Course ID:	Course Title:	Fall 2022
BCH 297	Biochemistry	Prerequisite: BIO 131, BIO 133, and CHE 251
		Credits: 3

Class Information		Instructor Information		Important Dates	
Delivery:	In Class	**Instructor:**	Dr. Chris Wang	**First Day of Class:**	Sept. 08
Days:	Tuesday and Thursday	**Email:**	chris.wang@ambrose.edu	**Last Day to Add/Drop:**	Sept. 18
Time:	4:00 – 5:15 PM	**Phone:**	(403) 410-2000 ext. 6910	**Last Day to Withdraw:**	Nov. 21
Room:	A1085-2	**Office:**	L2113	**Last Day to Apply for Coursework Extension:**	Nov. 28
Lab/Tutorial:	Instructor: Dr. Pearl Cherry E-mail: Pearl.Cherry@ambrose.edu Time: Monday 8:15-11:15 AM (3 hrs/week) Room: A2151	**Office Hours:**	by appoint (open door policy)	**Last Day of Class:**	Dec. 12
Final Exam:	Date: Saturday, Dec. 17, 2022 Time: 1-4 pm Location: A1085-2				

Important Dates and Information

For a list of all important dates and information regarding participating in classes at Ambrose University, please refer to the Academic Calendar at https://ambrose.edu/academic-calendar.

Course Description

Biochemistry explores the chemical makeup and reactions that are essential for life processes. This course will introduce students the structure and function of carbohydrates, amino acids, proteins, lipids, and enzymes, along with an introduction to metabolism. The course tutorial and laboratory components will introduce students to some fundamental biochemistry experiments and aid in the comprehension of the concepts covered during lectures.

Expected Learning Outcomes

It is the aim of the course that students acquire the following skills:

1. Understand the structure, function, and biochemistry of important biological macromolecules.
2. Understand the principles of enzymatic activities and analysis.
3. Comprehend various metabolic pathways and appreciate their complexity, network, and regulation.
4. Connect metabolic pathways and biomolecules to common metabolic diseases.

Textbooks

- David Nelson and Michael Cox. 2021. Lehninger Principles of Biochemistry 8th Edition. Macmillan Learning.
  - eTextbook + Achieve courseware - ISBN: 9781319230906

- it is required to sign up for **Achieve**:
  - instructor's course ID: **wh2ovv**

- it is required to sign up for **Poll Everywhere** in-class response system at (*free subscription*)
  - free subscription at https://www.polleverywhere.com/
  - https://www.polleverywhere.com/guides/student
  - Poll Everywhere apps are available for iPhone and Android

Course Schedule

The following schedule provides a general guideline and timetable for topics and tests. It may change depending on the progress throughout the semester.

Date	Lecture Topic	Readings (Lehninger 8th Ed.)
Sept. 08	Introduction to BCH 297	
Sept. 13	Topic 1 – The Chemical Foundation of Life: ◦ aqueous chemistry ◦ chemical bonds ◦ water - main chemicals of life and the importance of water in biochemistry ◦ buffer and pH	Ch. 2
Sept. 15	continuation on Topic 1 - The Chemical Foundation of Life	Ch. 2
Sept. 20	Topic 2 – Introduction to Proteins: ◦ amino acids – the building blocks of proteins ◦ peptide bond and protein polypeptides ◦ there are four different levels of protein structure ◦ protein primary structure determines all higher levels of protein structure	Ch. 3
Sept. 22	Continuation on Topic 2 - Introduction to Proteins	Ch. 3
Sept. 27	Continuation on Topic 2 - Introduction to Proteins	Ch. 3
Sept. 29	Continuation on Topic 2 - Introduction to Proteins	Ch. 3
Oct. 04	Continuation on Topic 2 - Introduction to Proteins	Ch. 3
Oct. 06	Topic 3 - The Three-Dimensional Structure of Proteins: ◦ two types of secondary structure elements. ◦ tertiary structure is the highest level of structure for monomeric proteins ◦ quaternary structure is the highest level of structure for oligomeric proteins	Ch.4
Oct. 11	Continuation on Topic 3 - The Three-Dimensional Structure of Proteins	Ch. 4
Oct. 13	**In-Class Midterm 1 (Topic 1 and 2)**	
Oct. 18	Continuation on Topic 3 - The Three-Dimensional Structure of Proteins	Ch. 4
Oct. 20	Continuation on Topic 3 - The Three-Dimensional Structure of Proteins	Ch. 4
Oct. 25	Topic 4 - Protein Function: ◦ protein structure is critical for protein function ◦ the relationship between protein structure and its function	Ch. 5
Oct. 27	Continuation on Topic 4 – Protein Function	Ch. 5
Nov. 01	Continuation on Topic 4 – Protein Function	Ch. 5

