

Technology Commercialization



Course Overview:

Market adoption of new technologies is of concern to researchers, interested in creating economic value from their research, and attracting research funding. However, technology utility, by itself, is not sufficient to achieve commercial success. This course offers a formal process and novel frameworks that helps technologists understand the complex issues around enhancing the value of their technologies, overcoming barriers to adoption, and identifying alternate strategies for market success. through strategic partnerships or venture creation.

Learning outcomes:

Identify and apply key concepts/frameworks of technology commercialization to real technology commercialization challenges.

- ▶ Build competitive advantage to develop sustainable technology commercialization strategies (patenting, branding, partnering).
- ▶ Utilize behavioral economics to predict how individual users will be motivated to adopt new technologies.
- ▶ Identify stakeholders who might influence the adoption decision, understand their barriers to adoption, and identify alternate approaches to overcome innovation inertia.
- ▶ Develop a comprehensive overview of alternate technology commercialization approaches.
- ▶ Learn how to apply the key ingredients of developing an experimental approach to technology commercialization (hypothesis development, experimentation, validation, pivot) to examine assumptions about users, market segments, business models, applications and jobs being done.
- ▶ The course is delivered experientially, with researchers invited to bring their technologies to the class, and explore them each week through a different lens, in order to develop a viable commercialization strategy. Feedback from the class (and the Professor) is then used to inform subsequent steps in the process.



Course Structure:

- ▶ Importance of technology commercialization
- ▶ Current models of technology commercialization
- ▶ Improving technology commercialization outcomes
- ▶ Understanding what jobs your technology can do
- ▶ Increasing your technology's core value
- ▶ Understanding the motivation to adopt
- ▶ Enhancing the value proposition
- ▶ Finding first users and applications
- ▶ Overcoming barriers to adoption
- ▶ Creating new business models, and new ventures
- ▶ Developing a go to market strategy



Course Details:

Course Number: MECH 6502

Course Pre-requisites: None

Course Timing: Weekly classes on Monday 11.00 am (Winter term)

Enrolment Open to: Technology, Engineering, Science
& Business Graduate Students

Course Faculty:

Dr. Andrew Maxwell received his Ph.D. in Management of Technology from the University of Waterloo in 2011, winning the Academy of Management's Heizer Award. Prior to this he completed an MBA at London Business School, and a B.Sc. (Eng.) in Electrical Engineering from Imperial College London. He has been Chief Innovation Officer at the Canadian Innovation Centre for the past ten years, developing and delivering innovative and entrepreneurial programs (such as VentureStart for FedDev/RIC and InnoGate for IRAP and the Innovators' Alliance). In 2012, he was appointed to the College of Engineering and School of Business at Temple University (Philadelphia), joining Lassonde in 2014, and being appointed to the Bergeron Chair in Technology Entrepreneurship in 2018.

His research examines the behavioral aspects of technology innovation, specifically how people and organizations make the decision to adopt new technologies, the disruptive impact of technologies on the marketplace, and the formation of new ventures to commercialize technologies. He has run various versions of his technology commercialization process globally under the "TechConnect" brand, is developing "Exploring Platform Technologies" through the NSF iCorps program in the US, and "Designing Technology Ventures" through NEXT Canada.

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Participant Feedback

In this experiential learning course, students, faculty, TTO professionals and industry advisors, are expected to use a specific framework to present and update their commercialization journey each week as well as to provide feedback on other projects presented in class. Based on the class feedback, participants make the decision to continue, pivot their technology commercialization project, or to recognize there is little chance of commercialization success. Participants deciding not to continue with their own projects then join another team, to continue their learning journey. As a truly experiential course, participants enhance their learning outcomes, students were required to keep a personal learning journal, and to share their insights with the instructor at the end of the class. Below we include some of the feedback:

What assumptions about technology commercialization did you have that were challenged during the course?

“Build it and they will come” turned out to be a faulty assumption. Your prospective customers may not understand or want the benefits that your technology offers at its cost.

“My assumption was that transferring a technology to a commercial product is a very straight forward process which encompass so much advertising. During this course, I found out that advertisement is only a channel in the journey of commercialization of a technology. There should be a very strong infrastructure for a technology to convince the customer to adopt it. “

“Before the course, I thought that technology commercialization is only a one way process. I thought after finishing my research then I should focus on how to commercialize it. But, I understood that from the very beginning of my research, I can start working on its value proposition and based on that I can modify my research or even decide to shift to another one with higher feasibility. “

“It isn’t necessary to build a whole prototype to test your idea with customers. It’s possible to test the desired effects of the invention on a test population to see if they really want it. Just because people say they want your cool thing, does not mean they will want or need it after continued exposure. “

“I assumed that in order to commercialize, you need to start up you own business, which will require a substantial amount of startup funding. Throughout the course, I have come to realize that there are other ways to commercialize such as, licensing and partnerships.

