

HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY



Department of Economics
ECON 6110S
(2 Units)

BUSINESS CYCLES & MONETARY POLICY
(Spring I, 2024-25)

Instructor

Name: Dr. KITNEY, Paul M.
Office: LSK 6056
E-mail: pkitney@ust.hk
Office hours: By Appointment

Teaching Assistant

Name: Mr. YAN, Ting Hin
Office: NA
E-mail: yantinghin@cuhk.edu.hk
Office hours: By Appointment

Class Schedule

Lecture time is Wednesday 9:00 am–12:20 pm, unless stated otherwise and are held in LSK G003. Teaching mode is “face to face”.

Course Description

This course provides an introduction to business cycles with applications in monetary policy, providing a natural progression from ECON 5140. It includes Real Business Cycle (RBC) models, monetary models, Dynamic Stochastic General Equilibrium Models (DSGE), and models with New Keynesian frictions, including nominal rigidities and financial frictions. In this course, students will learn how to solve various models analytically using dynamic programming and

sequential methods. Key topics in monetary policy (or monetary economics) such as money neutrality, super money neutrality, the Fisher equation, Friedman rule, equilibrium determinacy, time inconsistency, and reputation in monetary policy are also explored in this course. Numerical solution techniques are emphasized with calibration and simulation methods taught using Matlab, Octave, and Dynare, to compute the quantitative impact of economic shocks and policy events. Bonus computing workshops will be provided. Applications to policy and real-world phenomena are emphasized throughout. Assumed knowledge is ECON 5140.

Course Intended Learning Outcomes (CLIO's)

After completing this course, students should be able to understand, explain and identify:

1. Modern business cycle models using sequential and dynamic programming techniques. **(PILO 1)**
2. Solution, calibration, and simulation methods in RBC, monetary models, New Keynesian DSGE to make predictions and inferences about economic shocks and policy events. **(PILO 2, 5)**
3. Key concepts in monetary economics such as money neutrality, super money neutrality, the Fisher equation, Friedman rule, equilibrium determinacy, time inconsistency and reputation to establish a deeper understanding of monetary policy and business cycles. **(PILO 1,2, 5, 13)**

Prerequisite

No formal prerequisite but ECON 5140 is assumed knowledge for this course.

Recommended Learning Resources

There is no required textbook. A detailed and comprehensive list of references is provided at the end of this document. Some useful reference books may include: Campante, F., Sturzenegger, F., and Velasco, A. (2021). *Advanced Macroeconomics: An Easy Guide*. LSE Press. This is a slightly lower technical level than this course. McCandless, G. (2008). *The ABCs of RBCs: An introduction to dynamic macroeconomic models*. Harvard University Press and Walsh, C. E. (2017). *Monetary theory and policy*. MIT press, around the level used in the course or slightly more advanced.

Homework

Students will be required to submit 3 short individual assignments for grading. Each assignment is worth 10% for a total of 30% of the total assessment. These will help prepare you for the exam. Students will be required to make a statement about the use of ChatGPT in assignments. See the policy on ChatGPT in this course outline. No ChatGPT is permitted in individual assignments. "Turnitin" is a requirement for submission of assignments. **No late homework will be accepted!**

Assessment Scheme

	Description	Weight
Final Exam	Examines all topics covered during the term	60%
3 Individual Assignments	Three short assignments to be submitted for assessment	30%
Class Participation	Constructive contribution to class discussion	10%

Final Examination

The final exam (closed book) will be held during class on March 27, starting around 8:45 am. The location is Room 1527, near LTE in the main academic building. There will NOT be make-up exams. Only serious medical or personal emergencies may be accepted as legitimate excuses for a missed exam. If you fail to attend an exam for medical reasons, you must present a doctor's note. If you miss an exam without a valid reason, then you will receive a zero. You will be permitted to have a 1-page A4 cheat sheet but otherwise, this exam is closed book. The final exam will be worth 60% of the total assessment in this course.

Attendance Policy & Class Participation

Class attendance will be recorded each week. Attendance may be used as an input for the class participation grade and in some circumstances may be a contributing factor in borderline grading decisions. Class participation is NOT a 1-1 mapping with attendance. While attendance may be a contributing factor, the constructive contribution to class discussion will be very influential in your class participation grade. Conversely, disruptive behavior will lead to a lower participation grade. Class participation is worth 10% of your total grade.

