

Course ID:	Course Title:	Winter 2018
BIO 231	Cellular and Molecular Biology	Prerequisite: BIOL 131 and BIOL 133
		Credits: 3

Class Information		Instructor Information		Important Dates	
Days:	Wednesday and Friday	Instructor:	Dr. Chris Wang	First day of classes:	Thu, Jan. 4
Time:	9:45 am – 11:00 am	Email:	chris.wang@ambrose.edu	Last day to add/drop, or change to audit:	Sun, Jan. 14
Room:	A2210	Phone:	(403) 410-2000 ext. 6910	Last day to request revised exam:	Mon, Mar. 5
Tutorial:	Monday 9:45 – 11:00 4m in A2210	Office:	L 2113	Last day to withdraw from course:	Fri, Mar. 16
		Office Hours:	Monday: 11 AM – 12 PM, Wednesday: 2-3 PM, or by appointment	Last day to apply for coursework extension:	Mon, Mar. 26
Final Exam:				Last day of classes:	Wed, Apr. 11

Course Description

This course examines the principles of cellular structure and function, as well as the interaction of cells with their environment.

Further Course Information:

A cell is the smallest unit of life. It is highly complex and organized so that cellular activities are precise and efficient. This course introduces students to the basic cell structures and their functions. Cellular processes including energy production, gene expression, reproduction and communication will be discussed.

Expected Learning Outcomes

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

1. Students will be able to identify basic cellular structures and explain their functions.
2. Students will be able to describe details of essential cellular activities.
3. Students will be able to corroborate etiology of some diseases to aberrant cellular component.

Textbooks

Gerald Karp. Cell and Molecular Biology: Concepts and Experiments. 8th Edition. John Wiley & Sons, Inc. ISBN: 978-1-119-24809-5.

Older editions of this textbook are acceptable. However, please take note of any updates and all references to the textbook in lectures and tutorials, such as figures and concepts, are based on the 8th edition.

Tentative Course Schedule:

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

Week of	Lecture Topic	Readings (Karp's 8 th Ed.)
	Tutorial Objective	
Jan. 05	Introduction to BIOL 231	
	NO Tutorial	
Jan. 08	Topic 1: The Structure and Function of the Plasma Membrane	Ch. 4
	Tutorial 1: Experiments/Techniques for Studying Plasma Membrane	
Jan. 15	Topic 1: The Structure and Function of the Plasma Membrane	Ch. 4
	Tutorial 2: more lecture on the structure and function of the plasma membrane	
Jan. 22	Topic 2: Cytoplasmic Membrane Systems: Structure, Function and Membrane Trafficking	Ch. 8
	Tutorial 3: In-Tutorial Assignment 01 - Plasma Membrane Assignment	
Jan. 29	Topic 2: Cytoplasmic Membrane Systems: Structure, Function and Membrane Trafficking	Ch. 8
	Tutorial 4: Experiments/Techniques for Studying Endomembrane Trafficking	
Feb. 05	Topic 2: Cytoplasmic Membrane Systems: Structure, Function and Membrane Trafficking	Ch. 8
	Tutorial 5: In-Tutorial Assignment 02 - Endomembrane Trafficking Assignment and Midterm Exam Review (Q/A) Session	
Feb. 12	<i>In-Class Midterm Exam (Feb. 14)</i>	
	Topic 3: Cytoskeleton and Cell Mobility	Ch. 9
	Open Tutorial: Presentation Preparation	

Feb. 19	Reading Week (NO CLASS!)	
Feb. 26	Topic 3: Cytoskeleton and Cell Mobility	Ch. 9
	Tutorial 6: Class Presentation on Cellular and Molecular Biology Techniques	
Mar. 05	Topic 4: The Nature of the Gene and the Genome	Ch. 10
	Tutorial 7: Class Presentation on Cellular and Molecular Biology Techniques	
Mar. 12	Topic 5: The Central Dogma: DNA to RNA to Protein	Ch. 11
	Tutorial 8: Class Presentation on Cellular and Molecular Biology Techniques	
Mar. 19	Topic 6: Control of Gene Expression	Ch. 12
	Tutorial 9: In-Tutorial Assignment 03 - The Cytoskeleton and Cell Motility Assignment	
Mar. 26	Topic 7: Cell Division	Ch. 14
	Tutorial 10: In-Tutorial Assignment 04 - DNA Structure and The Central Dogma Assignment	
Apr. 02	Apr. 04 - Ambrose Research Conference (ARC) – No Class	
	Apr. 06 - Cell Division	Ch. 14
	Tutorial 11: In-Tutorial Assignment 05 - Cell Division Assignment	
Apr. 09	Topic 8: Cell Signaling and Signal Transduction: Communication between Cells	Ch. 15
	Tutorial 12: Open Tutorial - Final Exam Review (Q/A) Session	

