site, and will be represented on the final exam for 2288A.

Please note that Biochem 2280A and Biochem 2288A are evaluated differently.

### 2288A evaluation

<table>
<thead>
<tr>
<th>Component</th>
<th>Date</th>
<th>Scheme 1</th>
<th>Scheme 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background quiz</td>
<td>Due Sep. 13, 11:55 pm</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Assignment 1</td>
<td>Due Oct. 1, 4:00 pm</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>3-hour midterm test (Topics 1-13)</td>
<td>Sat. Nov. 2, 4:00-7:00 pm</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>Due Nov. 12, 4:00 pm</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Assignment 3</td>
<td>Due Dec. 5, 4:00 pm</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>3-hour final exam (Topics 14-23)</td>
<td>TBA</td>
<td>34%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Your final grade for the course will be the higher of Scheme 1 or Scheme 2.

### Background quiz

The background quiz consists of questions designed to refresh your memory about key concepts relevant to Biochemistry that should have been covered in first-year Biology and Chemistry. The quiz will be available on OWL before the first lecture. You can repeat the quiz as many times as you like before the deadline; only your best score will be counted.

### 2288A Assignment

Collaboration is a necessary skill when working in science so students are encouraged to form groups of up to 3 people to complete and submit one joint assignment. The assignments will be made available on OWL around the time each professor begins their lecture series. Groups must submit an electronic copy to Turnitin via OWL no later than 4:00 pm on the due date of each assignment. Late assignments will be penalized 1 mark (of the total of 10 allotted to the assignment) per day late. Assignments more than 3 days late will not be accepted. If a team misses an assignment deadline because one of its members is granted an academic accommodation (either by the Dean's office or because of a self-reported absence), the revised deadline for that team will be 48 hours after the end of the accommodation period.

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).

### 2288A test and exam

Room assignments for the midterm test and final exam will be posted on the OWL course site. All students are responsible for determining where they are to write each examination and to appear at the designated room on time. Students should not make travel commitments before verifying when the final examination will be held through the Registrar’s Student Centre interface.

Students must provide their own pencils and erasers (pens are not allowed) for the examinations and they MUST bring their Student ID card. Electronic devices, including (but not limited to) calculators, cell phones, iPods, and Apple Watches are NOT allowed in the exam rooms.
Biochemistry 2280A/2288A exams include multiple choice questions marked on Scantrons. This course uses software that will detect unusual coincidences in answer patterns that may indicate cheating. Students should note that discrepancies between answers circled on their exam and those recorded on their Scantron will not be adjusted. Students should note that discrepancies between answers circled on their exam and those recorded on their Scantron will not be adjusted. **Missed midterm tests:** Students who are unable to attend the midterm due to athletic or academic conflicts are expected to write a make-up test on Thursday Oct. 31. Students who know of a conflict in advance of the midterm must notify Dr. Dempsey no later than Friday Oct. 25.

If you miss both the scheduled midterm and the make-up test you will be required to write a comprehensive final examination (Topics 1-23) worth the total value of both the midterm and final exams. You must obtain permission for this special exam from the office of your Dean and contact Dr. Dempsey at least 3 weeks prior to the date of the final exam.

Students must familiarize themselves with the Policy on Accommodation for Medical Illness for Undergraduate Students, located at:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Academic Counselling Office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved by the Academic Counselling Office and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Academic Counselling Office immediately.

A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found at:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

**Grades:** Midterm grades will be available through OWL. Final course grades can be viewed online through the Registrar's Student Centre website. Final grades in this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer (e.g., 74.4 becomes 74, while 74.5 becomes 75). Marks WILL NOT be bumped to the next grade or GPA level (e.g., an 84 will NOT be bumped up to an 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.

**Special examinations**

http://www.uwo.ca/univsec/pdf/academic_policies/exam/definitions.pdf

A Special Examination is any examination other than the regular final examination, and it may be offered only with the permission of the Dean/Academic Counselling Office 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.
A Special Examination must be written at the University or an Affiliated University College no later than 30 days after the end of the examination period involved. To accommodate unusual circumstances, a date later than this may be arranged at the time permission is first given by the Dean/Academic Counselling Office of the Faculty. The Dean/Academic Counselling Office will consult with the instructor and Department Chair and, if a later date is arranged, will communicate this to the Office of the Registrar.

If a student fails to write a scheduled Special Examination, permission to write another Special Examination will be granted only with the permission of the Dean/Academic Counselling Office in exceptional circumstances and with appropriate supporting documents. In such a case, the date of this Special Examination normally will be the scheduled date for the final exam the next time the course is offered.

When a grade of Special (SPC) or Incomplete (INC) appears on a student's record, the notations will be removed and replaced by a substantive grade as soon as the grade is available.

**Scholastic offenses:** As outlined by the University, plagiarism is 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). Whether intentional or unintentional, plagiarism is a Scholastic Offence and will be penalized. All students are responsible for work submitted under their name. All students are responsible for reading the list of Academic Rights and Responsibilities at the following website:

[http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=1&command=showCategory&SelectedCalendar=Live&ArchiveID=](http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=1&command=showCategory&SelectedCalendar=Live&ArchiveID=)

Infractions will result in a grade of zero on the test, exam, or assignment in question. If you require additional information please access:

[https://www.uwo.ca/univsec/appeals_discipline.html](https://www.uwo.ca/univsec/appeals_discipline.html)

**Cell Phone and Electronic Device Policy**

The Schulich School of Medicine & Dentistry is committed to ensuring that testing and evaluation are undertaken fairly across all our departments and programs. For all tests and exams, it is the policy of the School and the Department of Biochemistry that any electronic devices, i.e., cell phones, tablets, cameras, or iPod are strictly prohibited. These devices **MUST** be left either at home or with the student’s bag/jacket at the front of the room and **MUST NOT** be at the test/exam desk or in the individual’s pocket. Any student found with one of these prohibited devices will receive a grade of zero on the test or exam. Non-programmable calculators are only allowed when indicated by the instructor. The Department of Biochemistry is not responsible for stolen/lost or broken devices.

**Senate regulation regarding the student’s responsibility regarding requisites:**

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.
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 (SSD) at 519-661-2147 for any specific question regarding an accommodation.

Evaluation
A detailed and comprehensive set of regulations concerning the scheduling of tests, assignments, etc. is available at: http://www.uwo.ca/univsec/academic_policies/examinations.html

15% Assessment Rule:
At least three days prior to the deadline for withdrawal from a course without academic penalty, students will receive assessment of work accounting for at least 15% of their final grade. For more details, refer to the link below: http://www.uwo.ca/univsec/pdf/academic_policies/exam/evaluation_undergrad.pdf

Statement on Student Conduct
Western’s Code of Student Conduct (see https://www.uwo.ca/univsec/pdf/board/code.pdf) prohibits assault, harassment, intimidation, threats, or coercion, as well as discrimination based on grounds including race, ethnic origin, sex, sexual orientation, gender identity, and disability. Students in this course are expected to speak and act in ways that maintain an environment in which all people feel safe and respected.

Useful Links
Registrarial Services: http://www.registrar.uwo.ca
Academic Counselling (Science and Basic Medical Sciences): http://www.uwo.ca/sci/counselling
USC Student Support Services: http://westernusc.ca/services/
Student Development Services: http://www.sdc.uwo.ca
Student Health Services: http://www.shs.uwo.ca/

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

Diversity Statement
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.