Biochemistry 2280A E-Course (section 650) – Summer 2021
Department of Biochemistry

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.

1. General Course Information

Biochemistry 2280 (650): Biochemistry and Molecular Biology – Summer 2021

Timetable: 6 weeks of classes – May 3 to June 11 (final exam after last class)

This is an online course. There are no in-person lectures. Instead, course materials and video lectures are posted to the OWL course site. There will be some optional live virtual office hours.

Important notes:
To complete this course you are expected to have a computer with a stable internet connection. It is recommended that you also have a working video camera, and a working microphone.

All due dates and timed assessments for this course will take place as scheduled in the Eastern Daylight Time zone (EDT, Western University, London, ON). Students in time zones other than EDT will need to account for any differences in timing.

List of Prerequisites
Biology: One of Bio 1001A or 1201A, and one of Bio 1002B or 1202B and
Chemistry: Chem 1301A/B, and Chem 1302A/B.

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.

2. Instructor Information

Course Coordinator and Instructor: Dr. Brian Dempsey

Email: brian.dempsey@uwo.ca
Phone: 519-661-3362
Office: Molecular Biology Laboratory Room C5 (Ground Floor)
Department of Biochemistry
Schulich School of Medicine & Dentistry
Western University
London ON, N6A 5C1

Students should post all questions about the course on the 2280 OWL Course Forum.

Dr. Dempsey will hold virtual office hours every week according to a schedule that will be announced at the start of the course. In addition, a teaching assistant(s) will be available for individual virtual appointments. Details will be announced at the start of term.
3. Course Description/Syllabus

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.

Learning 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.

4. Course Materials

All components of this course, including testing, will be delivered in an online environment. Students taking this course are required to have a reliable internet connection to access all course components. All course material, other than textbook readings and questions, are available through the 2280 OWL online course site. Some of the learning modules may link to external videos. Students with OWL issues should see: OWL Help

Required Textbook: Essential Biochemistry, Fourth Edition by Charlotte Pratt & Kathleen Cornely, published by Wiley Inc. as an online text through WileyPlus. Refer to the 2280 OWL site to find readings for each topic. This book is available online through the Western Bookstore: https://bookstore.uwo.ca/product/cebcoid24704

Students should check OWL (http://owl.uwo.ca) for course 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 and their Western email on a regular basis for course announcements.

To access the material on OWL, you must achieve a perfect score on an OWL quiz relating to this course syllabus. This quiz does not count toward your mark, and you can repeat it as many times as necessary.

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Topics and Schedule:

<table>
<thead>
<tr>
<th>Recommended dates</th>
<th>Topics</th>
<th>Approx. time commitment*</th>
<th>Assessment Due</th>
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</thead>
<tbody>
<tr>
<td><strong>Section 1</strong></td>
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<tr>
<td>May 3 – 9</td>
<td>Topic 1: The chemical basis of life</td>
<td>20 hours</td>
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<td></td>
<td>Topic 2: Amino acids and ionization</td>
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<td>Topic 3: Protein structure and analysis</td>
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<td>Topic 4: Protein function</td>
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<td>Topic 5: Enzyme catalysis</td>
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<td></td>
<td>May 9: Background Quiz</td>
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<td>May 10: Summary Paragraphs Topics 1-5</td>
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<tr>
<td><strong>Section 2</strong></td>
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<tr>
<td>May 10 – 16</td>
<td>Topic 6: Lipids and biological membranes</td>
<td>15 hours</td>
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<td>Topic 7: Carbohydrate Structure</td>
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<td></td>
<td>Topic 8: Fundamental Concepts in Metabolism</td>
<td></td>
<td>May 14: Assignment 1 Due</td>
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<td></td>
<td>Topic 9: Carbohydrate Metabolism</td>
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<td>May 17: Summary Paragraphs Topics 6-9</td>
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<tr>
<td>May 17 – May 23</td>
<td>Topic 10: Citric Acid cycle</td>
<td>15 hours</td>
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<td>Topic 11: Oxidative phosphorylation</td>
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<td>Topic 12: Lipid Metabolism</td>
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<td></td>
<td>Topic 13: Summary of energy metabolism</td>
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<td>May 24: Summary Paragraphs Topics 10-13</td>
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<tr>
<td>Wed. May 26</td>
<td>Midterm: Covers Topics 1 - 13</td>
<td>20 hours</td>
<td>May 26: Midterm</td>
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<td><strong>Section 3</strong></td>
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<tr>
<td>May 24 – May 30</td>
<td>Topic 14: Nucleic Acid Structure</td>
<td>15 hours</td>
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<td>Topic 15: DNA Replication</td>
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<td>Topic 16: DNA Repair</td>
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<td>Topic 17: Molecular Basis of Cancer</td>
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<td>May 31: Summary Paragraphs Topics 14-17</td>
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<tr>
<td>May 31 – June 6</td>
<td>Topic 18: Prokaryotic Transcription</td>
<td>15 hours</td>
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<td></td>
<td>Topic 19: Eukaryotic Transcription</td>
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<td>June 1: Assignment 2 Due</td>
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<td>Topic 20: RNA Processing</td>
<td></td>
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<td>Topic 21: Translation</td>
<td></td>
<td>Jun 7: Summary Paragraphs Topics 18-21</td>
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<td><strong>Section 4</strong></td>
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<td>15 hours</td>
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<tr>
<td>June 7 – June 11</td>
<td>Topic 22: Recombinant DNA Technology</td>
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<td>Topic 23: Sequencing Genomes</td>
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<tr>
<td>Tues. June 15</td>
<td>Final Exam: Covers Topics 14 - 23</td>
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<td>June 15: Final</td>
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</tbody>
</table>

