

MIMM 387 Syllabus

Faculty of Science
Department of Microbiology and Immunology



“The Business of Science”

Winter 2019

Course Title:	The Business of Science
Course Number:	MIMM 387
Credits:	3
Prerequisite:	At least one 200-level biological or biomedical discipline or permission of instructor.
Location:	Duff Medical Building THTR 1
Class Time:	Monday and Friday 11:35 a.m. – 12:55 p.m.
Course Coordinator:	Dr. Robert A. Murgita (robert.murgita@mcgill.ca)
Office:	Room 408, Lyman Duff Building (4 th Floor)
Office hours:	To Be Determined

This is not your typical undergraduate science course. You will be dealing with the various aspects of translational science, and with some of its many controversial areas (i.e. vaccine vs anti-vaccine sentiments, etc.). We also expect you to question the instructors, challenge their points of view if you disagree, and engage in dialogue with the instructors and your peers.

This course will address the art of asking powerful questions (why & how) that can be more significant than when, where or yes/no questions in any research setting. They lead to inquiry, insight, open ideas, and depth of thought. They can stimulate reflective thinking, challenge assumptions and shake dogma.

NOTE: THIS COURSE HAS A SUBJECTIVE GRADING SYSTEM. The course is not recommended for students who are not comfortable with, or do not wish to accept this form of assessment. However, the course will not discourage those who can effectively communicate their counter-arguments to any positions expressed by lecturers throughout the course.

I. Course Description

Over the past three decades, science and business have united to give rise to innovative start-up biotech companies, which have become the driving force behind scientific innovation. It has become evident that many pioneering scientific institutions are strengthened by a productive interaction between Academia and the private sector. The contrasting ideologies in public and private research, and the potential of private capital to accelerate innovation will also be discussed. This course will reveal not only cultural differences between Pharmaceutical and Biotechnological industries, but also beneficial relationships between Academia and Industry in the complex and expensive process of moving new and novel therapeutics from bench to bedside.

High-profile academic clinicians will address controversial issues associated with therapeutic interventions and vaccine programs. Moreover, the interface between Law and Science will be examined by addressing intellectual property protection mechanisms, including patent, copyright protection, etc.

This course is designed to encourage dialogue between the speaker and the student audience. An objective of the course is to teach students how to make quality decisions based on critical thinking when forming opinions on controversial topics in science and medicine. This course is not designed like many traditional science courses; you are expected to speak up in class and stimulate dialogue with the lecturers and your peers. This course will help you better approach and deal with controversial topics, as this skill is needed to make such decisions in your future careers.

II. Course Objectives

Careers in the technical, clinical, legal, and managerial areas of Biotech and Pharmaceutical industries are becoming an increasingly attractive option for science graduates. However, while undergraduate students learn copious scientific facts belonging to their respective discipline, they

seldom gain the opportunity to assimilate this knowledge into well-formulated concepts. In their collaboration with the private industry, modern scientists require knowledge of business, law, and the rules of intellectual property protection in the form of patents and trade secrets. Therefore, this course offers students a rare opportunity to interact, question, and network with experts from various disciplines to understand the business aspects of the bioscience and health science sectors.

III. Learning Outcomes

Acquiring Knowledge:

- Understand that academia and the private sector can overlap for scientific ventures.
- Understand the transition of scientific discoveries into marketable products.
- Explore the regulatory and financial challenges faced by the scientific world.
- Learn to express opinions in both verbal and written form using “critical thinking” (see below for definition).

Individual Productivity Skills:

- Learn to manage time to comply with set deadlines.
- Learn to seamlessly integrate divided tasks into final, coherent work.
- Learn to sort through research material and isolate key facts and data.

Critical Thinking Skills:

- Recall prior scientific knowledge to critically analyze controversial scientific issues.
- Learn to develop a balanced viewpoint and an educated opinion on subjects when a correct response may lie in the grey area as opposed to being black or white.

IV. Course Material

No textbook is required for this course. Readings and selected PowerPoint/PDF slides come from individual lectures, which will be posted on myCourses. There will be a short answer review quiz on the last day of class, where you will be tested on the takeaway messages presented in lectures. Lecture material may also be helpful as a foundational resource for your final paper. Moreover, although not necessary, you are welcome to apply material learned in lectures to your written assignments. **A laptop is required to complete the assignments in-class. If this is a problem, please let us know as soon as possible.**

Note:

- (1) Attendance and participation:** students are expected to attend all lectures. Expressing your opinion in class throughout the semester is **strongly encouraged** as it creates a dynamic class environment.
- (2) Lectures will not be recorded** and selected lecture PowerPoint/PDF presentations may not be provided due to confidentiality policies. All other presentations will be made available on myCourses after the lecture.

