

# ANAT 416 Development, Disease and Regeneration

Last updated: March 18, 2024

**Term:** Winter 2024

**Course Coordinator:** Dr. Khanh Huy Bui ([huy.bui@mcgill.ca](mailto:huy.bui@mcgill.ca))

**Tuesday and Thursday, 11:35 am – 12:55 pm in SADB 1/12**

**Instructors:** Huy Bui, Christian Rocheleau, Andrew Bateman, Alexandre Dubrac, Luke McCaffrey, Gregor Andelfinger, Frederic Charron, Natasha Chang, Michel Cayouette, Hideto Takahashi, Jun-Li Liu

**Workload:** 3 credits

**Prerequisites:** *BIO 303 or ANAT 381*

**Teaching Assistants:** Ajay David ([ajay.david@mail.mcgill.ca](mailto:ajay.david@mail.mcgill.ca))

**Description:** This course is designed to be an upper level developmental biology class. The course will explore the significance of developmental biology for disease and regeneration and is meant to grow on the other developmental biology and embryology courses that exist at McGill University.

Students will learn advanced developmental biology principles, the molecular basis for stem cells, organogenesis and their applications to various diseases.

The course will give students a more in-depth analysis of these topics at the molecular level. It will focus on teaching students about the development of specific organs and diseases associated with them and how developmental biology principle can be applied to the regeneration of these organs. In addition, the evaluation in the course will teach you how to read scientific papers and write a short abstract or essay on that topic.

**Course materials:** There is no textbook, but notes, review articles and primary research articles will be assigned. Readings from the literature or a publication from the lecturer's research group may be assigned for each instructor's lecture to enhance understanding of the material.

**Recordings:** All the lectures should be recorded automatically through McGill Lecture Recording System. However, due to unexpected technical problems, lectures might not be recorded properly.

## Course timetable

	Date	Instructor	Topic/title
Thursday	4 Jan. 2024	Huy Bui	Cilia &
Tuesday	9 Jan. 2024	Christian Rocheleau	Introduction to early embryonic development
Thursday	11 Jan. 2024	Huy Bui	Intro to Lineage Tracing / Assignment Overview
Tuesday	16 Jan. 2024	Christian Rocheleau	Hydra
Thursday	18 Jan. 2024	Christian Rocheleau	Planarian
Tuesday	23 Jan. 2024	Luke McCaffrey	Epithelial stem cells and differentiation
Thursday	25 Jan. 2024	Luke McCaffrey	Stem cells and Cancer
Tuesday	30 Jan. 2024	Hideto Takahashi	Development of Neuronal Connectivity in Brain Health and Disease_1
Thursday	1 Feb. 2024	Hideto Takahashi	Development of Neuronal Connectivity in Brain Health and Disease_2
Tuesday	6 Feb. 2024	Andrew Bateman	Skin regeneration
Thursday	8 Feb. 2024	Andrew Bateman	Skin regeneration
Tuesday	13 Feb. 2024	Gregor Andelfinger	Heart
Thursday	15 Feb. 2024	Gregor Andelfinger	Heart
Tuesday	20 Feb. 2024	Jun-Li Liu	Pancreas 1
Thursday	22 Feb. 2024	Jun-Li Liu	Pancreas 2
Tuesday	27 Feb. 2024	Huy Bui	Model organism - Ciliopathies
Thursday	29 Feb. 2024		TBD
Tuesday	5 Mar. 2024	March Break	
Thursday	7 Mar. 2024	March Break	
Tuesday	12 Mar. 2024	Natasha Chang	Muscle stem cells and myogenesis
Thursday	14 Mar. 2024	Natasha Chang	Muscle degeneration and myopathies
Tuesday	19 Mar. 2024	Frederic Charron	Cancer and Development 1
Thursday	21 Mar. 2024	Frederic Charron	Cancer and Development 2
Tuesday	26 Mar. 2024	Alexandre Dubrac	Neurovascular development, diseases and regeneration
Thursday	28 Mar. 2024	Alexandre Dubrac	Neurovascular development, diseases and regeneration
Tuesday	2 Apr. 2024	Michel Cayouette	Eye Diseases and regeneration (Part 1 - diseases)
Thursday	4 Apr. 2024	Michel Cayouette	Eye Diseases and regeneration (Part 2 - regeneration)
Tuesday	9 Apr. 2024	Huy Bui	Exam Preview

## Assessment

### ***Flexible writing assignments*** (1st 3%, 2nd 5%)

Student will be assigned some topics out of 13 topics of lectures according to their interest and write 250 – 300-word abstracts summarizing each of the lectures they have selected. The abstract should include the following elements: introduction to the subject, statement of the scientific question asked, methodology, summary of results, interpretation/conclusion, and implication of the findings on a broader context. Abstracts must be submitted in MyCourses. The deadline for the abstracts is late January and late February (see Mycourses for detailed deadline). The first abstracts will NOT be graded by its content, but it will be peer-reviewed by your peers. Your peer review feedback for another person will be graded based on whether it covers all aspect of the rubric and appropriate feedback (see examples in Mycourses). The last abstract will be graded based on content and style, according to a grading rubric (see below).

