Bachelor of Technology Partnership

Course Outline

1. COURSE INFORMATION

Session Offered	Winter 2021	
Course Name	Engineering Economics	
Course Code	GEN TECH 2EE3	
Date(s) and Time(s) of lectures	C01: Monday 11:30am-12:20pm, Wednesday 2:30pm-4:20pm C02: Monday 12:30pm-2:20pm, Wednesday 12:30pm-1:20pm C03: Monday 4:30pm-6:20pm, Friday 11:30am-1:20pm	
Program Name	One of the following: Automotive and Vehicle Technology / Biotechnology / Process Automation Technology	
Calendar Description	Costing methods of engineering designs and processes; minimum acceptable rate of return, return sensitivities, time value of money, internal rate of return, pay-back period, amortization of equipment and capital cost allowance structures.	
Instructor(s)	Michael D. Justason Section: C03 Karim F. Karim Sections: C01, C02	E-Mail: justaso@mcmaster.ca Office Hours & Location: ETB/215, by appointment E-Mail: karimk7@mcmaster.ca Office Hours & Location: ETB/209, by appointment

2. COURSE SPECIFICS

Course Description	The purpose of this course is to equip students with the basic concepts of engineering economics through the understanding of theoretical and conceptual financial analysis. Applications of the following types of engineering economic decisions will be explored: capital, cash flow, and the time value of money concepts; nominal and effective interest rates when considering loans, mortgages, and bonds. The application of present worth analysis, annual equivalent analysis and rate of return analysis in evaluating independent projects, comparing mutually exclusive projects, and making decisions. After-tax financial analysis requiring an understanding of capital cost allowance (depreciation) and corporate income tax. Break-even, sensitivity and risk analysis, and decision making in the public sector.		
Instruction Type	**Code**	**Type**	**Hours per term**
	C	Classroom instruction	39
	L	Laboratory, workshop or fieldwork	
	T	Tutorial	
	DE	Distance education	
		Total Hours	39

Resources **Any of the textbooks listed here are acceptable for this course. These texts are 'strongly suggested' but are not 'required'. Some previous editions are also acceptable – please consult the instructors with*	**ISBN**	**Textbook Title & Edition**	**Author & Publisher**
	ISBN: 9780133405538 (Strongly Suggested) 9780199029280 (Optional) 9780195447545	Engineering Economics: Financial Decision Making for Engineers, Sixth Edition Engineering Economic Analysis 3rd Canadian Ed. (Loose-leaf version)	*Fraser, Jewkes, Pirnia (Pearson)* *Newnan, Whittaker, Eschenbach, Lavelle (Oxford)*

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<tr><td rowspan="3">specific questions regarding the course text.</td><td>(Optional)</td><td>Engineering Economic Analysis, 3rd Canadian Ed. (Hardcover)</td><td>Newnan, Whittaker, Eschenbach, Lavelle (Oxford)</td></tr>
<tr><td>Other Supplies</td><td colspan="2">Source</td></tr>
<tr><td>Course Resources</td><td colspan="2">Additional course resources will be available on (A2L)</td></tr>
<tr><td>Prerequisite(s)</td><td colspan="3">Registration in Level 2 of Automotive and Vehicle Technology, Biotechnology, or Process Automation Technology</td></tr>
<tr><td>Corequisite(s)</td><td colspan="3">N/A</td></tr>
<tr><td>Antirequisite(s)</td><td colspan="3">GEN TECH 1EE3; GEN TECH 3EE3</td></tr>
<tr><td>Course Specific Policies</td><td colspan="3">Students are expected to attend and actively participate during class sessions offering insight, comments, reinforcement, contrary views, and underscoring examples. It is expected that students read some of the course material that is coming under discussion prior to class.

Switching Classes:
You are required to attend the class days/times for the section in which you are registered. It is possible to attend another class day/time occasionally for specific conflicts that are both urgent and important in nature, such as a coop job interview – <u>however you must get prior approval from the instructor.</u>

Quizzes:
This course will have 5 Quizzes. Tentative dates are posted below. The dates of the Quizzes will be announced in A2L.

The lowest quiz score will be excluded from the calculation of your final grade, leaving 4 quizzes worth 5% each (total of 20%). <u>If you use an MSAF for one of the 5 quizzes</u>, your final grade will be calculated as follows:
• Each of the remaining 4 quizzes will be worth 4% each for a total of 16% (NOTE: the lowest score is not dropped – all 4 of the remaining Quizzes ‘count’)
• The Midterm will be worth 30% (unchanged).
• Your Final Exam will be worth 54% (4% added).

Midterm Exam:
The midterm will be a common exam written by all sections outside of regular class time tentatively scheduled for Saturday March 6th from 9 am to 11 am. The midterm exam format will include multiple-choice questions and application-focused problems covering course material from weeks 1-7.
• <u>Self MSAF is not permissible for weights on evaluations that are greater than or equal to 25% (i.e. midterm, final exam).</u> Any attempt to submit a falsified MSAF for this course for a missed midterm exam constitutes academic dishonesty and charges may be filed with the Office of Academic Integrity.
• Please note that there <u>are no deferred mid-term examinations</u> in this course. If, for any reason a student misses a mid-term examination, the student must apply for a Notice of Absence through the Faculty office. If the Faculty approves and issues an MSAF based on this application, the value of that examination will be applied to the cumulative final examination (i.e. a missed midterm exam with approved MSAF will result in the cumulative final examination being weighted at 80% of the final grade). If the Faculty does not approve the application, the student would receive a mark of zero for the missed midterm exam.