Nov. 03	Continuation on Topic 4 – Protein Function	Ch. 5
Nov. 08	*No Class due to Fall Reading Week*	
Nov. 10	*No Class due to Fall Reading Week*	
Nov. 15	<u>Topic 5 – Enzymes:</u> ◦ enzymes are proteins that catalyze chemical reactions ◦ enzymes bind substrates in their active sites and stabilize the transition state ◦ enzymes have specific requirements to achieve full activity ◦ enzymes can be kinetically characterized and can be inhibited	Ch. 6
Nov. 17	Continuation on Topic 5 - Enzymes	Ch. 6
Nov. 22	**In-Class Midterm 2 (Topic 3 + 4)**	
Nov. 24	Continuation on Topic 5 - Enzymes	Ch. 6
Nov. 29	<u>Topic 6 – Carbohydrates:</u> ◦ carbohydrates have the general formula $(CH_2O)_n$ ◦ monosaccharides are joined together via glycosidic bonds to form oligosaccharides and polysaccharides	Ch. 7
Dec. 01	Continuation on Topic 6 - Carbohydrates	Ch. 7
Dec. 06	<u>Topic 7 – Metabolism:</u> ◦ metabolic pathways ◦ metabolic control mechanisms	Ch. 13
Dec. 08	Continuation on Topic 7 - Metabolism	Ch. 11

Laboratory Schedule:

Week of	Laboratory of the Week
Sept. 12	*No lab*
Sept. 19	Introduction to BCH 297 Lab Tutorial: Case Study "One Headache After Another"
Sept. 26	Lab 1: Experimental Design to Purify Taq Polymerase
Oct. 03	Lab 2: Purification of Taq Polymerase ***Purification Protocol Due***
Oct. 10	Lab 3: Dialysis of the Purified Taq Polymerase
Oct. 17	Lab 4: Quantitation Analysis of Taq by Bradford Assay
Oct. 24	Lab 5: Qualification Analysis of Taq by SDS-PAGE Electrophoresis ***Material and Methods for Dialysis Due***
Nov. 07	*No Lab due to Fall Reading Week*
Nov. 14	Lab 6 (Part 1): Functional (Enzymatic) Analysis of Taq by Polymerase Chain Reaction
Nov. 21	Lab 7: Bioinformatics - Protein Sequence Analysis ▪ in the lab session, we will also run the agarose gel to analyze the products from PCR reactions in the week of Nov. 14 ***Material and Methods and Results for Protein Concentration Due***
Nov. 28	Open Lab Session ***Material and Methods and Results for Purity Analysis Due***
Dec. 05	***Material and Methods and Results for Enzymatic Activity Due***
Dec. 12	***Lab Report Due***

Assessment and Evaluation:

Evaluation Methods	Due Date	Weighting
pre- and post-lecture assignments on Achieve	multiple	15%
lab quiz	multiple	5%
lab assignments	multiple	10%
lab report	Dec. 12, 2022	15%
midterm Exam 1 (Topic 1 + 2)	Oct. 13, 2022	15%
midterm Exam 2 (Topic 3 + 4)	Nov. 22, 2022	15%
final exam (cumulative) 70-80% on new materials and 20-30% on materials covered in Midterm 1 and 2	Date: Saturday, Dec. 17, 2022 Time: 1-4 pm Location: A1085-2	25%
Total		100%

