

UNIVERSITY OF
WATERLOO



FACULTY OF ENGINEERING

Engineering Economics: Financial Management for Engineers

MSCI 261, Spring 2022

Instructor: Dr. Jangho Yang

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Office Hour: Monday, 10 am–12 am, CPH 3629

Teaching Assistants: Yekta Amirkhalili (yekta.amirkhalili@uwaterloo.ca) & Sara Ebrahimkhani (sara.ebrahimkhani@uwaterloo.ca)

Class: Mon 3:00 pm - 4:20 pm & Fri 1:30 pm - 2:50 pm *Fri 12:30 pm - 2:50 pm (May06, May20, Jul08, Jul22), QNC 2502

Tutorial: Thur 4:30 pm - 5:30 pm, QNC 2502

Course Description

Engineering Economics: Financial Management for Engineers covers basic economic and financial concepts widely used in financial decision making. The main objective of the course is to give engineering students the foundation for understanding the basic building blocks of modern financial management. For this purpose, the course will discuss key concepts and topics in engineering economics and corporate finance, such as valuation, project evaluation, elements of financial statements, stock and bond market, and risk analysis/management. While the course is ambitious in terms of the coverage, equal attention is paid to the real-life examples to show how each concept can help us to understand the mechanism of firms' behavior in the modern corporate system. Since the course aims for an intuitive and basic understanding of corporate finance based on examples, the use of mathematics is limited and only a high-school level of algebra is required.

Course Objectives

1. Learn basic financial concepts to evaluate various investment options
2. Understand the role of tax and inflation in economics decisions

3. Learn tools to analyze corporate financial statements
4. Apply basic concepts in economics and finance to analyze financial market structure
5. Understand risk analysis and risk management

Main Readings

- Newnan, D. G., Eschenbach, T., & Lavelle, J. P., *Engineering Economic Analysis* (Fourth Canadian Edition) (2018), Oxford University Press.
- Ross, S. A., et al. (2022), *Fundamentals of Corporate Finance* (11th Canadian Edition), McGraw-Hill Education

Communication

Announcements

- All the course announcements will be made on Learn.

Online discussions and questions

- There are two forums for discussions and questions created on Teams: Weekly Topic Discussions & General Course Discussion. Use the Weekly Topic Discussions forum to ask questions related to course materials each week. Use the General Course Discussion Forum to ask clarifying questions related to course logistics, e.g. exam schedule, assignment due date. The instructional team will regularly check and respond to all questions as quickly as possible.

Email Policy

- All course related inquiries should be posted on Teams. This policy is motivated by the non-rivalrous and non-excludable nature of the intellectual communications between students and the instructional team. All students enrolling in this course have the equal right to participate in collective learning through questions and answers.
- E-mail is an official means for communication only when i) students have personal issues to be discussed with the professor, e.g. accommodations due to extenuating circumstances or assignment/exam grading appeal, and ii) students have confidential feedback to the instructional team.
- Instructors will not respond to text messages on Teams.

Course Requirements and Marking Scheme

Online Quiz	10%	(2 quizzes, 5% each)
Group project	35%	
Midterm exam	25%	
Final exam	30%	

Notice:

1. The group project is about building an investment portfolio via Investopedia Trading Simulator. The project involves three steps: initial portfolio proposal (May 20), final report (July 14), and oral presentation (July 15, July 18, July 21, July 22). Detailed instructions will be announced separately.
2. All project related submission needs to be made on Learn (Dropbox).
3. The two exams are held in person. Exam questions consist of concept checks, simple calculations, and short essay questions.
4. The two quizzes are held online (on Learn) on May 26 and July 14. The quiz will be made available at 12 pm for 12 hours. Once you start the exam, you will have 1 hour to complete the quiz.
5. A missed exam/quiz counts as a zero unless there are extenuating circumstances. Only with acceptable excuses, make-up exams will be held on an individual basis.
6. No plagiarism is tolerated in any circumstance such as an extended illness requiring hospitalization or visit to a physician with documentation and a family emergency, e.g. serious illness (with written explanation). Students need to submit a University of Waterloo Verification of Illness Form. Please refer to [Accommodation due to Illness Policy](#) for more information.