Final Exam:</td></tr>
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	The cumulative final exam will be written during the scheduled examination period. The final exam format will include multiple-choice questions and application-focused problems. The Instructors reserve the right to utilize Respondus Proctoring for all Examinations.	
Departmental Policies	Students must maintain a GPA of 3.5/12 to continue in the program. In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of "out-of-class" work for every scheduled hour in class. "Out-of-class" work includes reading, research, assignments and preparation for tests and examinations. Where group work is indicated in the course outline, such collaborative work is mandatory. The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception. Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals that are not in class. Instructor has the right to submit work to software to identify plagiarism.	
3. SUB TOPIC(S)		
Week 1 Jan 11th	Engineering Economics and Decision Making, Ethics, Estimating Costs, Dealing with Abstractions, Cash Flow Diagrams, Time Value of Money, Equivalence, Single-Payment Compound Interest Formulas, Nominal and Effective Interest	Oxford-Chapters 1,2&3 Pearson-Chapters 1&2
Week 2 Jan 18th **Quiz 1 – Due Jan 24th** **Chapters 1 & 2**	Completion of Week 1 Above	Oxford-Chapters 1,2&3 Pearson-Chapters 1&2
Week 3 Jan 25th	Repeated Cash Flows, Uniform Series of Payments, Arithmetic and Geometric Gradients	Oxford-Chapter 4 Pearson-Chapter 3
Week 4 Feb 1st **Quiz 2 – Due Feb 7th** **Chapter 3**	Cash flow Analysis application to mortgages and bonds	Oxford-Chapter 4 Pearson-Chapter 3
Week 5 Feb 8th	Present Worth Analysis, Annual Worth Analysis, Minimum Acceptable Rate of Return (MARR), Comparisons for Independent Projects and Mutually Exclusive Projects, Comparison of Alternatives with Unequal Lives, Payback Period	Oxford-Chapters 5 & 6 Pearson-Chapter 4
Mid-term Recess: Monday February 15th to Sunday February 21st		
Week 6 Feb 22nd **Quiz 3 – Due Feb 28th** **Chapters 3, 4 and 5**	Rate of Return Analysis, IRR, Net-Present-Worth, Incremental Analysis	Oxford-Chapter 7 Pearson-Chapter 5
Week 7 Mar 1st	Rate of Return Analysis (continued), Choosing the Best Alternative, Multiple IRR's, ERR, Graphical Solutions, Spreadsheets and GOAL SEEK, Future Worth Analysis, Payback Period, Sensitivity & Break-Even Analysis	Oxford-Chapters 8&9 Pearson-Chapter 5 **Midterm Mar 6th** **Online: 9 am to 11 am**

Week 8 Mar 8th	Income, Depreciation, and Cash Flow, Depreciation Methods, Capital Cost Allowance, Basic Elements of Financial Accounting	Oxford-Chapter 11 Pearson-Chapters 6
Week 9 Mar 15th **Quiz 4 – Due Mar 21st** **Chapters 5 & 6**	Replacement Decisions: • Reasons for Replacement or Retirement • Defender and Challenger Are Identical • Challenger is Different from Defender and Challenger Repeats Indefinitely • Challenger is Different from Defender and Challenger Does Not Repeat	Oxford-Chapter 12 Pearson-Chapter 7
Week 10 Mar 22nd	After-Tax Cash Flows, Acquiring and Disposing of Assets, Capital Tax Factors, Working Capital, Minimum Attractive Rate of Return	Oxford-Chapter 13 Pearson-Chapter 8
Week 11 Mar 29th **Quiz 5 – Due Apr 4th** **Chapters 7 and 8**	Inflation, Price Indices, Constant Dollars versus Then-Current Dollars, Effect of Inflation on After-Tax Calculations	Oxford-Chapter 14 Pearson-Chapter 9
Week 12/13 Apr 5th/Apr 12th	Course Catch-up/Recap and Exam Review	

Classes end: Wednesday, April 14
Final Examination Period: Thursday, April 15 to Friday, April 30
All examinations MUST be written during the scheduled examination period.

Note that this structure represents a plan and is subject to adjustment term by term.
The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. 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.

4. ASSESSMENT OF LEARNING *including dates*	**Weight**
Quizzes (top 4 out of 5 quizzes)	20%
Mid-term test	30%
Final examination (tests cumulative knowledge)	50%
TOTAL	**100%***

Percentage grades will be converted to letter grades and grade points per the University calendar.
*** An additional bonus mark of up to 3% will be based on class participation using the Top Hat platform for live synchronous responses during the lectures. There will be no cost to the student for utilizing the Top Hat platform. Since this is only a bonus component to encourage participation, MSAF's will not be accepted for missed classes and there will be no makeup opportunity.**

5. LEARNING OUTCOMES

1. Explain the effect of time on the value of money and apply it to engineering/financial decisions
2. Apply appropriate comparison techniques in the evaluation of competing alternatives from an economic perspective
3. Apply the concept of Minimum Acceptable Rate of Return and Internal Rate of Return for the purpose of evaluating projects
4. Calculate the value of an asset from an accounting perspective using the concept of depreciation
5. Calculate the Equivalent Annual Cost of an asset for use in replacement decisions
6. Calculate the effect of Tax on engineering/financial decisions
7. Calculate the effect of inflation on the Minimum Acceptable Rate of Return and the Internal Rate of Return

6. COURSE OUTLINE – APPROVED ADVISORY STATEMENTS

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.

http://www.mcmaster.ca/policy/General/HR/Discrimination_Harassment_Sexual_Harassment-Prevention&Response.pdf

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: 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.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.

Check the McMaster/Avenue email and course websites on a regular basis during the term.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

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.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should rev follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 w days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to th examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for assignments, and tests. http://www.mcmaster.ca/policy/Students-AcademicStudies/Studentcode.pdf

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instru include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, music artistic work, including lectures by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Stude should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instru this is a concern for you.

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 ch such as McMaster Daily News, A2L and/or McMaster email.