

## BIOC 5307 – Current Topics in Molecular and Cell Biology of Lipids Course Outline Fall 2018

### **General information:**

The class meets every Thursday from 12:30 to 2:30 pm. The instructor and coordinator is Dr. Barbara Karten ([bkarten@dal.ca](mailto:bkarten@dal.ca)). Each session consists of a discussion of one or two journal articles, and an introduction of a current topic in lipid research by the instructor. Journal article discussions are a mix of informal discussions and more formal journal club style student presentations followed by a discussion. The articles must be read by all students in the class. Each topic also includes one or two review articles as recommended background reading. Students should be prepared to discuss the background and rationale of the study, the main questions addressed, methods used, main results and conclusions, and what further steps could be undertaken. Possible connections to the students' own research can also be discussed. The objectives are that students practice reading scientific articles and can *i*) identify the major points and structure of the paper, *ii*) critically appraise the appropriateness of the methods used, *iii*) distinguish results and conclusions, *iv*) put the work in context of the field and their own research, and *v*) consider further questions that could be addressed.

### **Class expectations and assessment:**

Students are expected to read the assigned journal articles each week and be prepared for a scientific discussion of the paper. Students are expected to give two journal article presentations over the course of the term (15% each), and one oral presentation on a current topic in lipid research (12.5%). In addition, students are expected to write one essay about the same topic. The essay will be written in two stages, students first write a detailed structure and bulleted list of the main sections and concepts of the essay (12.5%), then, with feedback from the instructor, an essay of 10 - 20 pages (double spaced, not including figures and references, 15%) and an abstract of the essay. Abstracts and essays will be handed out to the other students in class one week prior to the last class. Students will give an oral presentation of their essay topic (12.5%). Throughout the course, students will also be asked to briefly introduce pre-assigned background concepts (four times, 5% of the grade each). These introductions will be brief and informal without prepared slides. General participation in the class discussions represents 10% of the grade.

Oral presentation skills	Journal article presentation (2)	2 x	15%
	Oral presentation of essay topic		12.5%
Written presentation skills	Essay, outline		12.5%
	Essay, final		15%
Understanding of concepts	Background concepts	4 x	5%
	Participation in discussions		10%

### **Outline of evaluation criteria and expectations**

*The Essay* will be a discussion of a current topic in lipid research. The essay should contain some background material to lead into the topic. Students are expected to use primary research papers, as well as review articles, in the preparation of the essay. Figures can be included if referenced correctly, but will not count into the page limit. References also do not count into the page limit. Students will have the opportunity to meet with the course coordinator to discuss the essay topic. The essay will be written in two stages to guide the students through a systematic approach to essay writing. Students will be expected to first prepare an outline of the essay, including the first sentence, titles of the subsections, and a detailed bulleted list of the main points that are going to be included in each section. The student should also indicate 2 or 3 of the most important primary research papers for the essay. The bulleted list should represent the logical flow of the essay. An example for an outline will be handed out to the students when the topics are assigned. The essay outline is discussed with the instructor, and evaluated for structure, logical flow, content, comprehensive coverage of relevant points, and adherence to the guidelines. The outline will serve as the basis for a 10 - 20 page essay targeted to a scientific audience who are not specialists in the field but have a good general knowledge of lipid metabolism, such as the other students in class. Essays are evaluated for clarity, redundancies/conciseness, scientific understanding, accurate recapitulation and citation of source material, appropriate terminology, scientific level of writing, and overall flow. Students are expected to read the abstracts of all essays and one full essay prior to the oral presentations in the last class. Students are expected to introduce the essay topic in an oral presentation in class, followed by a discussion period. The student giving the presentation will be evaluated for the presentation and the ability to answer questions regarding the topic. Essay topics will be chosen by the student and instructor together in the first or second week of classes. The essay outline is due Oct 20. The final essay is due Nov 20 (No extensions!).

Students should be aware of the university regulations on plagiarism, which are available on its website (<http://www.registrar.dal.ca/calendar/ug/UREG.htm#12>). Dalhousie University defines plagiarism as “the presentation of the work of another author in such a way as to give one’s reader reason to think it to be one’s own. Plagiarism is a form of academic fraud. Plagiarism is considered a serious academic offence which may lead to the assignment of a failing grade, suspension or expulsion from the University, or even the withdrawal of a degree previously awarded.” The Department of Biochemistry & Molecular Biology policy is attached below.

*Journal article presentations* should be prepared with Powerpoint or a similar program, and include a brief introduction into the topic, a selection of the figures shown in the article and a summary slide. Each student will give two presentations. The presenter should be familiar with the techniques used in the study, and briefly explain the rationale, the data shown, and the conclusions from the data for each figure. At the end of the presentation, the student should present a summary of the main points made in the discussion. The student should be able to lead a discussion about the article. Students not presenting are expected to have read the paper.

*Short introduction to background:* These short oral presentations at the beginning of the class serve to introduce the other students in the class to certain background topics from the journal article, for example methods or background concepts not directly related to lipids that would be beyond the scope of the journal club presentation itself. Students will be assigned these topics at least a week in advance and will be asked to briefly (5 min) explain these concepts without slides or technical aids.

