

## BIOL 634 Advanced Cell Biology – Fall, 2021

### 1. General information

**Professor:** Dr. Alisa Piekny

**E-mail:** alisa.piekny@concordia.ca

**Office hours:** Virtually or in-person by appointment (SP437.15), and immediately before and/or after most lectures

### 2. Course Description

This course will cover cell biology of eukaryotic cells from yeast to mammalian cells including topics such as signaling, trafficking, cell cycle, migration, apoptosis, polarity, and cancer.

#### Topics\*

Introduction to cells  
Techniques for studying cells  
Model organisms  
Cell signaling  
Microfilaments, microtubules and their motors  
Vesicle trafficking  
Nuclear transport, breakdown and re-assembly  
Cell cycle regulation  
Chromatin and chromosomes  
DNA replication, repair, recombination  
Mitosis  
Cytokinesis  
Polarity, stem cells and asymmetric division  
Apoptosis  
Cancer  
Cell junctions and migration  
Plant cell growth and division

\*Time-dependent

Readings are from a range of articles (URL links will be posted on Moodle – you may need to login to the Concordia network to access the links). For background reading, you can refer to textbooks (e.g. Molecular Cell Biology 7<sup>th</sup> Edition, by Lodish et al.; The Cell Cycle Principles of Control by David O. Morgan, versions available through the library).

### 3. Objectives

Students should acquire a comprehensive understanding of the topics listed above including fundamental concepts and their experimental foundations. Students will learn to read scientific research articles, and will gain both written and oral communication skills.

#### **4. Schedule (Subject to Change)**

**Lectures:** Wednesdays and Fridays, 10:15-11:30 in room CC-115 from Sept. 8<sup>th</sup> – Dec. 3<sup>rd</sup>, 2021 (possible make-up day Dec. 7<sup>th</sup>, 2021).

**Midterm assignment due on October 8<sup>th</sup>, 2021.**

**In-class presentations will begin on Oct. 13<sup>th</sup>, 2021. Article summaries are due on the day of the presentations.**

**Final exam – TBD, scheduled by the Exam's Office.**

#### **5. Course Material**

**Reading for the various topics will be posted on the course website to improve your understanding of the material. Slides will be posted for students to view in a flexible manner. Recorded lectures will be posted for some modules (e.g. for lectures prior to student presentations).**

The assigned readings are from research articles, review articles, and textbooks. Multiple readings are provided to give different coverage of more complex topics. The sources of these readings are:

1. Vanier Library [Reserves](#) has many, but not all, readings as pdf files or hardcopy books.
2. Links, and a list of readings can be found on the Moodle site for the course for each lecture. Most are only available once logged onto the Concordia vpn or the library e-journals webpage.

#### **6. Grading**

##### **Biol 634:**

Midterm assignment due Oct. 8<sup>th</sup>, 2021 (20 marks)

20-minute presentation (individual) on a chosen topic\* in mid-late November, dates TBD (30 marks)

5 summaries (1/2 – 1 page) of articles for the undergraduate presentations (10 marks)

Final paper\* due Dec. 13<sup>th</sup>, 2021 (40 marks)

*\*Topics for the paper and presentation can be the same, and can be related to your graduate work. See information below for different formats for the final paper.*

##### **Midterm Assignments**

Questions will be posted on Moodle on Friday Oct. 1<sup>st</sup> and will be due by midnight on Friday Oct. 8<sup>th</sup>.

They will be based on the course content covered in the lectures in September. Each question should be answered within ½-1 page max (1-inch margins and 12-point font). When relevant, appropriate references should be used and include research articles and/or reviews. You should use in-text referencing with full citations listed at the end of the assignment (see guidelines for referencing at the end of this outline). WEBSITES OR BLOGS ARE NOT SUITABLE REFERENCES. You can include figures, which will not count in the length. The reference list also does not count as part of the page limit. Please make sure your name and student ID are indicated. You may work together with other students on your answers, but please make sure you write your own answers in your own words. Part of the goal of this assignment is to help you learn how to write scientifically.

### **Article summaries**

Write 5 summaries (½-1 page in length) of different articles presented by the undergraduate students. You cannot write a summary of the article that your group is presenting, but otherwise you are welcome to choose which articles you wish to summarize. They should provide an overview of the paper including a brief description of the field of study, hypothesis (if applicable), objectives of the study, some of the key methodologies used, the key findings, main conclusions and the impact of their findings on the field of study. They will be submitted on the day of the presentation of that article via e-mail to the TA. URLs for the articles will be posted at least 1 week in advance or as soon as possible.

