

Western University
Faculty of Engineering
Centre of Engineering Leadership and Innovation

ES3331A: Managing Innovation and Design
Course Outline 2019-20

Description: This course is for students who have an interest in innovation and its management in entrepreneurial settings and corporate environments. Without innovation, there is no entrepreneurship, but not all innovations manifest in the form of new businesses or business processes. Understanding the foundations of innovation and how it may—or may not—improve firm performance is crucial for success in the hypercompetitive business landscape. Our objective in this course, then, is to build a better understanding of the conceptual domain of innovation and what managing innovation means for today's engineering leaders.

Instructor: Darren Meister, PhD., Ivey Business School, Western University
dmeister@uwo.ca
Consultation hours: By appointment (but quite flexible)

Academic Calendar Copy: This course targets the essential aspects of building technology-based businesses and how to identify technology innovation capability for use within existing businesses or new start-ups. Students analyse the firm's goals, strengths, weaknesses and opportunities leading to reasonable marketing strategies and action plans. Students to make decisions in the face of uncertainty.

Contact Hours: 3 lecture hours/week, 0.5 course.

Prerequisites: Third-year standing in an engineering program or permission of the instructor

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record.

CEAB Accreditation Units: Complementary Studies (Elective Course) = 100% or 39 AUs

Required Textbook: Ivey Publishing Course Pack (print copy or digital download copy instructions will be provided in class)

Other Required References: Copies of material discussed in class will be provided.

General Learning Objectives (CEAB Graduate Attributes)

Knowledge Base		Use of Engineering Tools		Impact on Society and the Environment	1/3
Problem Analysis		Individual and Team Work	2/3	Ethics and Equity	
Investigation		Communication Skills	3/3	Economics and Project Management	2/3
Design	3/3	Professionalism		Life-Long Learning	3/3

Notation: x/y , where x is the cognitive level (1: Remember, 2: Understand, 3: Apply) at which the attribute is assessed and y is the academic level (1: Beginner, 2: Intermediate, 3: Advanced) at which the attribute is assessed.

Topics and Specific Learning Objectives

1. Topic: Innovation Processes

At the end of this section, students will be able to:

- a. describe the major stages of an innovation process
- b. participate in innovative design processes

2. Topic: Innovation Design

At the end of this section, students will be able to:

- a. undertake user-centred design processes
- b. describe the design process differences due to industry setting

3. Topic: Innovation Culture

At the end of this section, students will be able to:

- a. describe the elements to an innovative culture
- b. identify approaches to implement an innovation improvement process

4. Topic: Diffusion of Innovation

At the end of this section, students will be able to:

- a. identify the critical develop a plan to increase market acceptance of a technology
- b. describe the key characteristics of an innovation

5. Topic: Customer-Driven Processes

At the end of this section, students will be able to:

- a. identify ways to integrate customer insights in to innovation processes
- b. forecast demand for new products
- c. manage open innovation processes

Evaluation

Course Component		Weight
Class Contribution (individual)	Class discussion is an integral aspect of full participation in this course. As we will be using Ivey's case method of teaching, students are expected to appropriately contribute in class. Grade weighting of this element of evaluation reflects this importance to the course. The evaluation rubric of class contributions will be discussed in class.	30%
Class Log Book (individual)	<p>Class Log Book: During each class, you should keep notes of your case prep and your in-class observations. After class you should make note of 3-5 key takeaways from the class that are contributing to your overall understanding of Innovation Management. Each week your notes should be about 1-2 pages in length from a standard log book. The log book is due on December 6.</p> <p>You should hand in your log book before Fall Reading week to get some feedback if you are meeting expectations or need to improve in some area.</p>	20%
New Product Launch Plan (group,; interim assignments due October 15 and 28, final Assignment due December 4)	<p>The purpose of this assignment is to design a new product. You will be assigned to teams of 4-6 individuals in order to develop a product or software innovation. The team will be a mix of students from HBA 4564 and ES 3331. The innovation should be reasonably novel and you should apply the design thinking process to its development and refinement.</p> <p>Your product (which can be a physical product, a software product, or a service) should satisfy the following characteristics:</p> <ol style="list-style-type: none"> a) It should serve a potential market of at least 1,000,000 users globally b) It should not have any direct competitors in the market today c) It should incorporate at least one of machine learning, artificial intelligence, data analytics, 5G, Blockchain or Internet of Things technology d) It should be sustainable <p>More details are provided below.</p>	50%

