

# ELEC 481/CPEN 481 941 2023S1 Economic Analysis of Engineering Projects

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## Course Outline

### CPEN 481: Economic Analysis of Engineering Projects

**Instructor:** Jeff Carmichael

**Days and Time:** M and T 14:00-17:00 online lectures

**Office Hours:** online in Zoom right after class (typically 17:00-17:30 M and T but sometimes earlier)

**Email:** [jeffjcarmichael@gmail.com](mailto:jeffjcarmichael@gmail.com) (<mailto:jeffjcarmichael@gmail.com>) (notice the extra 'j' in the middle)

**Supporting Websites:** [piazza.com/ubc.ca/summer2022/eleccpen4811012022s](https://piazza.com/ubc.ca/summer2022/eleccpen4811012022s)   
(<http://piazza.com/ubc.ca/summer2022/eleccpen4811012022s>)

Head TA: Xiao Han, [xiao.han@ubc.ca](mailto:xiao.han@ubc.ca) (<mailto:bia26@mail.ubc.ca>)

**Course Description:** This course covers an introduction in evaluating engineering projects from an economic perspective and gives insight on measuring financial desirability of different project plans. After this course, students should feel comfortable working with cash flows, estimating costs/benefits, present worth analysis, rate of return analysis, and incorporating depreciation, inflation and tax. Students will also be introduced to principles of creating a business plan. The course uses mathematical techniques extensively including graphs, algebra, and some probability analysis.

## Required Textbook:

*Engineering Economic Analysis: Fourth Canadian Edition*; Donald G. Newnan, John Whittaker, Ted G. Eschenbach, Jerome P. Lavelle; Oxford University Press, 2018.

This textbook is available in the UBC bookstore digitally or in print.

**Evaluation:** 9 assignments totaling 63% (7% for assignment 1, 8% for 2, 9% for 3, 7% for 4, 6% for 5, 7% for 6, 6% for 7, 5% for 8, and 8% for 9), and a final exam (37%). Late submissions, including the final exam, will be penalized 2% of the total value of the assignment for each hour it is late.

	Date	Topic
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1a	M May 15	Course overview Chapter 1: Economic decisions, engineering costs, and cost estimating
1b	M May 15	Chapter 3: Interest and equivalence Other perspectives on economic analysis Brief electricity utility example
2a	T May 16	Chapter 4: Equivalence for repeated cash flows
2b	T May 16	Chapter 5: Present worth analysis Detailed present worth analysis example (fleet purchases)
	F May 19	<b>Assignment #1 due date</b>
	M May 22	<b>Statutory holiday</b>
3a	T May 23	Chapter 6. Annual cash flow analysis
3b	T May 23	Chapter 7: Rate of return analysis <b>Assignment #2 due date</b>
4a	M May 29	Ideal and second-best solutions
4b	M May 29	Chapter 8: Benefit-cost ratio, payback period analysis methods
	M May 29	<b>Assignment #3 due date</b>
5a	T May 30	Chapter 9: Selection of a minimum attractive rate of return Chapter 8: Public sector objectives and analysis challenges

		Cost-effectiveness analysis method
5b	T May 30	Public sector continued TBL and Economic methodologies for measuring environmental benefits
	F Jun 2	<b>Assignment #4 due date</b>
6a	M Jun 5	Chapter 14: Inflation and price change
6b	M Jun 5	Chapter 10: Uncertainty in future events <b>Assignment #5 due date</b>
7a	T Jun 6	Chapter 2 Accounting and engineering economy
7b	T Jun 6	Chapter 2 continued
	F Jun 9	<b>Assignment #6 due date</b>
8a	M Jun 12	Creating a Business Plan
8b	M Jun 12	Chapter 11: Income, depreciation and cash flow <b>Assignment #7 due date</b>
9a	T Jun 13	Ch 11 continued
9b	T Jun 13	Chapter 12 After-tax cash flows
	F Jun 16	<b>Assignment #8 due date</b>
10a	M Jun 19	Chapter 12 continued Chapter 9 (tax-related material)
10b	M Jun 19	Chapter 13 Replacement analysis

11a	T Jun 20	Real-life case study examples
11b	T Jun 20	Applied examples of real-life challenges in Metro Vancouver projects Applications of course topics to emerging innovations Course summary and overview of material on final exam
	F Jun 23	<b>Assignment #9 due date</b>
	date tbd	Take home Final Exam (to be released eve before exam date, due evening of scheduled exam)

## Course Summary:

Date	Details	Due
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