BIOL 4150 Cellular Regulation
Imogen R. Coe
(with thanks to Tanya Noel)

Housekeeping Stuff:
Calendar Description: A detailed examination of molecular, cellular and physiological processes associated with the action of peptide hormones, neuro-transmitters and growth factors. Emphasis is on cell receptors and signal transduction mechanisms involving cyclic nucleotides and calcium. Three lecture hours. One term. Three credits.

Prerequisites: SC/BIOL 2020 4.00; SC/BIOL 2021 4.00; SC/BIOL 3010 3.00 and SC/BIOL 3110 3.00 strongly recommended as prerequisites or corequisites.

Course Director: Dr. Imogen Coe, Rm 247 Farquharson x77848
Office hours: By appointment only through Mrs. Audrey Johnson (ajohnson@yorku.ca)
E-mail: coe@yorku.ca (I try to answer questions promptly but please be aware that I get an enormous number of e-mails everyday and may not be able to respond within 24 hours)

Learning objectives:
Upon successful completion of BIOL 4150 3.0, students will be able to:
- explain major concepts, breakthroughs, "hot topics", controversies, methodologies and issues in cellular regulation, demonstrating detailed knowledge in certain topics (i.e. listed course topics).
  (More details will be provided for particular concepts/methodologies/issues during the course.)
- gather, review, evaluate and interpret information relating to cellular regulation from a variety of sources including peer-reviewed literature, major reviews, popular writing in science and the news media.
- apply learning and demonstrate the ability to integrate information from other areas (e.g. biochemistry, genetics) to an advanced level of understanding of recent findings in cellular regulation.
- identify gaps in the field of cellular regulation and/or identify controversies that need to be resolved experimentally.
- develop experimental strategies to answer questions in cellular regulation
- propose, design and predict the outcome of experimental strategies
- identify major areas of research in cellular regulation that are relevant to society (e.g. dysfunction in cellular regulation relating to disease)
- communicate (orally and in writing) all the the above to both peers, a general scientific audience and to a lay audience.
- effectively and collegially work with others in the class setting.

Accommodation Statement:
Students who feel that there are extenuating circumstances that may interfere with their ability to successfully complete the course requirements are encouraged to discuss the matter with the Course Director as soon as possible.

Students with physical, learning or psychiatric disabilities who require reasonable accommodations in teaching style or evaluation methods are encouraged to consult with the

Office for Persons with Disabilities (OPD) and ensure that requests for appropriate accommodations are arranged with the Course Director early in the term.

Academic integrity:
Students are expected to be familiar with and follow York University's policies regarding academic integrity. Please consult the lab manual and website below for more details:
http://www.yorku.ca/academicintegrity/students/index.htm

Student information sheet – please see:
http://www.yorku.ca/secretariat/senate/committees/ccas/documents/Course%20Outline%20-%20Student%20%20Info%20Sheet%20-%20March%2027-06.htm

Planned course topics:
In the context of particular issues/cases/problems, we will explore key aspects of:

- History of cellular regulation
- Themes in cellular regulation

Policies:
1. If you miss a test with a legitimate documented reason, permission may be granted to take a makeup test. Only a "York Attending Physician's Statement Form" (can be downloaded as part of the Petitions Package or obtained from me) OR a similarly detailed doctor's note (i.e. not a form stating that the student visited a clinic) will be accepted for medical excuses. All documentation supporting your excuse for missing a test must be received by me within 2 weeks of the missed test.

2. The tests and final exam will include written questions. If you believe that an answer on a test was marked incorrectly, you must submit your (written) rationale and paper for remarking within 1 week of the test being made available to you (if you completed your test in ink). ***Note: Remarking can result in the mark being raised, confirmed or lowered.***

3. In order to be fair and consistent with regards to the entire class, individual grades are not negotiable. **Contact me about marks ONLY if there is a clear error in your mark** (calculation, clerical, etc.) as soon as possible at micro@yorku.ca. It is highly unlikely that you will receive a response regarding any other mark-related queries.

4. Students who do not write the final exam, but have completed all midterms and project assignments by the scheduled dates, must contact me for permission to write a deferred exam (i.e. sign the Deferred Standing Agreement form). It is Senate Policy that "*Normal requests for deferred standing must be communicated within one week following a missed examination, or on the last day to submit course work*". Please check out the Registrar's Office Deferred Standing FAQs (http://www.registrar.yorku.ca/services/ds_faq.htm) for more details. Students who have missed one or more midterms (or other major components) will likely be required to petition to write a deferred exam.

Objectives:
1. The big questions driving this course are:

- What is "Cellular Regulation"?
- What do scientists mean by the term "Cellular Regulation"?
- How do scientists study "Cellular Regulation"?

- What are the big breakthroughs in “Cellular Regulation”?
- What do lay people understand by the term “Cellular Regulation”?
- What do you need to know about cellular regulation as an upper-year biology student?
- What do you need to know about cellular regulation as an informed citizen?

Some notes about this course:

- I will not stand in front of you and lecture for 3 hours.
- Science is dialogue. I expect you to contribute and speak up.
- I want to know what you want to know – this is a “design it yourself” course (with boundaries)
- There will not be a final exam. There will be a major grant proposal to write because this is a better test of your understanding and ability to integrate ideas. This is also much closer to what real scientists studying cellular regulation do.
- To write a good grant proposal, you will need to learn about key issues and concepts in cellular regulation by reading the primary literature and recent reviews, identify gaps in the field, synthesize hypothesizes or develop models that will explain those gaps that can be tested experimentally (hypothesis driven research) and design experiments that will answer those questions and either confirm your hypothesis or provide data that will advance the understanding of that area of interest.
- Class time should be focused on interesting/complicated/problematic topics, rather than material that is easy to learn (e.g. from reading the text). I will not be testing anyone’s ability to memorize and regurgitate.
- To deal with complex issues, you will need to be able to apply and integrate information, and use problem-solving skills.
- I’ll happily share the resources I’ve got, but you’ll need to seek, read and understand those resources.
- Please ask me for guidance – I’m here to help you learn. I’ll try to highlight what I think students might have trouble with anyhow, but you can (and should) direct me to concepts you find problematic so that we can explore them in class.

