

# Biology 217D -- Introduction to Cell Biology

## Fall 2014

Class Time: TRF 4 - 4:50      Room: 1437 Instructor: Dr. Pliny Hayes  
Office: 1607I Phone: 403.343.4058 email: pliny.hayes@rdc.ab.ca

**Office hours:** M T R: 10:00 --11:00

I will (attempt to) be in my office at the above hours, although sometimes meetings are called at short notice and I might have to cancel with little warning. If you cannot see me then, phone or see me after class to arrange an appointment for some other time. I am often in my office at other times during the day, so please stop in if you are in the area to ask a question or to simply introduce yourself.

### Academic Calendar Entry:

An introduction to cellular and molecular biology. Topics include: biological macromolecules; membrane structure and function; cellular structure; bioenergetics and energy flow; respiration and photosynthesis; cell division and the cell cycle; DNA structure and replication; transcription and translation; recombinant DNA and genetic regulation.

**Credit hours:** 4

**Prerequisites:** Biology 30 & Chem 30

**Learning Activities:** The nature of the course requires that the majority of the class material will be delivered by lecture, but time is set aside in every session for questions and ensuing discussion. The labs will involve intense group work involving experimental design and scientific writing as well as the acquisition of a variety of technical abilities.

**Learning Outcomes:** The course is meant to prepare you to be a biologist. By the end of the course I expect you to have a command of the basic concepts and facts of cellular biology, but I expect a great deal more as well. Science is not a pile of facts, it is a process; to participate effectively in that process you need mental and physical skills as well as facts. In the lecture and on exams I will encourage you to develop analytical and critical-thinking skills. In the lab you will be encouraged to work as a team member and to develop the abilities to write fluently, to present technical data coherently, and to speak effectively in public.

### Required Texts:

- 1) *Campbell Biology, 10<sup>th</sup> Ed.*, Reece et al., Benjamin Cummings, 2014.
- 2) Biology 217 Lab related files and the Guide to Producing a Scientific Paper are available on Blackboard

### Academic Misconduct:

Please become familiar with what constitutes academic misconduct, as well as the consequences. Plagiarism involves submitting work in a course as if it were the student's own work. Plagiarism may involve the act of submitting work in which some or all of the phrasing, ideas, or line of reasoning are alleged to be the submitter's own but in fact were created by someone else. The complete RDC policy is available at: [http://www.rdc.ab.ca/about/standard\\_practices/documents/student\\_dispute\\_appeal\\_and\\_misconduct\\_processes\\_policy.pdf](http://www.rdc.ab.ca/about/standard_practices/documents/student_dispute_appeal_and_misconduct_processes_policy.pdf). The lecture portion of the course involves in-class midterms and a final, so submission of others' works is not a problem, but in lab reports the option is there. Don't take it. My policy is to assume that you are honest until you force me to conclude otherwise. I recognize that there are many diversions in college life and that biology (fascinating as it is) may not be your first priority; if you choose to not do the work, that is understandable in a wide variety of contexts. The grade I assign at the end of term is simply a measure of your performance in the course, not my judgment of your value as a human being. However, if you choose to not work in this course (or any other) you should not attempt to get an undeservedly high grade by being dishonest. Even if you are not caught, you know that you have been dishonest and that is no way to live your life. Taking responsibility for one's actions is a measure of being an adult. As well, if you cheat you may well get away with it for a while, but if you adopt cheating as a strategy you will eventually be caught. I understand that cheating is sometimes rewarded in other professions, but in academics there is no second chance. Your reputation for honesty is your most important possession, for once that is lost your career is over -- all your years of study are worthless, and you have to start again at the bottom of some other field.

The high regard that academics have for one another is not simply the clan-loyalty of a bunch of geeks; it is a genuine appreciation of colleagues who have chosen to live honorably.

**Deferred Exams:** A student who has missed or will miss a final exam because of illness, domestic affliction, or other compelling reason should let me know as soon as possible, and must apply to the registrar for a deferred final exam. Be prepared to supply a doctor's note or other verification.

**Supplemental Exams:** If a student feels that s/he has not performed as well as expected on the final exam, s/he may apply for a supplemental exam subject to the following conditions: 1) a fee will be charged; and 2) each student is allowed to write a maximum of two supplemental exams per year.

