

ECON5630: Topics in Empirical Industrial Organization

The Hong Kong University of Science and Technology

Spring 2025

Course Information

- **Credits:** 4
- **Schedule:** Tuesday & Thursday, 14:00-15:50
- **Venue:** Room 5564
- **Department:** Economics

Instructor Information

- **Instructor:** Prof. Kohei Sunada
- **Email:** kkawaguchi@ust.hk
- **Office Hours:** By appointment

Teaching Assistant

- **TA:** Wanghei Ip
- **Email:** whipab@connect.ust.hk

Course Materials

- **Lecture Notes:** ECON5630 Topics in Empirical Industrial Organization
 - **GitHub Repository:** [kohei-kawaguchi/EmpiricalIO](https://github.com/kohei-kawaguchi/EmpiricalIO)
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Course Description

This PhD-level course covers various econometric methods used in industrial organization, focusing on the structural estimation approach. These methods, developed since the 1980s alongside the modernization of industrial organization based on game theory, are widely applied in:

- Antitrust policy
- Business strategy
- Labor economics
- International economics

Course Content

The lecture covers:

1. Classic econometric methods (80s-00s) for estimating primitive parameters in imperfect competition:
 - Production and cost function estimation

- Demand function estimation
- Merger simulation
- Entry and exit analysis
- Dynamic decision models

2. Modern methods for recovering model primitives in:

- Auction
- Matching
- Network
- Bargaining

Prerequisites

- PhD-level microeconomics and microeconometrics
- Undergraduate-level industrial organization
- Programming skills (R and C++)
 - While prior knowledge is not required, rapid learning is expected
 - Experience in other programming languages is beneficial

Note: Audit without credit is not permitted for students.

Intended Learning Outcomes (ILOs)

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

1. Learn and practice econometric methods for empirical industrial organization
2. Implement these methods from scratch through programming
3. Explain the strengths and weaknesses of each method
4. Critically review empirical papers
5. Understand new methodology independently

Assessment and Grading

This course uses criterion-referencing without grade curves. Detailed rubrics are provided for each assignment.

Assessment Components

Component	Weight	Details	Due Date
In-class Questions	20%	- 1 point per question (max 2 per class) - Must record in Discord channel by next class	Every class
Coding Exercises	30%	- Choose 5 out of 9 exercises - 6 points each - Submit via GitHub Classroom	1 week after assignment

Component	Weight	Details	Due Date
Replication Exercise	30%	- Simulation coding (15%) - Estimation and debugging (15%)	End of March/April
Reading & Presentation	20%	Present assigned section from latest Handbook of Industrial Organization	As assigned

Mapping of Course ILOs to Assessment Tasks

ILO	In-class Questions	Coding Exercises	Replication Exercise	Reading & Presentation
1. Learn and practice econometric methods	✓	✓	✓	✓
2. Implement methods through programming		✓	✓	
3. Explain strengths and weaknesses	✓			✓
4. Critically review papers	✓			✓
5. Understand new methodology	✓			✓

Grading Rubrics

In-class Questions (20%)

- **1 points:** Any clear questions

Coding Exercises (30%)

For each exercise (6 points):

- **Code Implementation (3 points)**
 - 3: Correct, clean, efficient, and well-documented code
 - 2: Working code with minor issues
 - 1: Code with major issues but shows understanding
 - 0: Non-working or missing code
- **Results (3 points)**
 - 3: Correct results
 - 2: Almost Correct results
 - 1: Partial results
 - 0: Incorrect or missing results

Replication Exercise (30%)

Simulation Coding (15%)

- **Code Quality (5%)**
 - Correct, clean, efficient, and well-documented
 - Follows best practices
- **Implementation (5%)**
 - Accurate replication of paper's model
 - Correct unit tests
- **Results Analysis (5%)**
 - Clear presentation of results
 - Thoughtful discussion of the comparative statics

Estimation & Debugging (15%)

- **Code Quality (5%)**
 - Correct, clean, efficient, and well-documented
 - Follows best practices
- **Implementation (5%)**
 - Accurate replication of paper's methodology
 - Correct unit tests
- **Results Analysis (5%)**
 - Clear presentation of results
 - Thoughtful discussion of the estimation results

Reading & Presentation (20%)

- **Content Understanding (8%)**
 - Comprehensive grasp of material
 - Clear explanation of key concepts
 - Accurate technical details
- **Presentation Quality (6%)**
 - Clear and organized delivery
 - Effective use of slides
 - Engaging presentation style
- **Discussion Leadership (6%)**
 - Thoughtful question handling
 - Facilitation of class discussion
 - Connection to broader topics

Final Grade Descriptions

- A (85% and above): Demonstrates exceptional understanding of econometric theory and implementation. Shows mastery in both theoretical concepts and practical applications. Code is exemplary, results are accurate, and presentations are clear and informative.
- B (70-84%): Shows solid grasp of course material with good technical implementation. Code works well with minor issues, results are generally correct, and presentations are clear and informative.
- C (50-69%): Demonstrates basic understanding of core concepts but with some gaps. Code has functional issues, results show partial understanding, and presentations meet minimum requirements.

- D (40-49%): Shows minimal understanding of course material. Significant issues in code implementation, incomplete or partially incorrect results, and presentations lack depth.
- F (Below 40%): Fails to demonstrate basic understanding of course material. Major problems with code, incorrect or missing results, and inadequate presentation performance.

Other Notes

Course AI Policy

Participants are strongly encouraged to use AI tools to help with the course. It is part of the course requirement to use AI tools to enhance your coding skills.

Communication and Feedback

All communication should be made through a Discord server specified in the canvas page and in the orientation class. Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on problem sets include discussion in the classroom. Students who have further questions about the feedback, including marks, should consult the instructor within five working days after the feedback is received.

Late Submission Policy

Late submission of problem sets, for whatever reason, will not be accepted.

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 for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

Course Schedule

- Orientation
- Introduction to structural estimation and working environment, best practices in coding
- Demand function estimation
- Cost function estimation
- Merger simulation
- Single-agent dynamic models
- Multiple-agent dynamic games
- Auction
- Handbook reading every week
- Coding exercises every week