The Hong Kong University of Science and Technology

UG Course Syllabus

Course Title: Introduction to Smart City Economics

Course Code: CIVL 4640

Credit: 3

Pre-requisite: MATH 1012 (prior to 2025-26) OR MATH 1013 OR MATH 1020 OR MATH 1023

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Course Description

This course will cover economic principles and tools for analyzing the emerging challenging problems in the context of Civil Engineering with a focus on smart city development. The course discusses various economic problems arising in modern power and transport systems through the lens of electric vehicles, renewable energy, mobility-on-demand services, etc. The course will complement the existing course in microeconomics by focusing on engineering applications and offering extensive practical examples within the smart city context. Through lectures and exercises, students will learn state-of-the-art models and tools to identify, formulate, and address challenging problems in smart city development..

Intended Learning Outcomes (ILOs)

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

1. Formulate and solve electricity market problems based on economic models and equilibrium analysis.

2. Formulate and solve economic problems in mobility-on-demand service based on economic models and optimization tools

3. Identify the potential for improvement in transport and energy systems and design strategies to realize the potential.

4. Appreciate a broad impact of civil engineering on smart city development and environmental sustainability.

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
Homework assignments	40%	Every 3 weeks
Class participation	10%	Every lecture
Final examination	50%	To be arranged by university

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

Mapping of Course ILOs to Assessment Tasks

[add to/delete table as appropriate]

Assessed Task	Mapped ILOs	Explanation
Class participation	ILO3, ILO4	Through class participation, the students are trained to identify the potential for improvement in transport and energy systems and design strategies to realize the potential (ILO 3), and appreciate a broad impact of civil engineering on smart city development and environmental sustainability (ILO 4).
Homework Assignments	ILO1, ILO2, ILO3	The homework assignment is designed to assess students' ability to formulate and solve electricity market problems based on economic models and equilibrium analysis (ILO 1); formulate and solve economic problems in mobility-on-demand service based on economic models and optimization tools (ILO 2); and identify the potential for improvement in transport and energy systems and design strategies to realize the potential (ILO 3).
Final Exam	ILO1, ILO2, ILO3	The final exam is designed to assess students' ability to formulate and solve electricity market problems based on economic models and equilibrium analysis (ILO 1); formulate and solve economic problems in mobility-on-demand service based on economic models and optimization tools (ILO 2); and identify the potential

		for improvement in transport and energy systems and design strategies to realize the potential (ILO 3).

Grading Rubrics

[Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.]

Final Grade Descriptors:

[As appropriate to the course and aligned with university standards]

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

Generative artificial intelligence tools are not allowed to complete assessment tasks.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include the mistakes made by the assignment as well as the areas for improvement. 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

No resubmission is allowed.

Required Texts and Materials

Kirschen, Daniel S., and Goran Strbac. *Fundamentals of power system economics*. John Wiley & Sons, 2018.

Stoft, Steven. *Power system economics*. Journal of Energy Literature 8: 94-99, 2002.

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.