### **Presentations**

You will give a 20-minute presentation on any topic in Cell Biology and/or which is related to your thesis. You are encouraged to use the same topic that you write your final paper on. The goal of your presentation is to ‘teach’ other students about a particular field of study. Be sure to provide the appropriate background for your audience (*e.g.* upper level undergraduate and entry level graduate students in cell and molecular biology). Include support for some of the information (*e.g.* data from previously published papers). When describing experiments and data, be sure to reference original papers, or indicate who did the experiments if the data is not published. Within the week following your presentation, please provide me with 2 potential exam questions for the Biol 467 students based on your topic (via e-mail or in person). **Please stay within your time limit.**

### **Final paper**

Your paper can be written in ‘grant’ or ‘review’ style on ANY cell biology-related topic and in any organism. This paper is meant to improve your writing skills and you have a lot of flexibility in choosing your topic. You are welcome (and encouraged) to choose a topic that relates to your thesis project.

*If you are writing a grant, follow the general format of an NSERC discovery grant (proposal section).*

NSERC Discovery Grant:

5 pages, single-spaced with 0.75-inch margins and 12-point times font. Figures and references should be included on additional pages. The typical format is as follows: 1. Research progress – what have you done so far? If you haven't done anything yet, then don't include this section (~1/2 page). 2. Literature review – introduce the field and the rationale for what you are proposing to do – what are the gaps in knowledge, or are there conflicting models that need to be resolved? Are you generating new technology? (~1 page). 3. Main hypothesis (if applicable) and research objectives – provide a brief description of these. Also provide your long-term goals (that may go beyond your project) (1-2 paragraphs). 4. Describe the research proposal – align this with your objectives. Describe what experiments you plan to do and how their predicted outcomes will generate knowledge that is relevant for your objectives. This is the longest section of the grant (~3-3 1/2 pages). 5. Impact – what is the expected impact of your work? Knowledge generation or new techniques – how can this knowledge be used by others? (~1-2 paragraphs).

*If you are writing a review, then follow a style such as this one:*

Nigg, E.A., Schnerch, D. and O. Ganier. 2017. Impact of centrosome aberrations on chromosome segregation and tissue architecture in cancer. *Cold Spring Harbor Symposia on Quantitative Biology* 82: 1-8.

The review should be ~10 pages 1.5 line spacing, 1-inch margins, with 12-point font. Figures and references should be on additional pages. The review should provide in depth information on a topic using published research articles. The emphasis should be placed on more recent articles (*e.g.* within past 5 years), since they are less likely to have been covered by other reviews. Try to provide some insight – don't just provide a laundry list of facts pulled from the articles. For example, discuss the context and relevance for different studies in supporting or refuting models that have been proposed for this topic. Also, there could be conflicting studies, which could have been done in very different ways, and the community could be supporting one more strongly vs. the other (*e.g.* based on citations)? If it makes sense to do so, also provide some insight on the potential impact or relevance of work being done in the field in areas of health or technological development. Also, provide some insight as to where you see the field going in the near future – what are some of the outstanding unanswered questions?

**7. Rights and Responsibilities** – Plagiarism: The most common offense under the Academic Code of Conduct is plagiarism which the Code defines as “the presentation of another person as one's own or without proper acknowledgement”.

This could be material copied word for word from books, journals, internet sites, professor's course notes, etc. It could be material that is paraphrased but closely resembles the original source. It could be the work of a fellow student, for example, an answer on a quiz, data for a lab report, a paper or assignment completed by another student. It might be a paper purchased through one of the many available sources. Plagiarism does not refer to words alone – it can also refer to copying images, graphs, tables and ideas. “Presentation” is not limited to written work. It also includes oral presentations,

computer assignments and artistic works. Finally, if you translate the work of another person into French or English and do not cite the source, this is also plagiarism.

In Simple Words:

DO NOT COPY, PARAPHRASE OR TRANSLATE ANYTHING FROM ANYWHERE WITHOUT SAYING FROM WHERE YOU OBTAINED IT!