Requirements:

- Students are encouraged to read the corresponding chapter prior to attending lectures.
- Students are encouraged to generate their own notes according to their learning styles.
- All lecture PowerPoints and tutorial assignments will be posted on Moodle.
- Tutorials are designed: (1) to understand the landmark experiments in cellular and molecular biology; and (2) to review the lecture topics and key concepts in preparation for tests. Tutorial assignment submission deadlines are on the day of the tutorial.

Attendance:

- No lecture attendance will be taken. However, students, who absent from lecture(s), are responsible for the course materials covered.
- doctor's notes are required for deferred midterm and final exams
- attendance will be taken in tutorial when in-tutorial assignments are given

Evaluation Methods:

Evaluation Methods	Due Date	Weighting
pre-topic learning	multiple	10%
in-tutorial/post-topic assignments	multiple	25%
in-tutorial presentation	Feb 26 th – Mar. 12 th	7%
Midterm Exam	Feb. 14, 2018	25%
Final Exam (cumulative)	Apr. 13 at 9 am in A2210	33%
Total		100%

Pre-Topic Learning: (10%)

- work in a group of 2-3
- submit a single-page, typed reading notes (can be in any format)
- make sure to include all the names of the group members in the assignment
- on-line submission via Turnitin in Moodle with file name: BIO 231 – XX (XX is the initial of the submitter)
- it is important NOT to plagiarise

Group Members:

Name	E-mail	Cell

In-Tutorial/Post-Topic Assignments: (25%)

- work in a group of 2-3 students
- e.g.* critical thinking questions, problem solving questions, simple experimental design
- assignment is due on the day of the tutorial and your attendance is required to receive the marks
- NO deferred assignment due to absence (unless pre-arrangement was made)

In-Tutorial Presentations: (7%)

- topic selection is on first come first serve basis (sign-up sheet posted on office door)
- 5 out of the total 7% is based on the quality of presentation
 - e.g.* how the techniques are performed
 - e.g.* what were the important discoveries made using these techniques/organisms
- 2 out of the total 7% is for the submission of the potential exam questions per group
 - two multiple-choice questions with A to E choices are required from each group
 - questions must belong to the topics presented by other groups (*i.e.* NOT your own topic)

Midterm Exam: (25%)

- only materials covered in the lectures will be tested
- 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

Final Exam:

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

Grade Summary:

Percent (%) to Letter Grade Conversion	Grade	Grade Point	Description
90.00% - 100%	A+	4.0	Excellent
85.00% - 89.99%	A	4.0	
80.00% - 84.99%	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	Minimal Pass
50.00% - 54.99%	D	1.0	
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.

Potential Topics for Techniques in Cell and Molecular Biology

1. Model Organisms: (4 presenters – 20 minutes)

- *Saccharomyces cerevisiae* and *Saccharomyces pombe*
 - *Caenorhabditis elegans* and *Drosophila melanogaster*
 - sea urchin and *Xenopus laevis*
 - mice
 - *Arabidopsis thaliana*
-

2. microscope: (4 presenters – 20 minutes)

- fluorescence microscopy and related fluorescence-based techniques (18.3)
 - transmission electron microscopy (18.4)
 - scanning electron microscopy (18.6)
 - specimen preparation for electron microscopy (18.5)
 - single-molecule fluorescence microscopy
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3. cell culture and cell fractionation: (2 presenters – 10 min)

- cell culture (18.9)
 - fractionation of cellular contents (18.10)
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4. protein chromatography: (2 presenters – 10 min)

- purification and characterization of proteins by various liquid column chromatography methods, such as affinity column, size exclusion column (18.11)
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5. protein electrophoresis: (2 presenters – 10 min)

- characterization of proteins by polyacrylamide gel electrophoresis (18.13)
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6. determining protein-protein interaction: (4 presenters – 20 minutes)

- yeast-two hybrid (18.12)
- co-immunoprecipitation followed by mass spectrometry (18.15)
- co-immunoprecipitation followed by immunoblotting (Western blot)

7. recombination DNA technology: (4 presenters – 20 minutes)