**Laboratories:** Information on individual lab times, rooms, and instructors will be posted separately.

**Assessment of Student Performance:** Throughout the term your abilities will be formally assessed in the laboratory based upon lab reports, and in lecture by your performance on two midterm exams and a final exam. The laboratory marks will be given as points (to a cumulative maximum of 300); the lecture exam marks will be given as percentages. At the end of the term, these marks will be the major determinant in assigning a letter grade reflecting your overall performance. However, your lecture mark might be increased by an additional two points based upon in-class performance. Your letter grade (see Red Deer College Calendar for details) will be based upon your adjusted relative position within the class and on my impression of the skills of the class as a whole relative to previous classes. Thus, if this year's class is exceptional, I will award more A's than has been usual in the past. Please note that the converse is also true, of course.

First Exam	24%
Second Exam	24%
Final Exam	24%
Laboratory	28%

The exams will not be cumulative in terms of detailed questions, but you will be expected to understand and be able to make use of material and concepts covered in earlier examinations. They will consist of short answer and extended answer written questions. There will be no multiple-choice questions. **NOTE:** Students should be aware that Alberta universities might not accept a grade lower than C-.

**Attendance:** You are strongly urged to attend all classes, as there is a very strong correlation between attendance and grades. If you do miss a class, you should arrange to borrow notes from another student, because you are responsible for all material discussed in class.

### Important dates:

03 Sep	First Day of Classes
13 Oct	Thanksgiving Day. College closed.
10 Nov	Final examination schedule posted
10 Nov	College Open. No credit classes
11 Nov	Remembrance Day. College Closed
03 Dec	Last day to withdraw from Fall Term 2014 courses and receive a WD on transcript
03 Dec	Last day of classes for Fall Term courses
08 Dec	First day of final examinations for Fall Term 2014 courses
13 Dec	Last day of final examinations for Fall Term 2014 courses

### General Information:

- This course may be eligible for Prior Learning Assessment. Students should refer to the RDC Course Calendar for a list of excluded courses.
- Classroom Learning Resources may be available to students in alternative formats.
- Students should be aware that Personal Counselling, Career, Learning and Disability Services are provided by RDC. Inquire about locations at Information Desk. It is the

student's responsibility to discuss their specific learning needs with the appropriate service provider.

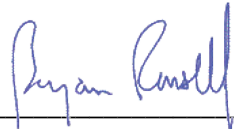
- It is the student's responsibility to be familiar with the information contained in the Course Outline and to clarify any areas of concern with the instructor.
- Students should refer to the Student Dispute, Appeal and Misconduct Processes Policy and Standard Practice should questions or concerns about the Course Outline not be resolved directly with the instructor.

**Midterm Feedback:** Midterm feedback for this course will be available from the instructor following marking of the first midterm examination.

**The RDC Final Examination Policy** will be followed with respect to Final Examinations. Please review this document to ensure you understand the contents and implications of the policy.

**Material and Special fees:** There is a *materials fee* of \$20.00 associated with BIOL 217 to cover [consumable lab supplies for use in](#) the laboratory. Please note that since you have already paid the fee with your tuition, this notice is not included here for your action; it is included merely to meet the RDC policy requirement for such a notice in this course outline.

**Changes to Course Outline:** Changes to the course outline may be made after the first class providing this is done in consultation with the students and reviewed by the Department Chairperson for completeness and consistency with all applicable college policies.