*These are approximate suggested time commitments and do not include time spent on assignments.*
Course Questions and Help:

Students can get help with course material by participating in the **2280 OWL Course Forum** through the course site. Students' names are not visible to other students. Dr. Dempsey will respond to the posted questions although all students are encouraged to participate in helping answer questions. Please keep your interactions friendly and respectful.

Dr. Dempsey will hold live virtual office hours every week using Zoom. The schedule and timing of these office hours will be determined once the course has started. No lecture material will be presented during the office hours. Office hours are intended to be interactive where students who have read the course notes and watched recorded lectures can ask questions. Attendance for the office hours is not required. The sessions will be recorded and made available on OWL. Students must use their UWO credentials to sign in to Zoom. See notes about online etiquette in Section 6 of this outline.

A TA will be available to schedule virtual office hour sessions to help students with course material. Scheduling information for these sessions will be available at the start of the course.

5. Methods of Evaluation

The final course grade will be calculated as shown below. Note that variable weighting will be used for some of the components of your final grade.

<table>
<thead>
<tr>
<th>Component</th>
<th>Topics</th>
<th>Date/Time (EDT)</th>
<th>% of Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background Quiz</td>
<td>prerequisite material</td>
<td>Sun. May 9, 11:55 pm</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>(best of 3 attempts)</td>
<td></td>
<td></td>
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<tr>
<td>Topic Summaries</td>
<td>1-5</td>
<td>Mon. May 10, 11:55 pm</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>6-9</td>
<td>Mon. May 17, 11:55 pm</td>
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<tr>
<td></td>
<td>10-13</td>
<td>Mon. May 24, 11:55 pm</td>
<td>(best 5/6 submissions)</td>
</tr>
<tr>
<td></td>
<td>14-17</td>
<td>Mon. May 31, 11:55 pm</td>
<td></td>
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<tr>
<td></td>
<td>18-21</td>
<td>Mon. June 7, 11:55 pm</td>
<td></td>
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<tr>
<td></td>
<td>22-23</td>
<td>Mon. June 14, 11:55 pm</td>
<td></td>
</tr>
<tr>
<td>Assignment 1</td>
<td>various</td>
<td>Fri. May 14, 11:55 pm</td>
<td>12.5*</td>
</tr>
<tr>
<td>Midterm exam</td>
<td>1-13</td>
<td>Wed. May 26, Time TBA</td>
<td>32.5*</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>various</td>
<td>Tues. June 1, 11:55 pm</td>
<td>12.5*</td>
</tr>
<tr>
<td>Lab modules</td>
<td>22-23</td>
<td>Fri. June 11, 11:55 pm</td>
<td>3</td>
</tr>
<tr>
<td>Final exam</td>
<td>14-23</td>
<td>Tues. June 15, Time TBA</td>
<td>32.5*</td>
</tr>
</tbody>
</table>

*Variable weighting will be used for these graded components, see below for details.

**Background Quiz:**

The background quiz consists of questions designed to refresh your memory about key concepts relevant to Biochemistry that have been covered in first-year Biology and Chemistry prerequisite courses. The quiz will be available on OWL before the first day of classes and is due by Sunday May 9 at 11:55 pm, although students should complete this quiz before beginning to view the 2280 course material. You can repeat the quiz three times before the deadline; your best score from your attempts will be used for calculation of your final grade.
**Topic Summary Paragraphs:**
These summary paragraphs are designed to help students maintain the scheduled pace through the 2280 course material. They are also a useful tool to help students consolidate their understanding of key concepts from the course. At the end of each week students will write a summary paragraph about one key concept from each of the topics assigned to be covered that week. Students must submit an electronic copy of their summaries on Monday of each week (see schedule above) through the assignments tab on OWL. Late assignments will be penalized 10% of the available marks per 24 hours late. Assignments more than 72 hours late will not be accepted. If a student misses a submission deadline because they were granted an academic accommodation (either by the Dean's office or because of a self-reported absence), the revised deadline for submission will be 24 hours after the end of the accommodation period. When calculating your final grade, your lowest summary mark will be dropped.

All submissions must be written in a student’s own words and will be reviewed for textual similarity by commercial plagiarism-detection software under license to the University. All documents submitted for such review 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).