I. Achieve Pre- and Post-lecture Assignments: (15%)

• all Achieve assignments are due at 11:59 PM (MST) of the dates indicated below

Topics	Corresponding Chapter	Assignment Due Dates	
		Pre-lecture	Post-lecture
1	**2**	September 15	September 25
2	**3**	September 19	October 16
3	**4**	October 05	October 30
4	**5**	October 24	November 19
5	**6**	November 14	December 4
6	**7**	November 28	December 10

II. Lab Components: (total: 30%)

• lab quiz: 5%
• assignments: 10%
• lab report: 15%

Lab Report: (15%):

• group work
• maximum 10 double-spaced pages with typing font of 11-12 size
• submit through Turnitin via Moodle
• assignment and case study are due on the day assigned and attendance for all lab work is required to receive the marks
• the week after the experiment, each group is expected to submit a "draft" write up on protocol, material and methods, result, and discussion of the experiments performed and the lab instructor will provide feedback
• a *penalty of deducting 15% each day will be applied for late assignment submission.*

III. Midterm Exams: (15% each)

- focus on understanding the biological concepts rather than detail memorization
- NO make-up or deferred exam unless evidence of legitimate excuse, such as doctor's notes, is presented

IV. Final Exam: (25%)

- is *comprehensive* with concentration (~80%) on the materials covered after the midterm

Attendance:

Regular attendance will be essential for success on all exams and assignments. No points will be subtracted from your grade for non-attendance. However, in-class assignments and any in-class graded activities cannot be made up and, **if missed, will receive a grade of zero**.

- ***BCH 297 is offered as an in-person course; therefore, attendance is required and will be taken in every class to fulfill the contact tracing requirement imposed by Alberta Health Services***
- **laboratory attendance is mandatory!**
- attendance is required to obtain marks for in-class or in-lab assignments

Grade Summary:

Percent (%) to Letter Grade Conversion	Grade	Grade Point	Description
95.00% - 100%	A+	4.0	Excellent
87.00% - 94.99%	A	4.0	
80.00% - 86.99%	A-	3.7	
77.00% - 79.99%	B+	3.3	Good
73.00% - 76.99%	B	3.0	
70.00% - 72.99%	B-	2.7	
67.00% - 69.99%	C+	2.3	Satisfactory
63.00% - 66.99%	C	2.0	
60.00% - 62.99%	C-	1.7	
55.00% - 59.99%	D+	1.3	
50.00% - 54.99%	D	1.0	Minimal Pass
00.00% - 49.99%	F	0	Fail

Because of the nature of the Alpha 4.00 system, there can be no uniform University-wide conversion scale. The relationship between raw scores (e.g. percentages) and the resultant letter grade will depend on the nature of the course and the instructor's assessment of the level of each class, compared to similar classes taught previously.

Please note that final grades will be available on student registration system. Printed grade sheets are not mailed out.

Other:

Classroom Etiquette:

Electronic Devices

Although computers and tablets can be used in the class for taking lecture notes, cell phone usage is not permitted. Please turn cellular phones off - it is very distracting to hear someone's phone go off in class. Texting and movie watching are prohibited in class.

Attend every class

You will find that students who attend every class, listen to the instructor and take good notes will be more likely to pass (with a higher grade). If you have an emergency or illness, please contact me ahead of time to let me know that you will be absent.

Important note: if you miss a class it is your responsibility to meet with the instructor, outside of regular class time, to determine a plan to make up the missed work.

Get to Class On Time

Students, who walk into the classroom late or leave early, distract other students and disrupt the learning environment.

Do Not Have Private Conversations

The noise is distracting to other students. Also, talking to classmates during lecture and presentations disrupts the normal learning environment.

Do Not Get Up and Walk Out Halfway Through the Class

It disturbs people and gives the unmistakable impression that you don't respect the class, the other students or the instructor. The instructor has the right to finish his or her thought at the end of the class period and conclude the class in an orderly fashion without people standing up and walking out

Your Classmates Deserve Your Respect and Support

Others may have different ideas and opinions from yours, they may ask questions you perceive to be "stupid," but they deserve the same level of respect from you as you wish from them.