Fair Contingencies for Emergency Remote Teaching

We are facing unusual and challenging times. The course outline presents the instructor's intentions for course assessments, their weights, and due dates in Spring 2022. As best as possible, we will keep to the specified assessments, weights, and dates. To provide contingency for unforeseen circumstances, the instructor reserves the right to modify course topics and/or assessments and/or weight and/or deadlines with due and fair notice to students. In the event of such challenges, the instructor will work with the Department/Faculty to find reasonable and fair solutions that respect rights and workloads of students, staff, and faculty.

Covid-19 Emergency Remote Teaching-Learning

In the case of another COVID outbreak, we will go back to online format. Live Sessions will be held on MS Teams during scheduled course times and the sessions will be recorded.

Important Dates

Class begins	May 2
Portfolio proposal	May 20
Online quiz 1	May 26
Midterm exam	June 17
Online quiz 2	July 7
Project report	July 14
Project presentation	July 15, 18, 21, 22
Class ends	July 26
Final exam	TBD

*Midterm and final exam dates are subject to change in case they conflict with other courses.

*Online quizzes: May 26 and July 14.

*No-class: May 23 (Victoria Day), June 3(Conference), July 1 (Canada day)

*Make-up Class: May06, May20, Jul08, Jul22.

Topics and Readings

*N: Newnan, R: Ross

Introduction: Overview of Engineering Economics

Week 1	N. Ch.1 R. Ch.1	<ul style="list-style-type: none"> • Course introduction • Topic overview • Examples of financial decisions
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Topic 1: Time Value of Money

Week 1-2	N. Ch.3 R. Ch.5	<ul style="list-style-type: none"> • The time value of money • Compounding and discounting • Present versus future value
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Topic 2: Cash flow Analysis

Week 1-2	N. Ch.4 R. Ch.6	<ul style="list-style-type: none"> • Valuation with multiple cash flows • Annuities and perpetuities • Effective annual rates and mortgages
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Topic 3: Project Evaluations

Week 2-3	N. Ch.5,6,7 R. Ch.9,10,11	<ul style="list-style-type: none"> • Present worth and annual worth analysis • Minimum attractive rate of return • Internal rate of return
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Topic 4: Stock and Bond Market

Week 3-4	N. Ch.9 R. Ch.7,8	<ul style="list-style-type: none"> • Channels of raising capital • Interest rates, and bond valuation • Bond yields and their determinants • Stock valuation and types of stocks
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Topic 5: Risk and Return

Week 5-6	N. Ch.10 R. Ch.12-13	<ul style="list-style-type: none"> • Average returns vs. variability of returns • Systemic and unsystematic risk • CAMP and modern finance theory
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Midterm Exam

Week 7 (July 17)

Topic 6: Risk Management

Week 8	N. Ch.10 R. Ch.24-25	<ul style="list-style-type: none"> • Hedging and derivatives • Sub-prime mortgage crisis
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Topic 7: Financial Statements

Week 9	N. Ch.2 R. Ch.3	<ul style="list-style-type: none"> • Flow variables vs. stock variables • Income statement & balance sheet • Examples of corporate financial statements
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Topic 8: Tax and depreciation

Week 10	N. Ch.11,12 R. Ch.2	<ul style="list-style-type: none"> • Types of taxes • Basic aspects of depreciation and examples • Different depreciation methods • After-tax cash flow
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Topic 9: Inflation

Week 10-11	N. Ch.14 R. Ch.2	<ul style="list-style-type: none"> • Product price heterogeneity and general price level • Construction of price index • Effect of inflation on after-tax cash flow
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Student Presentation

Week 11-12

Final Exam

TBA

Academic Integrity and Students with Disabilities

Academic Integrity

In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. Check the [Office of Academic Integrity's website](#) for more information.