V. Grading Scheme

(A) 5 In-Class Assignments (40% total grade)

These assignments (5) are **held in class** and are worth 10% each. Your first assignment will be a chance for you to practice writing a critical reflection, thus it will not be graded as it's an opportunity to receive feedback. You are still required to write this assignment, and any absences must be accompanied by legitimate documentation. These in-class assignments will be held on Wednesday evenings in our lecture hall (refer to the schedule for dates). These evening sessions will be up to 3

hours and will consist of watching a video, writing a critical reflection (**up to 500 words maximum**), which is to be submitted during the session via myCourses, and finally, a brief discussion period. These assignments require students to think critically about the information that is being presented to them. Recalling information from previous lecture material may help you formulate the best answers, but referencing these past lectures isn't necessary. During the weeks when you have these evening sessions, both morning classes will be cancelled. There are no make-up assignments, and those who are absent must present us with a **legitimate doctor's note, etc.** If you miss an assignment, and have a legitimate documentation, the next assignment will be worth 20%. If you miss the fifth assignment, then the 10% will be added to your final paper. Failure to present a with valid documentation will result in a grade of 0.

(B) Critical Thinking Essay or Book Review (40%)

Students will be paired randomly in groups of two and work together to prepare an up to 5-page (not including cover page, references, etc.) analysis on an area of focus from a list of topics that will become available on myCourses, or there will be an option to write an up to 5-page book review (book options will also be provided on myCourses). The groups and topics/ books will be provided after the add/drop period is over (January 22nd). It will require readings and references from reliable sources and high impact journals to present all sides of the arguments for the topics.

Essay Grading Criteria: All essays will be graded by Dr. Murgita. Grading is based on content, organization, coherence, depth of topic coverage, extent of literature review, proper usage of in-text citations, correct format of the "Bibliography" section, sentence structure, grammar, neatness, and style. Students must make every effort to produce an essay free of typographical or grammatical errors.

(C) Final Exam (20%):

There will be an exam during the final exam period covering content from all lectures and seminar sessions. You will not be expected to memorize word-for-word definitions, etc.; however, you will be tested on your ability to grasp the big ideas that are presented. The quiz will be composed of five (5) short answer questions, and you will have to answer four (4). Each question will be worth five (5) marks, for a total of twenty (20) marks. If you miss the final exam, and have legitimate documentation, you will be required to write the exam during the deferred exam period in August. The format of the exam will remain the same. Any further information regarding deferred exams (dates, etc.) can be provided by the university.

Important dates

Evaluation	Grading % Of Final Mark	Written Assignments
In-Class Written Analyses (5)	40% (10% per assignment)	January 30 (practice – not graded) February 13 February 27 March 20 April 3
Critical Thinking Essay or Book Review	40%	Any time on/ before April 12 (hard copy only)

Final Exam	20%	TBD (during final exam period)
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VI. What Is Critical Thinking?

This course explores many of the controversial issues that exist in science and medicine, and for which there is no right or wrong answer. This makes it necessary for the grading system to be subjective – to measure your ability to critically think through the various aspects of the issue under discussion.

Critical thinking is required when confronting an issue that is not black or white, but rather in a grey area; the issue is analyzed from a multi-dimensional perspective. This entails not only questioning the opposition’s stance, but also questioning your own stance. As such, it requires you to make reasoned judgments that are logical and well thought-out, with supporting evidence and arguments. It entails effective communication and self-corrective thinking, allowing us to overcome our native egocentrism and sociocentrism¹.

This class requires submitting a critical thinking paper at the end of the semester. Writing critically is a prerequisite for writing any future research papers (academic, clinical, or even business proposals). All require fundamental components: objectives and arguments that are supported by evidence from reliable sources and a topic of interest to be analyzed from all directions (i.e. strengths and weaknesses). This essay will be a “training ground” for what you must do later in your scientific, academic, clinical, or business careers².

For more information about critical thinking and critical essays go to:

¹ <http://www.criticalthinking.org/pages/our-concept-of-critical-thinking/411>

² <https://www.privatewriting.com/critical-essay>

Writing Guide

Objective of paper

For the paper (or book review), each student will be assigned into random groups of two and must write a 5-page (maximum) paper on a provided topic or book (topics and books TBD).

Topic Choice

Dr. Murgita will provide essay topics and book options to choose from; however, it is up to the group to refine the topic so that it can be sufficiently analyzed in the 5-page limit. If you wish to seek advice from Dr. Murgita about your topic, do NOT go to him without referring to primary sources first. If you cannot find any substantial or reliable information on your topic, then it is not a good topic.