ChatGPT Policy

ChatGPT is not permitted in this course. No use in exams or individual assignments is permitted. In your assignments students are required to make a statement as to whether they used ChatGPT and if they did to declare how they done so. Violation of this policy will be considered an academic integrity breach with potentially serious consequences.

Academic Integrity Policy

Honesty and integrity is a central value in HKUST. Please be aware of the importance of maintaining a high standard of honesty in assignments and examinations in this course. Please familiarize yourself with the university rules and the HKUST academic honor code by visiting the following website: <http://www.ust.hk/vpaa/integrity/>

Course Syllabus

Please note this is a tentative schedule. Topic order may be changed and some topics may be removed or modified, based on time constraints, student progression, and continuous improvement.

Lecture time is Wednesday 9:00 am – 12:30 pm, held in LSK G003, unless stated otherwise.

Week	Date	Topics*
1	Feb 5	Lecture 1 - Motivation, Data and Evolution of Macro Theory - Business cycle data, stylized facts, methods in business Cycle analysis, monetary policy and schools of thought; and a brief introduction to the history of macroeconomic theory.
2	Feb 12	Lecture 2 - Introduction to Discrete-time Dynamic Optimization - Revision of the 2-period model and sequential methods (Lagrangian) methods of dynamic optimization for infinite horizon and finite horizon models; and an introduction to dynamic programming (Bellman method) for finite and infinite time horizons.
3	Feb 19	Lecture 3 - Real Business Cycle Models - The link between technology shocks, the New Classical School and RBC; RBC model set up and analytical solution; quant solution methods; RBC model simulation using DYNARE, producing impulse response functions and their diagrams; and evaluating the RBC model.
4	Feb 26	Lecture 4 - Money in Utility Model - Solution and Interpretation - Introducing money into business cycle models; solving analytically using dynamic programming; key results such as the Fisher equation, neutrality, superneutrality of money and the Friedman rule. Solution and simulation of the MIU model using DYNARE.
5	Mar 5	Lecture 5 - New Classical and New Keynesian Ideas in Monetary Policy - Keynesian principles and revision of ISLM; Lucas Island Model - imperfect information and incomplete nominal adjustment; monetary policy transmission; and monetary policy analysis.
6	Mar 12	Lecture 6 - Monetary Policy in the New Keynesian DSGE Model - Financial Frictions and the Financial Accelerator - Motivating the NK IS curve and NK Phillips curve via the role of nominal rigidities; solution and simulation of the NK DSGE model in DYNARE; uniqueness or determinacy conditions in the NK DSGE model and the role of the Taylor Principle and Taylor Rules in monetary policy; derivation, presentation and motivation of financial frictions in the NK DSGE Model via the Financial Accelerator Model; and the solution and calibration and interpretation of shocks and policy events.
7	Mar 19	Lecture 7 - Time Consistency and Optimal Monetary Policy - Motivation: rules versus discretion in monetary policy - which is better for achieving central bank objectives?; we derive the concept of inflation bias using an optimal policy approach, that occurs under discretionary policy; and we consider the various solution methods to inflation bias including the role of reputation in monetary policy.
8	Mar 26	Final Exam 8:45am -Room 2, 31F, Tower 1, Millennity

*Additional references may be provided for certain topics on Canvas or in class.

Assessment Timetable

Week	Date	Topics*
1	Feb 5	
2	Feb 12	Assignment 1 posted
3	Feb 19	Assignment 1 deadline , Assignment 2 posted
4	Feb 26	
5	Mar 5	Assignment 2 deadline , Assignment 3 posted
6	Mar 12	
7	Mar 19	Assignment 3 deadline
8	Mar 26	Final Exam - 8:45am - Room 2, 31F, Tower 1, Millennity

*Please note that the timetable is tentative and may change throughout the course.