New Product Development Assignment

For this assignment, you team will be responsible for three submissions:

- a) Problem Definition (400-800 words, due October 15 at 11:59 PM): You will submit a problem definition that will explain the problem that you will be solving. In this assignment, you will explain:
 - a. Why this problem is important?
 - b. Who this problem affects?
 - c. Why a solution is hard to develop?
 - d. How will you know that you have a great solution? This is a list of criteria to evaluate solutions and constraints (at least 2) that it must meet. IT IS NOT A SOLUTION.
- b) Ideation Report (400-800 words, due October 28 at 7:59 AM): You will submit possible solutions to your problem. In the assignment, you will explain:
 - a. Three possible solutions. The diversity of possible solutions is important.
 - b. How you will gain feedback on each solution. It is not expected that you do excessive feedback seeking on each solution but you must gain feedback on each idea from people outside of your group membership.

Outside of the word limit, you will re-submit your problem definition. It can be different than your original problem definition but must include all the elements. In other words, you can change your problem but must redo the first assignment if you change it. It is not regraded.

- c) Final Submission (1500-3000 words, due December 4 at 11:59 PM). This will be your final submission. On November 18, you will participate in a feedback session in class (7-10 PM). Therefore, you must have a solution defined by then *but it will be in rough form and is changeable*. More information will be shared in the session pack on Learn. On December 2, you will present a five-minute information session about your innovation that includes a simple prototype, mockup, or wire frame of your innovation. There are no marks assigned on November 18 or December 2 but these are opportunities to gain feedback. Your final submission should include:
 - a. A description of your solution (you should include pictures, or other graphics showing your solution)
 - b. An assessment of how well your solution addresses the problem
 - c. A description of how your solution integrated feedback received from different sources.
 - d. Your group's reflections on how you would do this type of project in the future (300-500 words, included in overall limit).

Outside of the word limit, you will re-submit your problem definition and ideation report. Again, these can be different than the originals but must include all the elements. In other words, you can change your problem and ideas but must redo the assignments if you do. It is not regraded.

Everyone on your team is expected to be an active participant in both the creation and execution of the project. To support this, confidential written peer feedback of your teammates is due via email within 48 hours of submitting the written report. Assign each of your teammates a numerical evaluation between 0% and 100% following the same criteria for class contribution and add a few sentences of commentary on each of your team members. At the discretion of the instructor, your peer feedback will be used to adjust individual marks on this assignment up to + / - 15%; all adjustments to the individual marks will be done in a way that preserves the average team mark. If you do not submit peer feedback, it will be assumed you rate your teammates' performance "average." To obtain a passing grade in the course, a mark of 50% or more must be achieved on contribution (in lieu of final exam). A contribution grade < 50% will result in a final course grade of 48% or less. Each student will normally receive the same grade for the term project.

Along with the final report submission, each student will have the opportunity to submit an individual group evaluation. This will inform the Professor if the students believe that differential grades should be assigned to group members. The student is expected to justify this with specific reasons. The Professor may or may not change the grade on the basis of these submissions. An important factor in this decision will be whether the group requested assistance in how to improve its function during the term and at least attempted to act on this advice.

Homework Assignments: Assignments (individual and group exercises) will be discussed during class hours. The assignments must be submitted for marking by the due dates discussed in class. Written assignments will be submitted electronically except for the log book which will require a standard log book - see the provisions concerning plagiarism below.

Late Submission Policy: Late submissions will not be accepted without prior arrangement. Presentations must be given on the assigned date.