If/when you encounter problematic concepts – you can:

- talk to your fellow students (in lab, in Moodle, in study groups)
- seek and read additional reference sources
- talk to me in class
- give input in Moodle quizzes/surveys

What will we do in class?

Specific examples or issues will be reviewed/discussed in class in the context of real-world problems, news stories, issues and/or recent research reports. Class time will provide an opportunity to discuss and explore aspects of topics that might be more difficult to learn on your own. Thus, it will be most effective if you have read the appropriate portions of the textbook and other recommended references prior to class. Confusing or problematic aspects can be brought up ahead of time or in class. (Mini-assignments/activities may be based on these topics, or others.) We may also have some guest experts in some classes.

A few example topics are listed below, with the themes that will be used in understanding and discussing the particular item/issue. **We will look at additional topics, and even the example topics are subject to change.**

- Cellular Regulation – a short history
- Cellular Regulation – why should we care
- ***Cellular Regulation in the news***

Course components:

Class: Tuesday 6:30 – 9:30 PM

Website: The BIOL 4150 Moodle site will include announcements, course materials, resources and a discussion forum.
http://moodle.yorku.ca or https://moodle08.yorku.ca/moodle/

Text/Readings: Readings (e.g. review and primary research articles) will be assigned during the course. Articles will be available through the York libraries. Some assignments will also require additional research and reading of scientific literature.

Evaluation:

One page summary explaining in **lay terms** a major breakthrough in Cellular Regulation:
10% **End Jan/early Feb?**
Critical Analysis of an assigned paper: 15% **Late Feb/Early Mar?**
Mini-assignments/Activities (e.g. newspaper article analysis, popular media analysis, etc.): 10%
Grant Proposal: 55%

Evaluation may be revised before Jan. 18. Details regarding the midterm/exam format, project components and mini-assignments and activities will be provided in class and in Moodle. The W term drop date is **Feb ??? 2010** .

Lecture Schedule (latest version, Jan 19 –subject to change)

1. Jan 5: Introduction

2. Jan 12: Lecture plan
Evaluation breakdown

1) Take a lay article (must be approved by CD) and critique it – provide a two-page summary of the article. Aim here is to demonstrate that you can critically evaluate science as reported around you in all sorts of different media and forums. Quality of science reporting ranges from very good to extraordinarily bad. Pick an article and highlight the strengths and weaknesses of the science reporting. Does it refer the reader to the original work? Does it cite the original work correctly? Is the original work worthy of a lay article of this sort? Provide, with the two page summary, the original article(s) on which the lay article was based.

Value of work = 15% (at least 5% will be for quality of writing, 10% for critical analysis and evaluation).

2) Take a "breakthrough" scientific article from the peer-reviewed literature (must be approved by CD), published within the last 12 months and write a one page lay piece on it. Provide the one page lay summary plus the original article.

Value = 15%. Aim is to demonstrate an understanding of the original article PLUS the relevance of the breakthrough to both the field and the broader community and to be able to communicate the science to a lay population. Must demonstrate ability to summarize scientific writing in a way that clearly communicates the science (background, nature, relevance, methodology, significance, etc.) to the general public.

3) Review of HOT PAPER – pick a major paper that piques your interest – for instance, something from the 2009 Nature Cell Biology journal and write a review of the paper. Maximum 5 pages. Paper MUST be approved by CD. Value =30%. Aim is to practise and demonstrate skills in critically reading original research papers. Things to consider:

4) Mini-grant proposal. Value = 40%. Take an area of cell biology that interests you (perhaps the topic of the HOT PAPER you picked) and write a mini-grant proposal. Maximum five pages (not including references). Identify field of research, name the gaps or unknowns in that field, questions remaining to be answered, provide context to proposed research. Possibly develop a working model or hypothesis that can be tested. Provide an experimental protocol or outline, perhaps statistical analyses that will provide data which will confirm or refute the working hypothesis or model or provide answers the questions in the field. Explain how the data from your proposed experiments will be used and how they will inform you. What will you do next? How will your findings advance the field and what future studies might be useful if all your proposed experiments work. What will you do if none of your experiments work or if they suggest an alternate hypothesis?

Topic for study: Go over a popular article from mass media in science.
Group study – identify factors that need to be addressed in popular articles.
Discussion
Group study – compare original article with the report.
Discussion
What do you need to know to evaluate the article. Do you know what you don't know?

Cellular regulation: Steroid hormones – focus on future studies – gaps in the field – working towards a mini-grant proposal. What are the questions that need answering? How will they be answered? What are the techniques involved in these studies.
What do you already know about steroid hormones?

3. Jan 19: Go over a breakthrough paper and turn it into a lay article.
Group study -

4. Jan 26: Summary of lay article due

5. Feb 2: CLASS CANCELLED

6. Feb 9: Summary of science article due

Feb 16 – READING BREAK – no class

7. Feb 23:

8. Mar 2.

9. Mar 9. Critical analysis of HOT PAPER due

10. Mar 16. Draft outline of mini-grant proposal (advised)

11. Mar 23.

12. Mar 30. Mini-grant proposal due.