- polymerase chain reaction (PCR)
- restriction endonucleases (18.20)
- formation of recombinant DNAs (18.20)
- DNA cloning (18.20)

8. DNA library: (2 presenters – 10 min)

- cDNA libraries (18.23)
- gDNA libraries

9. transgenic organisms: (2 presenters – 10 min)

- DNA transfer into eukaryotic cells and mammalian embryos (18.24)

10. gene silencing techniques: (4 presenters – 20 minutes)

- site-directed mutagenesis, RNA interference, morpholino, and knockout mice

11. genome editing techniques: (4 presenters – 20 minutes)

- transposons
- CRISPR-Cas9
- Zinc-Finger Nucleases (ZFNs)
- Transcription Activator-Like Effector Nucleases (TALENs)
- recombinant Adeno-Associated Virus (rAAV)

12. DNA sequencing: (4 presenters – 20 minutes)

- traditional Sanger DNA sequencing method (18.22)
- next generation and third generation sequencing methods

13. Synthetic Cells: (2 presenters – 10 min)

- history research current advances in synthetic cells and organisms

14. System Medicine: (2 presenters – 10 min)

- current advances and the future of system medicine

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.

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 Academic Policies:

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. If students do not wish to use their Ambrose accounts, they will need to forward all messages from the Ambrose account to another personal account.

Registration

During the **Registration Revision Period** students may enter a course without permission, change the designation of any class from credit to audit and /or voluntary withdraw from a course without financial or academic penalty or record. Courses should be added or dropped on the student portal by the deadline date; please consult the List of Important Dates. After that date, the original status remains and the student is responsible for related fees.

Students intending to withdraw from a course after the Registration Revision Period must apply to the Office of the Registrar by submitting a "Request to Withdraw from a Course" form or by sending an email to the Registrar's Office by the **Withdrawal Deadline**; please consult the List of Important Dates on the my.ambrose.edu website. Students will not receive a tuition refund for courses from which they withdraw after the Registration Revision period. A grade of "W" will appear on their transcript.

Students wishing to withdraw from a course, but who fail to do so by the applicable date, will receive the grade earned in accordance with the course syllabus. A student obliged to withdraw from a course after the Withdrawal Deadline because of health or other reasons may apply to the Registrar for special consideration.

Exam Scheduling

Students, who find a conflict in their exam schedule must submit a Revised Examination Request form to the Registrar's Office by the deadline date; please consult the List of Important Dates. Requests will be considered for the following reasons only: 1) the scheduled final examination slot conflicts with another exam; 2) the student has three final exams within three consecutive exam time blocks; 3) the scheduled final exam slot conflicts with an exam at another institution; 4) extenuating circumstances. Travel is not considered a valid excuse for re-scheduling or missing a final exam.

Electronic Etiquette

Students are expected to treat their instructor, guest speakers, and fellow students with respect. It is disruptive to the learning goals of a course or seminar and disrespectful to fellow students and the instructor to use electronics for purposes unrelated to the course during a class session. Turn off all cell phones and other electronic devices during class. Laptops should be used for class-related purposes only. Do not use iPods, MP3 players, or headphones. Do not text, read, or send personal emails, go on Facebook or other social networks, search the internet, or play computer games during class. Some professors will not allow the use of any electronic devices in class. The professor has the right to disallow the student to use a

laptop in future lectures and/or to ask a student to withdraw from the session if s/he does not comply with this policy. Repeat offenders will be directed to the Dean. If you are expecting communication due to an emergency, please speak with the professor before the class begins.

Academic Policies

It is the responsibility of all students to become familiar with and adhere to academic policies as stated in the Academic Calendar. 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.

Extensions

Although extensions to coursework in the semester are at the discretion of the instructor, students may not turn in coursework for evaluation after the last day of the scheduled final examination period unless they have received permission for a course Extension from the Registrar's Office. Requests for course extensions or alternative examination time must be submitted to the Registrar's Office by the deadline date; please consult the List of Important Dates. Course extensions are only granted for serious issues that arise "due to circumstances beyond the student's control."

Appeal of Grade

An appeal for change of grade on any course work must be made to the course instructor within one week of receiving notification of the grade. An appeal for change of final grade must be submitted to the Registrar's Office in writing and providing the basis for appeal within 30 days of receiving notification of the final grade, providing the basis for appeal. A review fee of \$50.00 must accompany the appeal. If the appeal is sustained, the fee will be refunded.

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 college. 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.

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