

Quantitative Macroeconomics with AI Integration

ECON 4999B, Fall 2026

Hong Kong University of Science and Technology
(course website is accessible through <http://canvas.ust.hk>)

Instructor: Yang Lu (yanglu@ust.hk)

Office Hours: by appointment, LSK 6059

Lecture Time and Location: Mon 1:30–2:50pm and Fri 9:00–10:20am, Rm 1033, LSK

Teaching Assistant: Harlly Zhou (hzhouci@connect.ust.hk)

Office Hours: Tue 4:00–6:00pm, LSK 5067

Tutorial Time and Location: Tue 3:00–3:50pm, Rm 1033, LSK

Project LLM Support: <https://ecz190.ust.hk/>

Project LLM Support Developer: Ian Wang (ywangox@connect.ust.hk)

Course Description

This course introduces a systematic research workflow designed to equip students with the technical and analytical tools necessary for modern academic and data-intensive projects. Students will master version control, data management, reproducible coding practices, and the strategic integration of AI in the research process through group research projects undertaken to apply macro models, statistical and econometrics tools to analyze real-world questions, in order to gain a better understanding of the models and practice problem-solving, teamwork, and presentation skills.

Pre-requisites

(ECON 3024 or ECON 3123) and ECON 3334.

Main Textbook

There is no required textbook. Lecture notes and other course materials will be posted on Canvas.

Tentative Topics

I. Technical Foundation and Version Control

- Version control, collaborative workflows, and responsible AI-assisted research

II. Data and Code Architecture

- Structured data, reproducible code, and research reporting pipelines

III. Documentation and Knowledge Management

- Project documentation, research organization, and knowledge management

IV. Research Methodology

- Literature review, economic and econometric analysis, research design, presentation, and paper writing

Depending on our progress, we may or may not cover all these topics.

Course Intended Learning Outcomes (Course ILOs)

At the end of the semester, you should be able to

1. formulate a coherent macroeconomic research question and research design grounded in relevant literature (PILO #1, 3)
2. build a reproducible research workflow using version control, structured data pipelines, and documented code architecture (PILO #1, 3)
3. select, apply, and evaluate appropriate macroeconomic and econometric models, and interpret their results (PILO #1, 3)
4. use AI as a research tool under explicit guardrails, remaining responsible for verification, error correction, and documentation (PILO #1, 3)
5. collaborate to execute, present, and revise a research project, and communicate findings in papers and presentations (PILO #2, 4)

(Program Intended Learning Objectives PILO can be found at <https://econ.hkust.edu.hk/programs-n-courses/econ/econ-curriculum>)

Teaching Approach

This course is primarily delivered through lectures and tutorials.

Teaching & learning activities	Roles in the course	Course ILOs addressed
Lectures	Learn the research workflow, macroeconomic analysis, and the disciplined use of AI.	1, 2, 3, 4
Tutorials	Introduce the course web app; review econometric toolkits; support group-project progress	1, 2, 3, 4
Exercises	Apply course concepts through assessed work	2, 4
Group project	Design and execute an empirical macro project; present, revise, and write up results	1, 2, 3, 4, 5
Final exam	Assess interpretation of AI-generated results in the context of group projects	3, 4

Grading Policy

Assessment Activities	Weighting	Course ILOs assessed
3 Exercises	15%	2, 4
Group project	55%	1, 2, 3, 4, 5
Final exam	30%	3, 4

Group project breakdown:

Item	Weight
Proposal	5%
Proposal presentation	5%
Draft presentation	10%
Revision presentation	10%
Final paper	20%
Peer evaluation	5%

Rubrics for Final Grade

A (Excellent Performance). Demonstrate a deep command of a reproducible research workflow, including version control, data architecture, and documented code. Design a well-posed macroeconomic question, choose appropriate models, and interpret results with care. Use AI under explicit guardrails, verify outputs, and correct errors. Communicate complex reasoning effectively in papers and presentations, and revise substantially in response to feedback.

B (Good Performance). Show a solid grasp of the research workflow and of standard macroeconomic and econometric tools. Complete a coherent project with appropriate model choice and generally sound interpretation. Use AI productively with meaningful human checks. Present and write clearly, and incorporate the main points of feedback in revisions.

C (Satisfactory Performance). Possess an adequate understanding of the workflow, models, and research-design steps. Produce a complete project that applies course tools but may lack depth in model justification, documentation, or interpretation. Use AI with uneven verification. Communicate the main findings, with limited revision in response to feedback.

D (Marginal Pass). Understand the basics of version control, data handling, and core models, but apply them incompletely or inconsistently. The project shows limited research design and weak documentation. AI use is poorly guarded or weakly checked. Communication and revision are thin or only partly on point.

F (Fail). Demonstrate insufficient understanding of the research workflow, macroeconomic and econometric tools, or research design. The project is incomplete, unreproducible, or unresponsive to feedback. Struggle to explain methods or results, or fail to take responsibility for AI-assisted work.

Course Policy

Tutorial: There will be a weekly tutorial.

It serves three purposes: (1) introduce the course web app; (2) review econometric toolkits; (3) support group-project progress.

Class participation:

Class participation will be encouraged via rewarding merit points, including asking questions and giving feedbacks to other groups.

Exercises:

Working in groups is welcome for discussion. Each student should submit an individually completed exercise.

Late submissions will not be accepted.

Group project:

The group project is the main vehicle for applying macroeconomic models and econometric tools to a real-world question.

Each group maintains its own Git repository. Commit history is used as reference evidence of individual contribution to support peer evaluation.

Final exam: The final exam assesses interpretation of AI-generated results in the context of group projects. A make-up exam will only be given in the case of illness for the final exam.

You must notify me by email before the exam for approval.

You must provide a valid medical or legal document.

Grading Disputes: With the exception of arithmetic errors, the instructor will handle them. In order to avoid problems associated with self-selection, disputes on individual questions will result in re-grading of the entire exercise, project component, or exam by the instructor. The re-graded score will be final and it may be higher or lower than the original one. Requests for re-grading must be submitted in writing to the instructor within one week since the score is first published.

Ground Rules

Mobile phones and any other disturbing electronic devices must be switched to the silent mode. Students are expected to attend all the classes on time. The exam and the project are based on the materials covered in class. If you have to miss some classes due to medical reasons, you are responsible to make it up by self-studying the posted lecture notes and consulting your classmates.

Academic honesty and integrity can never be emphasized enough, and any violation will be seriously punished. Please get familiar with the rules by checking the following website: <http://www.ust.hk/vpao/integrity/>.

AI is an intended part of this course. You are expected to use AI to support literature search, coding, drafting, and revision, and you are equally expected to set guardrails for that work. Hierarchical pseudocode, Git history, and README documentation are the human-checked record of what the group decided and verified. You remain responsible for every claim, specification, and result you submit.

Final Notes

Student feedback is essential for course improvement. At any time during the semester you are encouraged to give me and/or the TA feedbacks on the lectures and/or the tutorials orally or anonymously (e.g., via campus mail, or slip a note under my office door). End-of-course survey is another excellent way for you to provide detailed feedbacks of the course. Every voice should be heard!