The Hong Kong University of Science and Technology

UG Course Syllabus

Course Title: Infrastructure Systems Engineering and Management

Course Code: CIVL2170

No. of Credits: [3-1-0:3]

Pre-requisites: MATH 2350

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Course Description

This course covers basic principles and techniques for analysing engineering systems. It includes an introduction to linear programs, network analysis, game theory, critical path method, and benefit-cost and present value analyses of engineering projects.

Methods of instruction: Two 1.5-hour lectures with an additional 1-hour tutorial per week.

Class time & venue: To be confirmed.

Key topics/themes include:

- Introduction to systems engineering and management
- Introduction to linear programs and their properties
- Formulation and solving of linear programs
- Formulation and solving of network problems
- Formulating decision making using game theory
- Project planning, work breakdown structure, and work sequencing
- Critical path method (CPM) and PERT networks
- Time value of money
- Economic appraisal and analysis of engineering systems

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Formulate and solve engineering optimization problems using the techniques of linear programs and network analysis.
2. Conduct engineering economic analysis and project planning and scheduling of engineering systems.

3. Identify and formulate a range of engineering problems.
4. Apply quantitative methods to solve engineering problems.
5. Appreciate a broad variety of engineering problems.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

Assessment Task	Contribution to Overall Course grade (%)	Due date
Assignments	40%	Not specified
Final examination	60%	To be determined

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Assignments	ILO 1, 2, 3, 4, 5	Reinforces and assesses understanding in Infrastructure Systems Engineering and Management using related (real world) examples.
Final examination	ILO 1, 2, 3, 4, 5	Assesses students' ability to apply knowledge and technical skills to solve problems in Infrastructure Systems Engineering and Management.

Grading Rubrics

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive and accurate grasp of infrastructure systems engineering and management concepts (e.g., linear programming, network analysis, game theory, CPM/PERT, time value of money, benefit-cost/present value analysis). Formulates problems correctly, selects appropriate quantitative methods, and solves them rigorously with clear justification and interpretation of results. Communicates solutions logically and professionally, and can synthesize ideas across topics to address unfamiliar, real-world engineering scenarios with minimal guidance.
B	Good Performance	Shows solid knowledge and understanding of the main course content and can correctly formulate and solve standard problems

		using appropriate techniques (e.g., LP, network methods, CPM/PERT, economic analysis). Explanations are generally clear, with only minor errors or omissions. Demonstrates the ability to analyze alternatives and interpret results in an engineering context, and performs well on familiar applications with some support for more complex or novel tasks.
C	Satisfactory Performance	Demonstrates adequate understanding of core concepts and can solve routine, well-structured problems when the method is clear (e.g., applying standard LP formulations, computing CPM schedules, performing straightforward present value calculations). Work may contain notable conceptual gaps, calculation errors, or weak interpretation, but meets minimum expectations overall. Shows effort and some ability to connect quantitative results to basic engineering decision-making.
D	Marginal Pass	Shows threshold understanding of some topics but has inconsistent performance across methods (e.g., difficulty formulating optimization models, interpreting network results, or applying economic evaluation correctly). Can complete parts of problems but frequently makes conceptual, methodological, or computational errors. Demonstrates limited ability to justify assumptions or interpret results, yet provides enough evidence of partial learning to meet minimum course requirements.
F	Fail	Demonstrates insufficient understanding of fundamental course concepts and methods. Unable to correctly formulate or solve core problem types (e.g., linear programs, network problems, CPM/PERT scheduling, time value of money/economic appraisal) even with guidance. Work shows major and persistent errors, minimal progress toward the intended learning outcomes, and does not meet the minimum standard required for passing the course.

Course AI Policy

- Using AI for final exam is NOT permitted.
- For assignments, if AI is used, students must include an AI Use Statement describing: (i) the tool used, (ii) what it was used for, and (iii) what was changed/verified by the student. The instructor may request chat logs or version history. Students must ensure the final submission is their own work and that all mathematics, models, assumptions, and results are verified and understood by the student.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

Resubmissions are not permitted. Late submissions are **not graded** and will receive **zero marks**, consistent with the course submission policy. Any approved special arrangements must be requested **before** the due date and supported by documentation as required by University policy.

Required Texts and Materials

ReVelle, C. S., Whitlatch, E. E., and Wright, J. R. (2003). Civil and Environmental Systems Engineering, Prentice Hall, New Jersey, USA.

Halpin, D. W. (2012). Construction Management, 4th edition, John Wiley & Sons, Inc.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.