

# **ENGINEERING ECONOMICS**

**ECO 1192C**

## **Course Outline**

**Instructor: C. Théoret**  
**Office: FSS 9051**

**January 9 to April 8 2017**  
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**Course schedule and location: Thursdays, 7-10 pm, FSS 2005**

### **1. DESCRIPTION**

Essentials of engineering economics; the "economizing" problem; time-value mechanics and equivalence; six approaches to engineering economy studies in the private sector; applications to mutually exclusive, independent and contingent projects; challenger and defender replacement studies; factoring depreciation, income taxes and price changes in engineering economic studies; cost minimization models; sensitivity: linear and non-linear break-even and scenario analyses, spider diagrams; analysis of public sector projects; ethics and economic engineering; project management; and decision-making under risk and uncertainty.

### **2. OBJECTIVE**

To convince engineering students that engineering economics is

- a distinct discipline at the interface between engineering and economics
- an essential part of all engineering decision-making.

### 3. TEXTBOOK

N.M. Fraser, E.M. Jewkes and M. Pirnia, Engineering Economics, 6<sup>th</sup> edition, Pearson, Toronto, Ontario, 2017 (on sale at the University and Agora bookstores).

Access at all times to the textbook is highly recommended. All subject-matter references are to the recommended course textbook.

Further readings can be found in section 6 of this course outline.

Chapters from the Fraser, Jewkes and Pirnia textbook covered this semester:

- a. Engineering Decision Making (Chapter 1)
- b. Time Value of Money and cash flows (2 and 3)
- c. Comparison Methods Part 1 (4)
- d. Comparison Methods Part 2 (5)
- e. Depreciation and Financial Accounting (6)
- f. Replacement Decisions (7)
- g. Taxes (8)
- h. Inflation (9)
- i. Public sector Decision-Making (10)
- j. Project Management (11)
- k. Dealing With Uncertainty and Risk (12)

### 4. FINAL GRADE

The final grade will be calculated from the following combination of examinations and assignments:

- Two (2) compulsory mid-term examinations: 2@15% = 30%
- Two (2) compulsory assignments: 2@15% = 30%
  - See **Course Calendar** for important dates.
- One (1) compulsory final examination : 1@40% = 40%

### 5. BACKGROUND DOCUMENTS

Several documents have been developed by the instructor to help students grasp key topics and understand spreadsheet applications (where possible).

Additional documents will be added during the semester. The documents currently available are:

1. Discount and Compound Interest Factor Applications.
2. Decision Criteria Interest Factor Derivation.
3. Decision-Criteria Interest Factors
4. Key Excel ® Financial Functions in Engineering Economics
5. Fixed Period (Planning Horizon) Asset Replacement
6. Before- and After-Tax Fixed Asset Replacement Analysis
7. Project Cash Flows (BTCH; ATCF; CFOE)
8. Depreciation-Induced Tax Savings From Capital Assets
9. Project Decision-Making With Inflation
10. One-Way Sensitivity Analysis
11. Capital Budgeting and Excel's Solver Add-In
12. Finding a Project's IRR With Excel's Solver Add-In
13. Financial Statements and Their Analysis
14. Project Management
15. Decision Tree Analysis
16. Fixed Asset Replacement Using Capital Tax Factors (CCTF)
17. Monte Carlo Simulations

## **6. EMAIL POLICY**

Please note that student emails to the instructor will NOT be answered if the

- a) questions have been discussed or answered in class; or
- b) information is available from other documents on the course website (e.g., the dates and coverage of mid-term exams).

Questions requiring detailed explanations should be raised during instructor and TA office hours.

## **7. WEEKLY OFFICE HOURS**

The instructor and teaching assistants will be available several times weekly to address student problems and questions.

The complete TA and instructor availability schedule is posted on Blackboard Learn.

## **8. CALENDAR OF LECTURES, EXAMINATIONS, ASSIGNMENTS**

A detailed calendar will be posted (with occasional updates) on the course website containing information on the content, coverage and dates of lectures, assignments and examinations.

Please refer to the website calendar on a regular basis for course-related

updates.

## **9. ABSENCE FROM EXAMINATIONS OR LATE ASSIGNMENT SUBMISSIONS**

Absence from any examination or test, or late submission of assignments due to illness, must be justified; otherwise, a penalty will be imposed.

The Faculty reserves the right to accept or reject the reason offered. Reasons such as travel, employment, and misreading the examination schedule are not usually accepted.