Rubrics for Final Grade

After completing this course, students should be able to understand, explain and identify:

1. Excellent Performance (A range): Demonstrates a deep understanding of the macroeconomic models covered in the course. Exhibits exceptional skills in solving models analytically and using numerical methods. Is excellent in providing economic intuition to the results of the models studied. Performs very well in class participation and individual assignments and the final exam.
2. Good Performance (B range): Shows a solid grasp of the macroeconomic models covered in the course. Shows good skills in solving models analytically and using numerical methods. Performs well in the final exam, assignments and contributes well in class participation.
3. Marginal Performance (B-, C+, C): Has basic knowledge of the macroeconomic models and solving models analytically and in numerical methods. Shows limited skills in utilizing them. Acceptable performance in assignments with limited class participation and has a solid performance in the exam.
4. Fail: Demonstrates insufficient understanding of the macroeconomic models in the course. Lacks skills in solving and interpreting these models. Unsuccessful in the assignments and/or final exam with little or no class participation.

Reading List

To be clear, the course notes provided are sufficient for this course but for those students who wish to extend their knowledge of the subjects covered, I provide a short reading list below. Note also that the bibliography at the back end of this document contains all the references cited in the course notes and the course outline.

Lecture 1 - Motivation, Data, and Evolution of Macroeconomic Theory

- Course notes

- For those interested in an introduction to the state of business cycle theory today and methodology I suggest a brief skim (very quick read) of Lucas (1980), Summers (1991) and Kydland and Prescott (1996).

Lecture 2 - Introduction to Discrete-time Dynamic Optimization

- Course notes
- For a revision of constrained optimization: see Chapter 18-19 of Simon and Blume (1994)
- Chapter 4 of Stokey et al. (1989) for a more technical treatment than this course, which may be of interest to those with a strong math background.

Lecture 3 - Real Business Cycle Models (RBC)

- Course notes
- Chapter 14 of Campante et al. (2021) provides a good introduction to RBC's at a similar level or slightly below this course.
- A great resource and reference on this topic is McCandless (2008). Most of the early chapters are useful, but particularly Ch.6 on the Hansen Model.
- A useful article to help you with log-linearization at our level or higher is Zietz (2006).

Lecture 4 - Money in Utility Model (MIU) - Solution and Interpretation

- Course notes

Lecture 5 - New Classical and New Keynesian Ideas in Monetary Policy

- Course notes.
- Ch. 15 of Campante et al. (2021) is at a lower level than this course but a useful introduction to the NK DSGE canonical model, nominal rigidities and the Lucas Island Model.
- Ch.7-8 of Walsh (2017) for a more comprehensive and slightly more technical treatment of NK DSGE in monetary policy and the Lucas Island Model.
- See Ch.22-24 of Mishkin (2012) for a detailed treatment of the monetary policy topics.

Lecture 6 - Monetary Policy in the New Keynesian DSGE Model - Financial Frictions and the Financial Accelerator

- Course notes
- For a rigorous derivation of the canonical NK DSGE model see Galí (2015).
- This lecture will be based on this article on the Financial Accelerator, known as BGG: Bernanke et al. (1999).

Lecture 7 - Time Consistency and Optimal Monetary Policy

- Course notes

References

- Batini, N., Callegari, G., and Melina, M. G. (2012). *Successful austerity in the united states, europe and japan*. International Monetary Fund.
- Bernanke, B. S., Gertler, M., and Gilchrist, S. (1999). The financial accelerator in a quantitative business cycle framework. *Handbook of macroeconomics*, 1:1341–1393.
- Blanchard, O. J. and Kahn, C. M. (1980). The solution of linear difference models under rational expectations. *Econometrica: Journal of the Econometric Society*, pages 1305–1311.
- Bullard, J. and Mitra, K. (2002). Learning about monetary policy rules. *Journal of monetary economics*, 49(6):1105–1129.
- Calvo, G. A. (1983). Staggered prices in a utility-maximizing framework. *Journal of monetary Economics*, 12(3):383–398.
- Campante, F., Sturzenegger, F., and Velasco, A. (2021). *Advanced Macroeconomics: An Easy Guide*. LSE Press.
- Clarida, R., Gali, J., and Gertler, M. (1999). The science of monetary policy: a new keynesian perspective. *Journal of economic literature*, 37(4):1661–1707.
- Eichenbaum, M. S., Rebelo, S., and Trabandt, M. (2021). The macroeconomics of epidemics. *The Review of Financial Studies*, 34(11):5149–5187.
- Galí, J. (2015). *Monetary policy, inflation, and the business cycle: an introduction to the new Keynesian framework and its applications*. Princeton University Press.
- Hansen, G. D. (1985). Indivisible labor and the business cycle. *Journal of monetary Economics*, 16(3):309–327.
- Henderson, D. W. and McKibbin, W. J. (1993). A comparison of some basic monetary policy regimes for open economies: implications of different degrees of instrument adjustment and wage persistence. In *Carnegie-Rochester Conference Series on Public Policy*, volume 39, pages 221–317. Elsevier.
- Hodrick, R. J. and Prescott, E. C. (1997). Postwar us business cycles: an empirical investigation. *Journal of Money, credit, and Banking*, pages 1–16.
- Keynes, J. M. (1936). *The general theory of interest, employment and money*.
- Kitney, P. (2018). Financial factors and monetary policy: Determinacy and learnability of equilibrium. *Journal of Economic Dynamics and Control*, 90:194–207.
- Kydland, F. E. and Prescott, E. C. (1982). Time to build and aggregate fluctuations. *Econometrica: Journal of the Econometric Society*, pages 1345–1370.
- Kydland, F. E. and Prescott, E. C. (1996). The computational experiment: an econometric tool. *Journal of economic perspectives*, 10(1):69–85.