### **Missed Examinations and Assignments**

A student who misses an assignment (presentation, essay or home assignment) due to illness should notify the instructor or department office and provide a valid medical certificate not more than 1 week after the scheduled examination. The medical certificate should indicate the dates and duration of the illness. If the missed assignment is a presentation, this will be rescheduled as soon as possible. Absence for non-medical reasons is not ordinarily acceptable unless pre-arranged with the instructor. A missed assignment or presentation for which no satisfactory arrangement has been made will receive a mark of zero. Essays and essay outlines must be submitted to the instructor or the department office no later than 5:00 p.m. on the designated due date. Extension of the due date will only be granted in the case of illness and supported by a valid medical certificate presented to the professor/instructor within one week of the due date. Other reasons, such as excessive workload, are not normally acceptable. Extension of due date will not normally exceed 7 calendar days. The grade for late essays will be reduced by 10% for each day after the due date.

### **Accessibility**

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic under the Nova Scotia Human Rights Act. Students who require academic accommodation for either classroom participation or the writing of tests and exams should make their request to the Advising and Access Services Center (AASC) prior to or at the outset of the regular academic year. Please visit [www.dal.ca/access](http://www.dal.ca/access) for more information and to obtain the Request for Accommodation - Form A. A note taker may be required as part of a student's accommodation. There is an honorarium of \$75/course/term (with some exceptions). If you are interested, please contact AASC at 494-2836 for more information. Please note that your classroom may contain specialized accessible furniture and equipment. It is important that these items remain in the classroom, untouched, so that students who require their usage will be able to participate in the class.

## Department of Biochemistry & Molecular Biology Policy on Plagiarism

### ***What is plagiarism?***

“Dalhousie University defines plagiarism as the submission or presentation of the work of another as if it were one’s own. Plagiarism is considered a serious academic offence, which may lead to the assignment of a failing grade, suspension or expulsion from the University. If a penalty results in a student no longer meeting the requirements of a degree that has been awarded, the University may rescind that degree.”<sup>†</sup> The Department is committed to protecting honest students against the devaluation of their work by students who resort to plagiarism.

Some examples of plagiarism include (but are not restricted to):

- Submitting as your own work any material created, in whole or in part, by someone else, **including material created in collaboration with other students**, unless specifically allowed by the course instructor and credited appropriately.
- Paraphrasing extensively or copying from sources such as the Internet, journal articles, or books (including textbooks) without crediting the original author or source.
- Using another student’s laboratory data, unless specifically allowed by the course instructor and credited appropriately.
- Submitting, in whole or in part, any work that has been submitted in another course, or re-submitting the same work in different years of the same course.

### ***How can plagiarism be detected?***

If required by the Instructor, work submitted for credit must be submitted in electronic as well as hard copy form.

Submissions may be screened by one or both of the following methods:

- A pattern recognition program that compares all submissions with one another as well as submissions from previous years. Every individual has a unique pattern of writing. This program will detect submissions that are derived from a common source, even if words or phrases have been changed.
- A third-party computer-based assessment system that compares submissions against a large database including previous submissions and Internet sources.

### ***What are the consequences of plagiarism?***

“Plagiarism is a serious academic offence which may lead to the assignment of a failing grade, suspension or expulsion from the University, or even the withdrawal of a degree previously awarded.”<sup>†</sup> **At Dalhousie University, the Department is obligated to refer any cases of suspected plagiarism to the Senate Discipline Committee**, which will then conduct a hearing to evaluate the innocence or guilt of students alleged to have committed an act of plagiarism.

### ***How can accusations of plagiarism be avoided?***

You can avoid accusations of plagiarism by:

- Preparing all submissions independently and ensuring that they are expressed in your own unique writing style.
- Never sharing any written or electronic material with other students. You may not work with another student while preparing materials you are planning to hand in.
- Acknowledging any material paraphrased extensively or copied from sources such as the Internet, journal articles or textbooks. Paraphrasing of short phrases from the course textbook need not be acknowledged.
- Guarding all your work, both drafts and final submissions, to ensure that no one else can copy it. If you provide access to your work and someone (including a student taking the same course in a future year) copies it, then you may be aiding in the commission of an academic offence. If you suspect that someone has taken any of your work, notify your course instructor immediately.
- Using only laboratory data that you actually collected in the lab. Altering laboratory data is not permitted. If your data are unusable, you must still report your own data along with any explanation as to why the data are unusable. You may then use data supplied by the lab instructor for analysis, but you must acknowledge such use.

<sup>†</sup> Dalhousie University Undergraduate Calendar, 2007/2008, p. 22.