Use of English: In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Attendance: Any student who misses more than 25% (or 3 classes) will be reported to the Dean (after due warning has been given). On the recommendation of the department, and with the permission of the Dean, the student will be assigned a failing grade in the course.

Absence Due to Illness or Other Circumstances: Students should immediately consult with the instructor or department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see the attached "Instructions for Students Unable to Write Tests or Examinations or Submit Assignments as Scheduled"). The student should seek advice from the instructor or department Chair regarding how best to deal with the problem. Failure to notify the instructor or department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

For more information concerning medical accommodations, see the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

For more information concerning accommodations for religious holidays, see the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Cheating and Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. University policy states that cheating, including plagiarism, is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning.

All required papers may be subject to submission for textual similarity review to commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between the University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

Use of Electronic Devices: Students may use laptops, tablet computers, or smart phones (vibrate mode only) during class for course related activities. Non-emergency phone calls or text during class are not permitted. Electronic devices may be used during the final project presentation if part of the presentation itself.

Policy on Repeating All Components of a Course: Students who are required to repeat an Engineering course must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment, or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted by the student for grading in subsequent years.

Internet and Electronic Mail: Students are responsible for regularly checking their Western e-mail and the course web site (<https://owl.uwo.ca/portal/>) and making themselves aware of any information that is posted about the course.

Accessibility: Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2111 ext. 82147 for any specific question regarding an accommodation.

Support Services: Office of the Registrar, <http://www.registrar.uwo.ca/>
Student Development Centre, <http://www.sdc.uwo.ca/>

Engineering Undergraduate Services, <http://www.eng.uwo.ca/undergraduate/>
USC Student Support Services, <http://westernusc.ca/services/>

Students who are in emotional/mental distress should refer to Mental Health @ Western, http://www.health.uwo.ca/mental_health/, for a complete list of options about how to obtain help.

ES 3331 Sessions Overview

	Topic	Session Part 1	Session Part 2
Week 1 Sep 9	Design Thinking	Introduction to Innovation	What is Design Thinking?
Week 2 Sep 16	Disruptive Innovation	Disruptive Innovation Case: Blue Apron	Disruptive Innovators Reading: Innovator's DNA
Week 3 Sep 23	Product Design	Joint Class Session in Engineering (7-10 PM) Product Design	
Week 4 Sep 30	Diffusion of Innovations	Case: D.Light Design	Case: D.Light Design (continued)
Week 5 Oct 7	Problem Definition	Joint Class Session in Engineering (7-10 PM) Problem Definition	
Week of October 14		<i>Hand-In Problem Definition Assignment (October 15 at 11:59 PM)</i>	
Week 6 Oct 21	Ideation	Joint Class Session in Engineering (7-10 PM) Ideation	
Week 7 Oct 28	Innovation Processes	Building Partner Networks Case: IQmetrix	The Role of Experimentation (Discussion)
		<i>Hand-In Ideation Report (October 28 at 7:59 AM)</i>	
Week of November 4		Fall Reading Week	
Week 8 Nov 11	Open Innovation	Case: Open Innovation at CIBC	Exercise: Kickstarter
Week 9 Nov 18	Testing and Feedback	Joint Class Session in Engineering (7-10 PM) Testing and Feedback	
Week 10 Nov 25	Leading Innovation	Case: Boehringer Ingelheim	Guest Speaker
Week 11 Dec 2	Wrap-Up	Presentation (time to be confirmed)	<i>No class because extra class week of October 21</i>