Academic Misconducts:

please refer to Ambrose Undergraduate Academic Calendar https://ambrose.edu/undergrad-academic-calendar/academic-information/academic-misconduct

Plagiarism:

Plagiarism is a very serious academic offence that involves presenting work in a course as if it were the result of one's own study and investigation when, in fact, it is the work of someone else. Plagiarism takes place when:

- an essay or other work is copied from another source, including your peer's work, and submitted as one's own
- parts of a work, including words, ideas, images or data, are taken from a source without acknowledgement of the originator
- work presented for one course is also submitted for another course without prior agreement of the instructors involved
- another person prepares the work that is submitted as one's own
- substantial editorial or compositional assistance from another person is received on work that is submitted as one's own

Cheating:

Cheating is also a very serious academic offence. Cheating on examinations, assignments and/or labs may take a number of forms, including:

- tampering or attempting to tamper with examination scripts, class work, grades or class records
- obtaining unauthorized assistance from anyone during the course of an examination
- impersonating another student during examinations
- falsifying or fabricating lab reports
- communicating with other students during an examination
- bringing unauthorized written material or electronic devices to an examination
- possessing, distributing, or attempting to possess or distribute unauthorized material in respect to examinations
- attempting to read the examination papers of other students
- deliberately exposing one's own examination papers to another student

Ambrose University Important Information:

Communication
All students have received an Ambrose e-mail account upon registration. It is the student's responsibility to check this account regularly as the Ambrose email system will be the professor's instrument for notifying students of important matters (cancelled class sessions, extensions, requested appointments, etc.) between class sessions.

Exam Scheduling
Students who find a conflict in their exam schedule must submit a *Revised Final Exam Time Application* to the Office of the Registrar by the deadline noted in the Academic Calendar. Requests will be considered for the following reasons only: 1) the scheduled final examination slot conflicts with another exam; or 2) the scheduled final examination slot results in three consecutive examination periods. Travel is not considered a valid excuse for re-scheduling or missing a final exam.

Standards of Behaviour in the Classroom Setting
Learning is an active and interactive process, a joint venture between student and instructor and between student and student. Some topics covered within a class may lead to strong reactions and opinions. It is important that Students understand that they are entitled to hold contradictory beliefs and that they should be encouraged to engage with these topics in a critical manner. Committing to this type of "active learning" significantly increases the learning experience for both teacher and student, and reflects the Christian imperative to pursue truth, which lies at the heart of the Ambrose educational experience. However, active discussion of controversial topics will be undertaken with respect and empathy, which are the foundations of civil discourse in the Classroom Setting. Primary responsibility for managing the classroom rests with the instructor. The instructor may direct a student to leave the class if the student engages in any behaviour that disrupts the classroom setting. If necessary, Ambrose security will be contacted to escort the student from class. Please refer to your professor regarding their electronic etiquette expectations.

Academic Integrity
We are committed to fostering personal integrity and will not overlook breaches of integrity such as plagiarism and cheating. Academic dishonesty is taken seriously at Ambrose University as it undermines our academic standards and affects the integrity of each member of our learning community. Any attempt to obtain credit for academic work through fraudulent, deceptive, or dishonest means is academic dishonesty. Plagiarism involves presenting someone else's ideas, words, or work as one's own. Plagiarism is fraud and theft, but plagiarism can also occur by accident when a student fails or forgets to acknowledge to another person's ideas or words. Plagiarism and cheating can result in a failing grade for an assignment, for the course, or immediate dismissal from the university. Students are expected to be familiar with the policies in the current Academic Calendar that deal with plagiarism, cheating, and the penalties and procedures for dealing with these matters. All cases of academic dishonesty are reported to the Academic Dean and become part of the student's permanent record.