## **10. SPREADSHEET APPLICATIONS**

Many engineering tasks can be solved quickly and easily within the framework of a spreadsheet (or worksheet).

Key Excel® financial functions will be introduced and a variety of problems will be presented throughout the course to illustrate the usefulness of spreadsheet programs in solving simple and complex engineering economy issues.

Students wishing to learn more about the applications of Excel to a range of engineering topics such as numerical differentiation and integration, and numerical differentiation techniques for differential equations may wish to consult Ronald W. Larsen, *Engineering with Excel*, 4<sup>th</sup> edition, Pearson Publishing, 2013.

## **11. LECTURES, EXAMINATIONS AND ASSIGNMENTS**

PowerPoint lecture notes reflecting general course material will be available from the University of Ottawa course website. Although classroom lecture notes will contain more practical problems and applications than course website lecture notes, their required subject-matter coverage will be identical.

The instructor and teaching assistants will have weekly office hours and will organize occasional review sessions to address specific student needs.

In addition to PowerPoint lecture notes, two typical “problem-and-solution” sets will be available from the course website.

A basic knowledge of Excel® is required to complete assignments and to grasp key principles of finance.

Students will find grades, answers to examinations and solutions to assignments on the course website.

## 12. ADDITIONAL REFERENCES

Benninga, Simon, Principles of Finance with Excel, Oxford University Press, New York, 2006.

Blank, L., A. Tarquin and S. Iverson, Engineering Economy, Second Canadian Edition, McGraw-Hill Ryerson, Toronto, 2012.

Meridith, J.R. and S.J. Mantel, Jr., Project Management – A Managerial Approach, Seventh Edition, John Wiley & Sons, 2009.

Newnan, D.G., J. Whittaker, T.G. Eschenback and J.P. Lavelle, Engineering Economic Analysis, Third Canadian Edition, Oxford University Press, 2012..

Park, C.S., M.J. Zuo and R. Pelot, Contemporary Engineering Economics: A Canadian Perspective, Third edition, Pearson Canada, 2012.

Pinto, Jeffrey K. Project Management - Achieving Competitive Advantage, Third Edition, Pearson, Toronto, 2013.

Sullivan, W.G., E.M. Wicks and C.P. Koelling, Engineering Economics, Pearson Education, Sixteenth Edition, Upper Saddle River, NJ, 2015.

White, J.A., K.S. Grasman, K.E. Case, K. LaScola Needy and D.B. Pratt, Fundamentals of Engineering Economic Analysis, First edition, John Wiley & Sons, 2014.

## 13. MEDICAL CERTIFICATES

The Faculty of Social Sciences accepts medical certificates from individuals who are recognized by the College of Physicians and Surgeons of Ontario.

Certificates from other healthcare providers will neither be considered valid nor accepted as grounds for a deferred grade, even if the health provider is referred to as a "doctor."

## 14. BEWARE OF ACADEMIC FRAUD

Academic fraud is an act committed by a student to distort the marking of assignments, tests, examinations, and other forms of academic evaluation. Academic fraud is neither accepted nor tolerated by the University. Anyone found guilty of academic fraud is liable to severe academic sanctions.

Here are a few examples of academic fraud:

- engaging in any form of plagiarism or cheating;
- presenting falsified research data;
- handing in an assignment that was not authored, in whole or in part, by the student;
- submitting the same assignment in more than one course, without the written consent of the professors concerned.

In recent years, the development of the Internet has made it much easier to identify academic plagiarism. The tools available to your professors allow them to trace the exact origin of a text on the Web, using just a few words.

In cases where students are unsure whether they are at fault, it is their responsibility to consult the University's Web site at the following address: [http://www.socialsciences.uottawa.ca/eng/writing\\_tools.asp](http://www.socialsciences.uottawa.ca/eng/writing_tools.asp) « Tools for Writing Papers and Assignments ».

Persons who have committed or attempted to commit (or have been accomplices to) academic fraud will be penalized. Here are some examples of the academic sanctions, which can be imposed:

- a grade of « F » for the assignment or course in question;
- an additional program requirement of between 3 and 30 credits;
- suspension or expulsion from the Faculty.

Last session, most of the students found guilty of fraud were given an « F » for the course and had between three and twelve credits added to their program requirement.

For more information, refer to:

[http://www.uottawa.ca/academic/info/newsletter/fraud\\_e.html](http://www.uottawa.ca/academic/info/newsletter/fraud_e.html)

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