### Course Schedule:

Date	Topic	Research articles	Background reading
Sept 20	Intracellular lipid trafficking, Lipid transfer protein	<a href="#">Iaea DB. et al (2017) Role of STARD4 in sterol transport... MBoC, 28, 1111</a> <a href="#">Chung J. et al (2015) PI4P/phosphatidylserine countertransport at ORP5 and ORP8-mediated ER-plasma membrane contacts Science 349, 428 – 432</a>	<a href="#">Wu et al (2018) Here, there, and everywhere: The importance of ER membrane contact sites. Science 361</a> <a href="#">Wong LH. Et al (2017) Advances on the Transfer of lipid by Lipid Transfer Proteins. TIBS 42, 516</a>
Sept 27	Membrane contact sites, ER-mitochondria	<a href="#">Chakrabarti et al (2017) INF2-mediated actin polymerization at the ER stimulates mitochondrial Ca<sup>2+</sup> uptake, inner membrane constriction and division. JCB 217</a> <a href="#">Filadi et al (2018) Tom70 sustain cell bioenergetics by promoting IP3R34-mediated ER to mitochondria Ca<sup>2+</sup> Transfer. Curr Biol. 28, 369-382</a>	<a href="#">Simmen et al (2018) Plastic mitochondria-ER contacts use chaperones and tethers ... Curr Opin. Cell Biol.</a> <a href="#">Herrera-Cruz et al (2017) Cancer: Untethering Mitochondria from the ER? Front Oncol 7.</a>
Oct 4	Membrane contact sites, ER-endosomes	<a href="#">Allison R. et al (2017) Defects in ER-endosome contacts impact lysosome function in hereditary spastic paraplegia. JCB 216, 1337</a> <a href="#">Katajisto et al (2015) Asymmetric apportioning of aged mitochondria between daughter cells is required for stemness. Science 348, 340</a>	<a href="#">Raiborg et al (2016) ER-endosome contact sites in endosome positioning and protrusion outgrowth. Biochem Soc Trans. 44, 441</a>
Oct 11	ESCRT, retromer	<a href="#">Wenzel et al (2018) Concerted ESCRT and clathrin recruitment waves define the timing and morphology of intraluminal vesicle formation. Nat Comm 9, 2932.</a> <a href="#">Purushothaman et al (2017) Retromer-driven membrane tubulation separates endosomal recycling from Rab7/Ypt7-dependent fusion. MBoC 28</a>	<a href="#">Wang et al (2018) Endosomal receptor trafficking: Retromer and beyond. Traffic, 19, 578</a>
Oct 18	Late endosomes, MVB	<a href="#">Li et al. (2016) Clues to the mechanism of cholesterol transfer from the structure of NPC1 middle luminal domain bound to NPC2. PNAS, 113, 10079</a>	<a href="#">Scott CC. et al (2014) Endosome maturation, transport and functions. Sem Cell Develop 31, 2-10</a> <a href="#">Wallroth et al (2018) Phosphoinositide conversion in endocytosis and the endolysosomal system. JBC 293, 1526</a>
Oct 25	Lysosomes, TFEB	<a href="#">Lawrence et al (2018) A nutrient-induced affinity switch controls mTORC1 activation by its RAG GTPase-Ragulator lysosomal scaffold. Nat. Cell Biol. 20, 1052</a> <a href="#">Perera et al (2015) Transcriptional control of autophagy – lysosome function drives pancreatic cancer metabolism. Nature 524, 361</a>	<a href="#">Napolitano and Ballabio (2016) TFEB at a glance. J Cell Sci 129, 2475</a> <a href="#">Thelen et al (2017) Emerging Roles for the lysosome in lipid metabolism. Trends Cell Biol. 27, 833</a>
Nov 1	Lysosomes	<a href="#">Willett et al (2017) TFEB regulates lysosomal positioning by modulating TMEM55B expression and JIP4 recruitment to lysosomes. Nat. Comm. 8</a> <a href="#">Pu et al (2017) A Ragulator –BORC interaction controls lysosome positioning in response to amino acid availability. JCB 216, 4138</a>	<a href="#">Cabukusta and Neefjes (2018) Mechanisms of lysosomal positioning and movement. Traffic</a> <a href="#">Raiborg (2018) How nutrients orchestrate lysosome positioning</a>
Nov 8	Autophagy/Exosomes	<a href="#">Yang et al (2017) Secretory carrier membrane protein 5 is an autophagy inhibitor that promotes the secretion of synuclein via exosome. PLOS One.</a> <a href="#">Hessviket al (2016) PIKfyve inhibition increases exosome release and induces secretory autophagy. Cell Mol Life Sci. 73 4717</a>	<a href="#">Van Niel et al (2018) Shedding light on the cell biology of extracellular vesicles. Nat Rev Mol Cell Biol. 19, 213</a> <a href="#">Palikaras et al (2018) Mechanisms of mitophagy in cellular homeostasis, physiology and pathology. Nat. Cell Biol. 20, 1013</a>
Nov 15	No Class, study break		
Nov 22	Lipid trafficking and signaling	<a href="#">Wu et al. (2015) Autophagy regulates Notch degradation and modulates stem cell development. Nat Comm.</a> <a href="#">Zheng et al (2018) PI5P4Kg functions in DTX1-mediated Notch signaling. PNAS 115, E1983.</a>	<a href="#">Szymanska et al (2017) Endosomal "sort" of signaling control. Sem Cell Dev Biol. 74, 11-20</a>
Nov 29		Student presentations on essay topic	