(Source: The Academic Integrity Website:

<http://provost.concordia.ca/academicintegrity/plagiarism/>)

### **Rules of Referencing**

Your primary sources/references typically should NOT be a Wikipedia site or other non peer-reviewed website. However, there are some peer-reviewed articles that are published online only (e.g. PLoS) and it is fine to include links for these papers. Much of the information on non-peer reviewed websites, such as Wikipedia, still rely on previously published information, and these papers are often listed at the bottom of the page. If you want to include information from this site, please go to the original paper and reference this to be sure that it is indeed saying what Wikipedia says it is. There are lots of peer-reviewed published papers that should be used as your primary source of information.

When writing scientific papers, particularly in Biology-related fields, it is not appropriate to quote verbatim from another piece of scientific work, even if it is properly referenced with quotations and the source. This is highly unusual and is done only in rare circumstances (for example, a quote from Darwin or other extremely influential person). Furthermore, while this quote might preface a paper, they are more commonly used in reviews to emphasize a point or argument vs. providing the reader with essential information.

When paraphrasing, which means putting another persons idea into your own words, you must provide the source/reference that it came from at the end of the sentence. If you have an entire paragraph all from the same source, then you can put the source at the end of the paragraph and it will be understood that the entire section was paraphrased.

Paraphrasing still implies that you have put another persons idea into your own words. There is a fine line between simply re-organizing their sentences and actually re-writing the entire sentence with your input. If you are unclear as to what this means, please ask myself or another academic source at the university.

Try the following format for proper paraphrasing (taken from the Concordia website for Academic Misconduct, in a powerpoint presentation from Johns Hopkins University):

**RESEARCH**  
**READ YOUR MATERIAL**  
**READ IT AGAIN**  
**TAKE BRIEF NOTES**

**UNDERSTAND IT**  
**ANALYZE IT**  
**SYNTHESIZE IT**  
**ORGANIZE IT**

If you are not sure, then the safest way is to include the source.

**One style of referencing:**

1. Single author: In parenthesis, indicate the last name of the author and the year the paper was published at the end of the sentence.  
Example: The central spindle stimulates formation of the contractile ring for cytokinesis (Glotzer, 2005).
2. Two authors: In parenthesis, indicate the last name of both authors and the year the paper was published at the end of the sentence.  
Example: Anillin stabilizes the contractile ring during cytokinesis (Piekny & Glotzer, 2008).
3. More than two authors: In parenthesis, indicate the last name of the first author, followed by et al. and the year the paper was published at the end of the sentence.  
Example: Active RhoA is generated by Ect2 to regulate contractile ring formation (Yüce *et al.*, 2005).

The full citation for each reference is listed in a 'References' section (see below) at the end of the document in *alphabetical* order.

**Alternate style of referencing:**

Each unique citation is given a number starting with 1 in order as they first appear. The number is indicated at the end of the sentence. You may have more than one citation for a sentence, list all numbers that apply.

Example: Cytokinesis is a process that occurs at the end of mitosis to separate a cell into two daughters<sup>1,2</sup>.

Example: Anillin stabilizes the contractile ring during cytokinesis<sup>3</sup>.

The full citation for each reference is listed in a 'References' section (see below) at the end of the document using the same *numbers* as they first appear in the text.

### **References**

The full citation for each reference is listed in this section alphabetically or numerically (alternate). The relevant information needed is: all of the authors (up to and including the first 5), the year the paper was published, the title of the paper, the name of the Journal the paper was published in, the volume of the Journal, and the page numbers. Some journals will use a doi address instead of volume and page numbers, so this is also acceptable.

The format can vary depending on the journal that you are writing for. Since you are not writing for

any particular journal, you can choose a format from your favourite journal and use it. Just be consistent throughout the same document. Here is an example of a style from the Journal of Cell Biology.

Glotzer, M. 2005. The molecular requirements for cytokinesis. *Science* 307: 1735-1739.

Piekny, A. and M. Glotzer. 2008. Anillin is a scaffold protein that links RhoA, actin and myosin during cytokinesis. *Current Biology* 18: 30-36.

Yüce, O., Piekny, A. and M. Glotzer. 2005. An ECT2-centraspindlin complex regulates the localization and function of RhoA. *J. Cell Biology* 170: 571-82.

If you use a number system for referencing, make sure you include the number in front of the author so that it can easily be referred to.

**1.** Piekny, A. and M. Glotzer. 2008. Anillin is a scaffold protein that links RhoA, actin and myosin during cytokinesis. *Current Biology* 18: 30-36.