Chairperson  \_\_\_\_\_  
Date: 2 September 2014

**Course Topics:** The course is divided into 3 major sections that correspond to the material on the exams.

Topic #		10 <sup>th</sup> edition	9 <sup>th</sup> Edition
1	Introduction and overview of the course: big ideas	1-9, 16-24	1-11, 18-24
	<b>CELL ULTRASTRUCTURE</b>		
	<i>Chemistry of Life</i>		
2	The nature of atomic bonds; preconceptions/misconceptions	28-41	30-43
3	Properties of water	44-49	46-51
4	Macromolecules	58-64, 66-89	60-66, 68-89
	<i>The Cell</i>	206-207	
5	Membranes and membrane transport	124-138	125-139
6	Classification of life	93-97, 562-572	94-97, 551-560
7	Organelles	97-112, 351-352, 122	98-108, 343, 123
8	The cytoskeleton	112-117	112-118
9	Cell surfaces and junctions	118-121	118-121
10	Cell Communication	210-227	206-223
	<b>ENERGY FLOW IN LIVING SYSTEMS</b>		
11	Thermodynamics; preconceptions/misconceptions	141-159, 162-167	142-160, 163-167
	<i>Cellular Respiration</i>		
12	Glycolysis	168-169	167-169
13	The Krebs cycle	110, 169-171	109-110, 170-172
14	Chemiosmosis	172-176	172-177
15	Anaerobic respiration, metabolic integration, and summary	177-182	177-181
	<i>Photosynthesis</i>		
16	The light reactions	110-111, 185-199	110-111, 185-197
17	The Calvin cycle	199-200	198-199
18	Photorespiration and summary	201-205	199-203
	<b>INFORMATION FLOW IN LIVING SYSTEMS</b>		
19	Eukaryotic cell division – mitosis; preconceptions/misconceptions	232-248	228-243
20	DNA; preconceptions/misconceptions	312-318	305-310
21	DNA Replication	318-327	311-319
22	Genes, RNA, proteins, and the genetic code (overview)	333-340	325-331
23	Transcription and processing	340-344	331-336
24	Translation	345-351, 357	337-342, 346-348
25	Gene regulation in <i>E. coli</i>	360-364	351-356
26	Bacteriophage, viruses, and prions	392-406	381-394
27	Biotechnology (time permitting)	408-417	396-401

The assigned pages are meant as a guide to appropriate material, not as specific reading assignments. For the exams you will be responsible for the material covered in class unless specifically informed otherwise.

Finally, I give you three quotations that I include in every course outline I distribute. You should read the first quote at least once a term until you finish your scholastic career. I am not joking. In the second quote note that television is omitted from the list of demon voices for the simple reason that Isherwood was writing in 1949. The third quote, by a philosopher of science, is an observation that can help you become a better biologist. Enjoy.

From the very beginning the child is trained to think ... in terms of comparison, of success and of failure. It is a weeding out system: the weaker get discouraged and fall out; a system designed to produce a few winners who are always in competition with each other... The other thing taught from the start is to distrust one's own judgment. Children are taught submission to authority, how to search for other people's opinions and decisions, and how to quote and comply... It may be that there is no other way of educating people. Possibly, but I don't believe it. In the meantime it would be a help at least to describe things properly, to call things by their right names. Ideally, what should be said to every child, repeatedly, throughout his or her school life is something like this:

"You are in the process of being indoctrinated. We have not yet evolved a system of education that is not a system of indoctrination. We are sorry, but it is the best that we can do. What you are being taught here is an amalgam of current prejudice and the choices of this particular culture. The slightest look at history will show how impermanent these must be. You are being taught by people who have been able to accommodate themselves to a regime of thought laid down by their predecessors. It is a self-perpetuating system. Those of you who are more robust and individual than others will be encouraged to leave and find ways of educating yourself – educating your own judgment. Those that stay must remember, always and all the time, that you are being moulded and patterned to fit the narrow and particular needs of this particular society."

-- Doris Lessing

To live sanely... you have to cultivate the art of staying awake. You must learn to resist (firmly, but not tensely) the unceasing hypnotic suggestions of the radio, the billboards, the movies, and the newspapers, those demon voices which are forever whispering in your ear what you should desire, what you should fear... the least wandering of the attention, the least relaxation of your awareness, and already the eyelids begin to droop, the eyes grow vacant, the body starts to move in obedience to the hypnotist's command... Wake up, wake up.

-- Christopher Isherwood

In general there are two ways of looking at what goes on in the world around us. In the more familiar, which derives from the cultural heritage of the Judeo-Christian and Graeco-Roman traditions within which modern science is done, the world is composed of isolable entities - electrons, or atoms, or molecules, or organisms, or tables and chairs - which possess discrete properties and interact with one another according to definable laws. In the second, less familiar view, the world is one of continuous process, out of which transitory entities occasionally crystallize... This latter way of conceptualizing the world is perhaps more akin to non-Western philosophical traditions, such as those of India and China. For most of the past hundred years, theorists have had to come to terms with such a world-view, for instance when they alternate between treating light as a stream of particles and as a wave, or when their mathematical symbolism demands that they speak of magnetic or gravitational fields. Many of the problems in the biological sciences derive from the cultural difficulty we [in the West] have in perceiving a world of fields and processes rather than of objects and properties.

-- Steven Rose