“ I now realize that due to the many routes of commercializing technology, it is not up to the creator of the technology to determine the best way to commercialize. Instead, one must look at the market ...“

“I had assumed that as long as people had a need for a technology, they will buy it, but this is very not true. Just because our sensors were more sensitive didn’t mean everyone would buy it, since not every application needs this super sensitivity and even if they do, people are reluctant to change their product from a trusted name brand to our new sensors no one has heard of. “

“I believed that providing better technology is the only thing that a researcher should look for. However, this course changes my mind, there are some more important things too such as the market size of the technology or barriers of adoption and also competing in the market which is really important. “

“ I had assumed that technology commercialization includes some simple steps that should be only followed. I found that it was not that much easy and it takes really hard work. “

“Technology commercialization was not a recipe I had imagined, and it cannot be done in isolation. It takes hard work and openness from everyone involved. At the same time, technology commercialization seemed more doable than daunting. “

“I initially thought licensing is not an appropriate means to earn money and did not understand reasons why any company would actually want to use it. After taking the course it made more sense to understand the importance of licensing. “

“..., another point that have been challenged was about free usage. I used to think that the value is reflected by how much customers pay to use the technology. But I learnt that the technology is proved to have value when customers are using it even if it is given for free at some stages. “

“before starting this course, commercializing a technology was a really big concept for me like a big work which will not be doable alone or in near future. But I understood that by breaking it into different steps which I learned in this course I can look at it as a work that is not that much hard “

“I did not know that commercialization can be done by a bunch of graduate students as well. I understood that commercialization has a complicated process, but it is not impossible for young, inexperienced students to start their own business”

“The second assumption which was challenged during this course was about being a manufacturer and supplier of your own product. Sometimes it is advisable that rather competing with the existing manufacturer, you can adopt your preposition based on being licensed partner. In this way, you are not only avoiding the competition, risks and high capital investment but also utilizing network and supply chain of the partner. “

Why would you say this class is important, or why would you say it is not important (for a graduate engineer)?

“This class is very important for graduate student as it is a “Myth Buster” for acquired social knowledge regarding to technology commercialization. The content of the course equips the students with very fundamental tools to investigate and update the business model to adopt with the market requirement. “

“I think this course is important because it shows us how it is like to translate the technical language to the commercial language.”

“For me, every single step we took towards developing our technology business model were useful. I was lucky enough that we use the technology I am working on in my research. The identification of the stakeholders and the barriers to adopt my technology were like a paradigm shift to how I look to my technology and the aspects I need to enhance throughout my research.”

“The importance of this course is that it provides us with a new mode of thinking. It encourages us to think beyond just the research phase. The course forces us to think about the product of our research beyond the thesis. Most importantly, it gave me the following question “How can I change my research and tests, so that I can make my work readily applicable to solve real problems. “”

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“This helps researchers get their work be used rather than be stashed away in some paper very few people might read.”

“I think that this class can be very important for the students who want to enter the market after graduation. This course, as well as introducing the process of technology commercialization, will make them more familiar with some business terms which most of the engineering students do not know anything about. “

“It is important because it gives a meaningful insight on what tools are available nowadays to build the business model and how to address the main issues towards it.”

“ in todays world where start-ups are born almost every other day, its very important that students are well versed with the technology commercialization and business model canvases. This is treated as basic knowledge for most people in the industry.”

“This course can motivate a graduate student to believe in herself, to know that by putting more effort into her research, someday she can start the company of her own. “

“ ... no one can say that this course is not important. It increases the critical thinking and creativity for students in choosing their research points.”

Based on your experience, what advice would you give to someone interested in taking the course in future?

“I would advise all the graduate students to attend this course, especially, those who dream to be entrepreneurs. The course not only teaches the students how to commercialize their technology but also how to present it in a professional and scientific way.”

“I will totally encourage him/her to enroll in this course. The nature and the learning curve of this course is completely different than any technical course anyone can have. “

“This course would also benefit academia minded people in the sense that they could build better relationships with industry if they can understand the concerns industry would have with technology. “

“... if you are ready for out of the box thinking then this course can be a great fun with learning”

“This course would be more interesting to you if you have previous knowledge of the conventional methods of starting a business. This way you can see the differences of this method of technology commercialization with the traditional methods that are being used by people in the market today.”

“I would ask them to join without a second thought. This is a very good and experiential learning course for the graduate engineers. This will help them at least in future if not now, by teaching how to commercialize a technology. It also gives insights about which factors to consider while investing in a technology development “

“My advice for postgraduate students is to keep in your mind that developing the business prospective in your research is vital and this course will stress on this concept through real situation project. Subsequently, all business terminologies that you are not aware of or are vague to you will be illuminated through the simulation project.”

“I would advise them to try to enjoy the learning process and engage with people. Also, try not to stick to your norms and interests only, because you might be surprised by how you would affect and be affected by people from different fields and scientific backgrounds. “

“They should have an open mind and be ready to think more in depth. There were many things in the class where I first thought I knew all the answers to, such as the value proposition for my technology, but there were many other factors, such as training costs, that I never even thought about.”

“Most surprising learning will happen during group work. Be prepared to articulate your own perspectives and be open to (and encourage) others’ viewpoints. Push yourself to work with people from different departments. You will gain meaningful friendships and see how your different strengths and others’ strengths can come together. “

Student and Participant Recommendations

Survey results from class of 2018,

Video interviews with graduate students: <https://vimeo.com/218871188>

Video interviews with faculty: <https://vimeo.com/219038661>

Student Evaluation of Technology Commercialization Course