Guest Speakers will happen during the course

***INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS
OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED***

IF, ON MEDICAL OR COMPASSIONATE GROUNDS, YOU ARE UNABLE TO WRITE TERM TESTS OR FINAL EXAMINATIONS OR COMPLETE COURSE WORK BY THE DUE DATE, YOU SHOULD FOLLOW THE INSTRUCTIONS LISTED BELOW. YOU SHOULD UNDERSTAND THAT ACADEMIC ACCOMMODATION WILL NOT BE GRANTED AUTOMATICALLY ON REQUEST. YOU MUST DEMONSTRATE TO YOUR DEPARTMENT (OR THE UNDERGRADUATE SERVICES OFFICE IF YOU ARE IN FIRST YEAR) THAT THERE ARE COMPELLING MEDICAL OR COMPASSIONATE GROUNDS THAT CAN BE DOCUMENTED BEFORE ACADEMIC ACCOMMODATION WILL BE CONSIDERED. DIFFERENT REGULATIONS APPLY TO TERM TESTS, FINAL EXAMINATIONS AND LATE ASSIGNMENTS. READ THE INSTRUCTIONS CAREFULLY. (SEE THE 2014 UWO ACADEMIC CALENDAR).

A. GENERAL REGULATIONS & PROCEDURES

1. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
2. Bring your request for academic accommodation to the attention of the chair of your (or the Undergraduate Services office if you are in first year) **PRIOR** to the scheduled time of the test or final examination or due date of the assignment. If you are unable to contact the relevant person, leave a message with the appropriate department (or with the Undergraduate Services Office if you are in first year). The address, telephone and fax numbers are given at the end of these instructions. Documentation must be provided as soon as possible.
3. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

B. TERM TESTS

1. If you are unable to write a term test, inform your instructor and the Chair of your Department (or the Undergraduate Services Office if you are in first year) **PRIOR** to the scheduled date of the test. If the instructor is not available, leave a message for him/her at the department office and inform the Chair of the Department (or the Undergraduate Services Office if you are in first year).
2. Be prepared to provide supporting documentation to the Chair and the Undergraduate Services Office (see next page for information on documentation).
3. Discuss with the instructor if and when the test can be rescheduled. **N.B.** The approval of the Chair (or the Undergraduate Services Office if you are in first year) is required when rescheduling term tests.

C. FINAL EXAMINATIONS

1. If you are unable to write a final examination, contact the Undergraduate Services Office **PRIOR TO THE SCHEDULED EXAMINATION TIME** to request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message **clearly** stating your name & student number (please spell your full name).
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a special examination, you **must** obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you **must** sign a "Recommendation for a Special Examination Form" available in the Undergraduate Services Office. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

N.B. It is the student's responsibility to check the date, time and location of the special examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Associate Dean if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4.
 - i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean. Documentation is mandatory.
 - ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean.

E. SHORT ABSENCES

If you miss a class due to a minor illness or other problems, check your course outlines for information regarding attendance requirements and make sure you are not missing a test or assignment. Cover any readings and arrange to borrow notes from a classmate.

F. EXTENDED ABSENCES

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You may want to seek advice from the academic counsellor in your Department or Ms Karen Murray in the Undergraduate Services Office if you are in first year.

G. DOCUMENTATION

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, **you must provide the doctor with a Student Medical Certificate** to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office if you are in first year). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence.**

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

H. ACADEMIC CONCERNS

You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).

You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.

If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your academic counsellor.

Calendar References: Check regulations in your 2019 Western Academic Calendar available at www.westerncalendar.uwo.ca.

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

<u>Drop Deadlines:</u>	First term half course (i.e. "A" or "F"):	November 5, 2014
	Full courses and full-year half courses (i.e. "E", "Y" or no suffix):	November 30, 2014
	Second term half or second term full course (i.e. "B" or "G"):	March 7, 2015

Undergraduate Services Office:	SEB 2097	telephone: (519) 661-2130	fax: (519) 661-3757
Dept. of Chemical and Biochemical Engineering & Green Process Engineering	TEB 477	telephone: (519) 661-2131	fax: (519) 661-3498
Dept. of Civil and Environmental Engineering:	SEB 3005	telephone: (519) 661-2139	fax: (519) 661-3779
Dept. of Electrical and Computer Engineering, Software Engineering, Mechatronics Engineering	TEB 279	telephone: (519) 661-3758	fax: (519) 850-2436
Dept. of Mechanical and Materials Engineering:	SEB 3002	telephone: (519) 661-4412	fax: (519) 661-3020