- Lucas, R. E. (1973). Some international evidence on output-inflation tradeoffs. *The American economic review*, 63(3):326–334.
- Lucas, R. E. (1976). Econometric policy evaluation: A critique ||, in *Carnegie-Rochester conference series, the phillips curve*.
- Lucas, R. E. (1980). Methods and problems in business cycle theory. *Journal of Money, Credit and banking*, 12(4):696–715.
- McCandless, G. (2008). *The ABCs of RBCs: An introduction to dynamic macroeconomic models*. Harvard University Press.
- Mishkin, F. S. (2012). *The economics of money, banking and financial markets (the Pearson series in economics)*.
- Modigliani, F. (1966). The life cycle hypothesis of saving, the demand for wealth and the supply of capital. *Social research*, pages 160–217.
- Mun, T. (1664). *England's Treasure by Forraign Trade, or The Ballance of our Forraign Trade is The Rule of our Treasure*. London: Thomas Clark.
- Phillips, A. W. (1958). The relation between unemployment and the rate of change of money wage rates in the united kingdom, 1861-1957. *economica*, 25(100):283–299.
- Ricardo, D. (1815). *An essay on the influence of a low price of corn on the profits of stock, with remarks on mr. Malthus' two last publications*.
- Robert, L. (1987). *Models of business cycles*.
- Sargent, T. J. and Ljungqvist, L. (2000). *Recursive macroeconomic theory*. Massachusetts Institute of Technology.
- Simon, C. P. and Blume, L. (1994). *Mathematics for Economists*. Norton, New York, 1st ed edition.
- Sims, C. (1995). Solving linear rational expectations models. *manuscript, Yale University*.
- Smith, A. (1776). *An inquiry into the nature and causes of the wealth of nations: Volume one*. London: printed for W. Strahan; and T. Cadell, 1776.
- Stachurski, J. (2022). *Economic dynamics: theory and computation*. MIT Press.
- Stokey, N. L., Lucas, R. E., and Prescott, E. C. (1989). *Recursive Methods in Economic Dynamics*. Harvard University Press, Cambridge, Mass.
- Summers, L. H. (1991). The scientific illusion in empirical macroeconomics. *The Scandinavian Journal of Economics*, pages 129–148.
- Taylor, J. B. (1993). Discretion versus policy rules in practice. In *Carnegie-Rochester conference series on public policy*, volume 39, pages 195–214. Elsevier.
- Tobin, J. and Brainard, W. C. (1976). Asset markets and the cost of capital.

Uhlig, H. (1999). Computational methods for the study of dynamic economies, chapter a toolkit for analyzing nonlinear dynamic stochastic models easily.

Walsh, C. E. (2017). *Monetary theory and policy*. MIT press.

Woodford, M. (2009). Convergence in Macroeconomics: Elements of the New Synthesis. *American Economic Journal: Macroeconomics*, 1(1):267–279.

Yun, T. (1996). Nominal price rigidity, money supply endogeneity, and business cycles. *Journal of monetary Economics*, 37(2):345–370.

Zietz, J. (2006). Log-linearizing around the steady state: A guide with examples. *Available at SSRN 951753*.