### ***News and Views*** 15%

Students choose one of the lectures according to their interest and write a News & Views – style articles of ~800 words about it. The goal of a News & Views article is to critically evaluate and explain the contribution of an original research paper. This article should include the following elements: Broad introduction to the subject and the question asked (this will require reading and citing few research papers or reviews), summary of methodology and findings, broader discussion on the implication of the findings. Include your “view” on the research, a critical evaluation, limitations and potential avenues of future research. The News & Views can be in the same topic with the Abstract but cannot be the same topic with the Essay. The Deadline for News & Views paper is March 7<sup>th</sup>.

### ***Essay*** 30%

Students will be assigned a topic for the essay assignment. The essay is similar to a review article that describe, summarize a topic presented in the lectures. The paper should be concisely written (about 5 pages, not including references and title page), double space, 2 cm margin and font size 12. Citation should be in Harvard referencing style. Only use citation for which you have read the articles. Essays must be uploaded to the Assignment on Mycourses by April 4<sup>th</sup>. The essay topics & number code assigned to students are available on Mycourses.

### ***Final exam*** 33%

Final exam will consist of short essay questions.

### ***Participation/In class quizzes*** 10%

We will do in class quizzes randomly in 5 lectures. The best 4 quizzes will be counted. The quiz is short and reflects materials only from 1 to 2 previous lectures.

### ***Participation/Contributions*** 3% (and 2% extra bonus to make up 102%).

We expect students to contribute positively to the discussion during the lectures. Lively discussion about lecture materials helps everyone gain better understanding. During the lectures, you can submit your name and questions to [Slido](#). (The App is available on Phone/Table or web-based on laptop) The TA will pick out the selected questions and proceed to ask you to ask the questions to the lecturer directly. You can also submit your name to [Slido](#) after answering the questions from the lecturers. Students expects to contribute to questions/discussions to [Slido](#) throughout the semester in at least 40% of the lectures to earn 3% of participation. **Bonus:** Top 10% contributors of the class will receive an extra 2% bonus to make 102% total.

### ***Participation/Course evaluation*** 1%

To promote the course evaluation for future improvement, there will be 1% reserved for course evaluation. If more than 50% of students evaluate the course on Mercury, everybody will receive 1% grade.

## Grading rubric for Abstracts

	Points (up to)
<b>Introduction.</b> An introductory statement provides both a basic introduction of the field (1-2 sentences) as well as a more detailed introduction into the specific research topic (2-3 sentences)	4
<b>Purpose.</b> A clear statement that the open question is that the research tries to answer	2
<b>Methodology.</b> Brief summarize the methodological approach of the research	2
<b>Findings.</b> In a few sentences, summarize the main results of the research	4
<b>Interpretation and conclusions.</b> State the main conclusions, describe how the work advances knowledge in the discipline and why it is important.	4
<b>Professional writing.</b> Abstract is 275 +/- 25 words, language is clear and precise, rules of grammar usage and punctuation are followed, no spelling mistakes.	4
<b>Total</b>	20