Academic Policies
It is the responsibility of all students to become familiar with and adhere to academic policies as stated in the Academic Calendar. The academic calendar can be found at https://ambrose.edu/academics/academic-calendar

Privacy
Personal information (information about an individual that may be used to identify that individual) may be required as part of taking this class. Any information collected will only be used and disclosed for the purpose for which the collection was intended. For further information contact the Privacy Compliance Officer at privacy@ambrose.edu.

Coursework Extensions
Should a request for a time extension on coursework exceed the end of the term, a *Coursework Extension Application* must be completed and submitted to the Office of the Registrar. The extension (if granted) will be recorded on the student record. Extensions are granted at the discretion of the instructor and registrar. Normally, Course Extension Applications will be considered only when all of the following conditions are met:

- the quality of prior course work has been satisfactory;
- circumstances beyond your control, such as an extended illness or death of a family member, make it impossible for you to complete the course work on time; and
- you submit *Coursework Extension Application* to the Office of the Registrar on or before the deadline specified in the Academic Schedule.

If granted, time extensions do not excuse you from a final examination where one has been scheduled for the course. A temporary grade of TX will be assigned until a final grade is submitted in accordance with the new deadline. A final grade of F will apply to:

- all course work submitted after the end of the semester unless a coursework extension has been granted; and all course work submitted after the revised due date provided by an approved extension to coursework.

Academic Success and Supports

Accessibility Services
Academic accommodation is provided to Ambrose students with disabilities in accordance with the Alberta Human Rights Act and the Canadian Charter of Rights and Freedoms. Provision of academic accommodation does not lower the academic standards of the university nor remove the need for evaluation and the need to meet essential learning outcomes. Reasonable accommodations are tailored to the individual student, are flexible, and are determined by considering the barriers within the unique environment of a postsecondary institution. It can take time to organize academic accommodations and funding for disability-related services. Students with a disability who wish to have an academic accommodation are encouraged to contact Accessibility Services as early as possible to ensure appropriate planning for any needs that

may include accommodations. Staff can then meet with students to determine areas to facilitate success, and if accommodations are required, ensure those accommodations are put in place by working with faculty.

Ambrose Writing Services
Ambrose Writing services provides academic support in the four foundational literacy skills—listening, speaking, reading, and writing. It also assists students with critical thinking and the research process. Throughout the academic year, students can meet with a writing tutor for personalized support, or they can attend a variety of workshops offered by Academic Success. These services are free to students enrolled at Ambrose University. Academic Success serves all students in all disciplines and at all levels, from history to biology and from theatre to theology. To learn more, please visit https://ambrose.edu/sas/writing-services

Ambrose Tutoring Services
Ambrose Tutoring Services provides support in specific disciplinary knowledge, especially in high-demand areas such as chemistry, philosophy, math and statistics, and religious studies. These tutors also coach students in general study skills, including listening and note-taking. During the academic year, Ambrose Tutoring Services offers drop-in tutoring for courses with high demand; for other courses, students can book a one-to-one appointment with a tutor in their discipline. These services are free to students enrolled at Ambrose University. To learn more, please visit https://ambrose.edu/tutoring.

Mental Health Support
All of us need a support system. We encourage students to build mental health supports and to reach out when help is needed.

<u>On Campus:</u>
- Counselling Services: ambrose.edu/counselling
- Peer Supportive Listening: One-to-one support in Student Life office. Hours posted at ambrose.edu/wellness.
- For immediate crisis support, there are staff on campus who are trained in Suicide Intervention and Mental Health First Aid. See https://ambrose.edu/student-life/crisissupport for a list of staff members.

<u>Off Campus:</u>
- Distress Centre - 403-266-4357
- Sheldon Chumir Health Care Centre - 403-955-6200
- Emergency - 911

Sexual Violence Support
All staff, faculty, and Residence student leaders have received *Sexual Violence Response to Disclosure* training. We will support you and help you find the resources you need. There is a website with on and off campus supports – ambrose.edu/sexual-violence-response-and-awareness.

<u>Off Campus:</u>
- Clinic: Sheldon Chumir Health Centre - 403-955-6200
- Calgary Communities Against Sexual Abuse - 403-237-5888

Note: Students are strongly advised to retain this syllabus for their records.