Essay guidelines:

Your paper should include:

- Cover page – paper title, name and student ID, course number, date of submission
- Introduction
- Strong thesis
- Conclusion
- References
- Tables and figures (if applicable)

- Must be clear, legible and relevant to the text
- Any figures should be at the end of your paper
- Give each figure or table an appropriate title, an in-text citation, and a descriptive legend (i.e. figure legends should be understandable through reading the legends alone)
- Tables and figures are not included in the overall page count of your essay. The essay needs to be 5 pages of text
- NOTE: If you constructed the figure yourself, please indicate by typing ‘created by author’ in place of your in-text citation

Reference guidelines

Content of references section:

- ONLY journal articles and books cited in your text can be listed in the references section
- Other references (e.g. websites, government/NGO documents, newspaper articles, etc.) must NOT be included in this references section. Instead, they are referenced as footnotes as they are not considered to be formal references

Organization of references section:

- List your references using consecutive numbers in the order that they appear in your text i.e. NOT alphabetically
- Follow the guidelines in the table below for references
- In-text citations should be denoted by **square brackets** or **parenthesis**
- If the reference is cited more than once in the text, the **same number** is used
- It is **unacceptable** to rely on a single reference over a large section of your paper. For instance, several paragraphs of introductory material and/or several paragraphs of conclusion should not use a source a single reference from either a journal or book

How to cite references

Source Type	Template	Example
Journal Article	Last Name, First Name Initials. <i>Title of the article</i> . Journal . Year of publication. Volume (Issue): Start page-End page.	Arnold, K., Bordoli, L., Kopp, J, and Schwede, T. <i>The SWISS-MODEL workspace: a web-based environment for protein structure homology modeling</i> . Bioinformatics . 2006. 22(2): pp. 195-201.
Book or Textbook	Last Name, First Name Initials. <i>Title of the Chapter</i> . Name of Book, edition . Year of publication. Place of Publication: Publisher.	Lanza, R., Gearhart, J., Hogan, B., Douglas, M., Pedersen, R., Donnal Thomas, E., Thomson, J., and West, M., eds.* <i>Chapter 11: How cells change their phenotype</i> . Essentials of stem cell biology, 2nd ed . 2009. San Diego: Academic Press. *List editors followed by the notation “eds.” if there are no authors but rather editors.

McGill Policy Statements

1. ***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 (see www.mcgill.ca/students/srr/honest/ 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 site www.mcgill.ca/students/srr/honest/).

2. ***In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded. 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).***

MIMM 387 Lecture Schedule – Winter 2019

DATE		TOPIC	LECTURER
1	F Jan 11	Introduction and Overview	Dr. Robert Murgita Professor, Microbiology and Immunology
2	M Jan 14	University-Industry Relationships	Dr. Robert Murgita Professor, Microbiology and Immunology
3	F Jan 18	Biotech vs. Pharma	Dr. Robert Murgita Professor, Microbiology and Immunology
4	M Jan 21	New Drugs in MS	Dr. Jack Antel MD Former Chairman of the Department of Neurology and Neurosurgery, MNI
5	F Jan 25	Clinical Research in Drug Development	Dr. Angela Genge MD Medical Director of the Clinical Research Unit, MNI
6	W Jan 30	Critical Thinking Exercise 1 (6-9PM)	Dr. Robert Murgita Professor, Microbiology and Immunology
7	M Feb 4	Patents in Technology and Science	Mr. Christian Cawthorn Partner, Norton Rose Fulbright Law Firm
8	F Feb 8	Pharmaceutical patents in an international context	Mr. Richard Gold Professor, Faculty of Law, McGill
9	W Feb 13	Critical Thinking Exercise 2 (6-9PM)	Dr. Robert Murgita Professor, Microbiology and Immunology
10	M Feb 18	How science can assist the debate about HPV vaccination	Dr. Eduardo Franco Chair, Department of Oncology, McGill
11	F Feb 22	Ethical issues in vaccine programs	Dr. Brian Ward MDCM, DMT&H Research Institute – McGill University Health Centre
12	W Feb 27	Critical Thinking Exercise 3 (6-9PM)	Dr. Robert Murgita Professor, Microbiology and Immunology
Mar 4-8		READING WEEK	NO CLASSES
13	M Mar 11	Healthcare systems	Dr. Antonia Maioni Professor, Dean – Faculty of Arts, McGill
14	F Mar 15	The business of scientific publishing: a paradigm change for scholarly journals	Dr. Eduardo Franco Chair, Department of Oncology, McGill
15	W Mar 20	Critical Thinking Exercise 4 (6-9PM)	Dr. Robert Murgita Professor, Microbiology and Immunology
16	M Mar 25	Heretics and conspiracy nuts in science and medicine	Dr. Joe Schwarcz Professor, Department of Chemistry, McGill
17	F Mar 29	AI in Medicine	Dr. Audrey Durand Post-Doctoral Student, School of Computer Science, McGill
18	W Apr 3	Critical Thinking Exercise 5 (6-9PM)	Dr. Robert Murgita Professor, Microbiology and Immunology
19	M Apr 8	Generic drugs: manufacturing, pricing, and distribution	Ms. L. Ferreira Director, Government Relations, Sandoz Canada Inc.

20	F Apr 12	General discussion: translational research, science and medicine, careers in biotech and Big Pharma	Dr. Robert Murgita Professor, Microbiology and Immunology
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