All members of the UW community are expected to hold to the highest standard of academic integrity in their studies, teaching, and research. This site explains why academic integrity is important and how students can avoid academic misconduct. It also identifies resources available on campus for students and faculty to help achieve academic integrity in — and out — of the classroom.

Intellectual Property

Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo. Intellectual property includes items such as:

- Lecture content, spoken and written (and any audio/video recording thereof)
- Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides)
- Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams)
- Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this Intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

Grievance

A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read [Policy 70 — Student Petitions and Grievances](#), Section 4. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline

A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. For information on categories of offenses and types of penalties, students should refer to [Policy 71 — Student Discipline](#). For typical penalties, check

Guidelines for the Assessment of Penalties.

Avoiding Academic Offenses

Most students are unaware of the line between acceptable and unacceptable academic behaviour, especially when discussing assignments with classmates and using the work of other students. For information on commonly misunderstood academic offenses and how to avoid them, students should refer to the [Faculty of Mathematics Cheating and Student Academic Discipline Policy](#).

Appeals

A decision made or a penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to [Policy 72 — Student Appeals](#).

Note for students with disabilities

The AccessAbility office is located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Turnitin.com

Text matching software (Turnitin) may be used to screen assignments in this course. Turnitin is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.

Academic Accommodations

Fair Contingencies for Emergency Remote Teaching

To provide contingency for unforeseen circumstances, the instructor reserves the right to modify course topics and/or assessments and/or weight and/or deadlines with due notice to students. In the event of further challenges, the instructor will work with the Department/Faculty to find reasonable and fair solutions that respect rights and workloads of students, staff, and faculty.

Online Academic Integrity for Individual Assessments

For all graded course assessments, students are expected to work individually and submit their own original work. Under Policy 71, the instructor may have follow-up conversations with individual students to ensure that the work submitted was completed on their own. Any follow up will be conducted remotely (e.g., MS Teams, Skype, phone), as the University of Waterloo has suspended all in-person meetings until further notice. Any permissions for collaboration on assessments (e.g., team project) must be provided by the instructor in writing.

Compassionate Consideration

If you are facing challenges that are affecting more than one course, please contact your Associate Chair or Director of your program. They will review your case and coordinate a reasonable and fair plan in consultation with appropriate others (for example: Instructors, Department Undergraduate Studies Committee, Chair, AccessAbility Services, Engineering Counselling services, Registrar's Office).

Wellness Support and Contact Information

We all need a support system. We encourage you to seek out mental health supports when they are needed. Please reach out to Campus Wellness and Counselling Services. We understand that these circumstances can be troubling, and you may need to speak with someone for emotional support. Good2Talk is a post-secondary student helpline based in Ontario, Canada that is available to all students including outside Ontario. MATES is a one-to-one student peer support program offered by the Waterloo Undergraduate Student Association in consultation with Campus Wellness. MATES provides support to students who are hoping to build social skills, or are experiencing personal or academic concerns or low-level mental health and wellness difficulties.

Appendix

All engineering programs are reviewed by the Canadian Engineering Accreditation Board (CEAB). One of the required accreditation criteria is that institutions ensure students have sufficient knowledge and proficiency with respect to the 12 Graduate Attributes (GAs) listed below. These attributes are mapped to the learning objectives in each course for assessment, as shown in the brackets. This allows the program to both comply with CEAB requirements and continuously improve

#	Acronym	Attribute Name	Attribute Definition
1	KB	Knowledge Base	Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
2	PA	Problem analysis	An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.
3	Inv	Investigation	An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.
4	Des	Design	An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
5	Tools	Use of Engineering Tools	An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
6	Team	Individual and team work	An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
7	Comm	Communication skills	An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
8	Prof	Professionalism	An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
9	Impact	Impact of engineering	An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.
10	Ethics	Ethics and equity	An ability to apply professional ethics, accountability, and equity.
11	Econ	Economics and project management	An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
12	LL	Life-long learning	An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.