Chem Eng 704 – Winter 2022
Biomedical Commercialization and Entrepreneurship
Graduate Course Outline

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Course Description & Prerequisites:
Biomedical Commercialization and Entrepreneurship is a unique graduate course for students in the biomedical sciences who are interested in taking their research beyond the lab and/or learning about the biomedical and life science industry. The course provides foundational knowledge and practical skills to allow learners to commercialize their work and/or prepare them to work as commercialization professionals in industry. The students will be educated on the process of research translation to clinic and commercialization while providing an understanding around the intricacies of the biomedical industry, preparing them for possible non-academic careers and fostering an interest in biomedical entrepreneurship.

Key themes of the course include understanding intellectual property and market assessment, and application of this knowledge to evaluate commercial potential of research projects (from the learner's own laboratory, where possible). In preparation for the final assessment, students will prepare case studies highlighting the journey from discovery to market of successfully commercialized academic projects. Guest speakers from relevant start-up firms and larger commercial entities will be invited to share their perspectives on this journey.

The course will be delivered via lectures on foundational content, case study presentations by students and guests, group discussions and project pitches. Participation in discussions, critical evaluation of peer presentations, and reflections on guest speaker discussions will be required to ensure active participation.

Course Objectives and Learning Outcomes:
At the end of this course learners should be able to:

- Describe different sectors of the biomedical industry (Biotech & Pharma, Medical Devices, Research & Lab services)
- Understand and articulate the steps needed to take a discovery to market (pre-clinical requirements, clinical testing, post-clinical marketing, regulatory requirements)
- Understand the current trends, opportunities and barriers in the biomedical industry
- Be capable of evaluating a research project for commercial potential (patentability, market appeal and fit, commercial feasibility)
- Present a pitch of a research project with a focus on the commercial potential

Other learning outcomes

- Select and critically assess a relevant case study
- Critically assess one's own research project, and apply learnings to optimize the commercial potential of one's work
- Communicate ideas in a number of formats (written, spoken, multimedia)

Recommended reading will be provided prior to each session.

Format

Classes will be held weekly, either in person or online depending on the content, guest speaker availability and university restrictions. Some classes will be delivered in a traditional lecture style, followed by in class discussion, with other content delivered peer-to-peer in the form of case studies or by guest lecturers speaking from personal experience. Students will be expected to be active participants in all classes, as well as by critical evaluation of their peers' case studies and reflections on guest lecturers.

Class Scheduling

Classes are currently scheduled for Mondays, 1-4 pm. Zoom links or classroom locations will be identified prior to class start.

Topics

Week 1 (Jan 10): Zoom

- Introduction to the Biomedical Industry: Start-ups, Biotech, Pharma and everything in between.
- Lecture and Industry Guest (Jennifer Hamilton, Johnson and Johnson Innovation).

Week 2 (Jan 17): Zoom

- Intellectual Property: Overview of IP, introduction to MILO and patentability of biomedical innovations.
- Lecture, In-class exercise and Industry Guests (Melanie Szweras and Reshika Dhir, Bereskin Parr- Melanie will focus on life science/pharma and Reshika will focus on medical devices, AI and digital solutions).

Week 3 (Jan 24): Zoom

- Intellectual Property continued: Patent searching skills.
- Demonstration, case study and in class exercises.
- Student interview reflection presentations.

Week 4 (Jan 31): Zoom

- Market Assessment: How to evaluating if there is a need for your innovation (Questions to ask and who to ask them of).
- Lecture and Guest Speakers (Jeannie An, McMaster Libraries, and Wesley Kosiba, Lab2Market program).

Week 5 (Feb 7): In Person (HSC 4E20)

- Lab to market: Taking a discovery in the lab to a product on the market.
- Lecture, Case Study and Guest Speaker (speaker will be updated once confirmed).

Week 6 (Feb 14): In Person (HSC 3H41)

- Case studies presented by students.
- Guest case study (Jake Magolan, other to be confirmed).

Week 7 (Feb 21): No Class due to Family Day Holiday

Week 8 (Feb 28): In Person (HSC 3H41)

- Case studies presented by students.
- Guest case study (Andrew McArthur, other to be confirmed).

Week 9 (March 7): Zoom

- Creating a commercialization plan: key elements to consider. Lecture and input from guest speaker.
- Lecture and Guest Speaker (Bharat Srinisava, Amplitude Ventures).
- Student interview reflection presentations.

Week 10 (March 14): Zoom

- Pitching your project.
- Lecture and Guest Speaker (Monika Yazdanian, ToeFX).
- Student interview reflection presentations.

Week 11 (March 21): In Person (HSC 4E20)

- outstanding issues re: finish interview reflections, questions on commercialization plan.

Week 12 (March 28): Online, Asynchronous

- Synapse Competition
- Debrief competition, highlighting relevant learnings relating to final pitches.

Week 13 (April 4): In Person

- Student pitches
- Guests and subject experts will attend to provide additional feedback.

Week 14 (April 11): In Person

- Student pitches
- Guests and subject experts will attend to provide additional feedback.

Note that the instructor and university reserve the right to modify elements of the course (with the exception of the grading and grading breakdown) during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. Students are responsible for finding out about announced changes if they miss class. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to remain informed of any changes.

Student Evaluation and Assignments

Assignment	Due date	Weight
1. Biomedical Professional Interview Reflection (Individual)	Weeks 3, 9, 10, 11 (date to be chosen by students)	10%
2. Case Study Presentation (Partners)	Weeks 6 and 8	20%
3. Critical Review of Peer Case Study Presentations (Individual)	Week 9	5%
4. Guest Speaker Reflection (Individual)	Week 14	5%
5. Commercialization Plan (Individual)	Week 12	30%
6. Pitch Presentation	Week 13-14	25%
Participation in Class Discussions	Weeks 1-14	5%

Policy Reminders

ACADEMIC INTEGRITY: You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.**

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at https://secretariat.mcmaster.ca/university-policies- procedures-guidelines/

The following illustrates only three forms of academic dishonesty:
•plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
•improper collaboration in group work.
•copying or using unauthorized aids in tests and examinations.

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It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

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EXTREME CIRCUMSTANCES: The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.