**Assignments:**
Students will be required to submit two assignments. The first assignment will be available on OWL at the start of the first week of the course. The second assignment will be released on OWL at the start of the third week of the course. Students must submit two identical copies of each of their assignments: one copy to Turnitin through the OWL assignments tab, and one copy to Crowdmark through a link that will be emailed to you at the start of the course. Both copies of the assignments must be submitted to the respective sites by the assignment due dates (see schedule above) or the assignment will be considered late. Late assignments will be penalized 10% of the total marks per day, to a maximum of 3 days late. After an assignment is 3 days late a mark of zero is given. Variable weighting will be used for the two assignments when your final grade is calculated. Your best assignment of the two will be weighted 15% and the other assignment weighted 10%.

Similar to the Topic Summary Paragraphs; all assignment submissions must be a student’s own work and will be reviewed for similarity by commercial plagiarism-detection software.

**Lab Simulation Modules:**
A lab simulation module of a plasmid miniprep will be posted to the OWL course site after the midterm exam. The module is divided into two parts and students must complete both parts of the simulation by the stated due date (Fri. June 11). The lab simulation modules will be completed on the OWL course site. Students will need to review course material and other provided background material before attempting the module. Then students will proceed through the module answering questions while referring to the protocol for a plasmid miniprep procedure. Students may attempt each question twice while completing the module.

**Exams:**
The midterm exam will cover material in Topics 1 to 13 and will be: Wednesday, May 26, 2021 (time to be announced). The exam will be run online through OWL Tests and Quizzes. This means students must have access to a reliable internet connection and a device on which they can type their answers. The final exam will cover Topics 14 to 23 and will be: Tuesday, June 15, 2021 (time to be announced). This exam will also be online through OWL with the same details as listed above.

Variable weighting will be used for the midterm and final exam when your final course grade is calculated. The exam with the higher mark will be weighted 35% and the other exam weighted 30%.

Biochemistry 2280A E-Course exams may include multiple choice components. The course uses software that will detect unusual coincidences in answer patterns that indicates cheating. The handling of academic offenses is described in the sections below.

No student will be allowed to write an examination without either a Western ONECard student ID or another piece of government-issued photo identification.
**Missed test/examination:** Students who are unable to write a scheduled test/exam must submit documentation to your Dean’s office through academic counseling to determine if they are eligible for Academic Consideration. If approval is granted for a make-up test you must contact Dr. Dempsey and you will then be provided details for the makeup exam/test.

There will be one makeup midterm and one makeup final exam scheduled for 2280 this summer. These makeup exams will be set on a date about one to two weeks after the regular exam. The format of these makeup exams may vary from the regularly scheduled exam. For example, if the regular midterm is multiple choice the makeup midterm may contain questions of a different format, including: short answer, long answer, and drawing diagrams, etc. If a student is unable to write the makeup midterm (after missing the regular midterm) they will be required to write a comprehensive exam covering all topics in the course and weighted to account for both the midterm and final exams. 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 a Special Exam (the name given by the university to a makeup Final Exam).

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

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**6. Western Academic Policies and Statements**

**Accommodation Policies**
Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: Academic Accommodation for Students with Disabilities.

**Academic Consideration for Student Absence**
Students will have 1 opportunity during the Summer term to use an on-line portal to self-report an absence during the term, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student’s final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student’s final grade,
- if a student has already used the self-reporting portal during the summer term

If the conditions for a Self-Reported Absence are *not* met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student’s Home Faculty.**

For Western University policy on Consideration for Student Absence, see Policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs and for the Student Medical Certificate (SMC), see: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.
Religious Accommodation

Students should consult the University’s list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar.

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.

Recording of Virtual Sessions

All of the remote learning sessions for this course, with the exception of office hours, will be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

Etiquette during Virtual Sessions

Some components of this course will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- please “arrive” to class on time
- please use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material
- to minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise
• to give us optimum bandwidth and web quality, please turn off your video camera for the entire class unless you are invited to speak
• unless invited by your instructor, do **not** share your screen in the meeting

The course instructor or teaching assistant will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

• if you wish to speak, use the “raise hand” function and wait for the instructor to acknowledge you before beginning your comment or question
• remember to unmute your microphone and turn on your video camera before speaking
• self-identify when speaking.
• remember to mute your mic and turn off your video camera after speaking (unless directed otherwise)

General considerations of “netiquette”:

• Keep in mind the different cultural and linguistic backgrounds of the students in the course.
• Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
• Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
• Be professional and scholarly in all online postings. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of “Zoom-bombing” a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

7. BMSUE Academic Policies and Statements

**Copyright and Audio/Video Recording Statement**
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. You must always ask permission to record another individual and you should never share or distribute recordings.

**Rounding of Marks Statement**
Across the Basic Medical Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based on their actual achievement. Final grades on 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., 74.49 becomes 74, and 74.50 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g. a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark “bumping” will be denied.

8. Support Services
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