## Grading rubric for News & View – style paper

	Points (up to)
The title catches the reader's interest as well as hints at the general content of the paper. The title needs to be intriguing and catchy, but not at the expense of being effective	1
A brief, 1-3 sentence pseudo-Abstract previews the general issue or problem and attempts to draw the reader in further by hinting that they will learn if they stick it out and read the rest of the N & V paper.	1
The first paragraph serves as a true Abstract and previews the entire paper very superficially. What was the state of affairs before the new research and the general problem addressed by the new research? Specifically, what questions are being ask and hypotheses tested by the new research? What is the "bottom line" on how the new research is going to advance our understanding, solve a problem, change the way we do things and set the stage for further progress (this may or may not correspond to what the authors assert, depending on the validity of their methods, logic and conclusions – you need to critically evaluate this and make your own judgement)? By this point, you must have "set the hook" and "make the sale", otherwise the reader will flip the page and read some other more interesting article!	3
The next few paragraphs summarize the state of affairs before the target article. This shouldn't be just lots of true facts. You must use pertinent information carefully to effectively set the stage for what follows.	3
The next few paragraphs give an overview of what the authors and the new research did, the logic for setting up the study, their specific hypotheses, their methods for testing their hypotheses, their results and conclusions. You should critically evaluate all of these, but in most cases, it is best to hold criticism till later, when you take up the issue of what needs to be done next. Avoiding filling space with irrelevant details; focus on things that are essential for understanding the strengths and weakness of the research.	4
The final few paragraphs give your evaluation of the strengths and weakness of the new research. Are the authors' conclusion sound? – why or why not? Do you come to different conclusions? – if so, what are they? Think carefully about whether there are alternative hypotheses that are equally compatible with the results. What needs to be done next? If the research is perfect, then use it as a stepping stone for the next big question. If you think the research has some methodological short coming, propose a better way to do the study next time.	4
<b>Article is 800 +/- 100 words, language is clear and precise, rules of grammar usage and punctuation are followed, no spelling mistakes, at least 4 references from primary literature are included, all cited appropriately within articles</b>	4
<b>Total</b>	20

## Grading rubric for Essay paper

	Points (up to)
<b>Introduction.</b> An introduction provides both a basic introduction of the field as well as a more detailed introduction into the specific research topic. The introduction states the main topic and previews the structure of the essay.	4
<b>Body.</b> Each paragraph has thoughtful supporting detail sentences that develop the main idea. Use of appropriate citations to support the statement made. The writing is clear and coherent.	6
<b>Organization &amp; Structure.</b> Logical and subtle sequencing of ideas through well-developed sub-header and paragraphs. Use of sub-header is a MUST.	5
<b>Conclusion.</b> The conclusion is engaging and states out the question of future research.	3
<b>Figure and table.</b> Usage of figures/tables to help presenting the main idea properly. Maximum 5 figures are allowed.	3
<b>Citation &amp; Bibliography.</b> All cited works are done in correct style.	3
<b>Professional writing.</b> Essay is ~5 pages excluding figures, tables and references, language is clear and precise, rules of grammar usage and punctuation are followed, no spelling mistakes, at least 10 references from primary literature are included, all cited appropriately within article.	6
<b>Total</b>	30

## Language of Submission

“In accord with McGill University’s [Charter of Student Rights](#), students in this course have the right to submit in English or in French any written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives.” (Approved by Senate on 21 January 2009)

« Conformément à [la Charte des droits de l’étudiant](#) de l’Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté, sauf dans le cas des cours dont l’un des objets est la maîtrise d’une langue. »

## Academic Integrity

“McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the [Code of Student Conduct and Disciplinary Procedures](#).” (Approved by Senate on 29 January 2003) (See McGill’s [guide to academic honesty](#) for more information.)

« L’université McGill attache une haute importance à l’honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l’on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l’étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le [guide pour l’honnêteté académique de McGill](#). »

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## Departmental Grading Policy

The Department of Anatomy & Cell Biology will **NOT** revise/upgrade marks except on sound academic grounds. Once computed, the marks in this course will **NOT** be altered/increased arbitrarily. Decimal points will be “rounded off” as follows: if the final aggregate mark is computed to be 79.5%, the mark will be reported as 80% (an A-); a final aggregate mark of 79.4% will be reported as 79% (a B+). These marks are **FINAL and non-negotiable**.

## Departmental Midterm Exam/In-Course Assessment Deferral Policy

A midterm exam or other in-course assessment (i.e. quiz, assignment, paper, etc.) in a course administered by the Department of Anatomy & Cell Biology may only be deferred in the case of a **justified absence** due to serious illness or significant extenuating circumstances AND when **valid documentation** is received by the Course Coordinator within FIVE working days of the original midterm exam or due date.

If the deferral request is accepted by the Course Coordinator, students may be offered one or both of the accommodations below, depending on the grading structure of the course:

- a) Add the weight of the midterm exam/in-course assessment to the final exam or another course component
- b) Write a deferred midterm exam/submit a deferred assessment which will be scheduled/due within 10 days of the original midterm exam/due date

Please see the full policy, including information on valid documentation requirements, here: <https://mcgill.ca/anatomy/undergraduate/policies-resources>.

## University Policy on Reassessments and Rereads

Please see the eCalendar for policies regarding reassessments of coursework and rereads of final exams: [www.mcgill.ca/study/university\\_regulations\\_and\\_resources/undergraduate/gi\\_final\\_examinations](http://www.mcgill.ca/study/university_regulations_and_resources/undergraduate/gi_final_examinations).