School of Economics

Academic Year 2023-24
Term 2

COMPUTATIONAL MACROECONOMICS: ECON 743

Class Time and Venue : TBA
Instructor Name : Ismail Baydur
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Tel : 6828 0095
Office : SOE 5074
Office Hours : By appointment.

COURSE DESCRIPTION

This course equips students with powerful computational tools to be used in macroeconomic analysis. Students learn how to solve macroeconomic models using computational methods, calibrate these models, and use calibrated models to address interesting questions in macroeconomics. While students are exposed to some basic macro models throughout the course, the main objective is computer implementation of these models, possibly with real data.

This course is part of the Econ PhD program. Non-Econ PhD or MSE/MSFE students can enroll in this course. There are no pre-requisites for this course.

I strongly recommend you to come to the class with your laptop for implementing in-class demonstrations.

ASSESSMENT METHODS

Class Participation : 10%
Assignments : 20%
Midterm Examination : 30%
Final Examination : 40%
Total **: 100%**

I will assign you seven group assignments throughout the semester. Group sizes can be either two or three. The assignments will require the use of Julia programming language.

There will be an in-class midterm examination and a take-home final examination. Different from the assignments and the midterm exam, the final exam will be more comprehensive requiring you to use various tools developed throughout the semester. Note that although Julia is relatively a young programming language, there is a great support available online. Visit https://julialang.org/ for a quick overview. We will also be covering topics in macroeconomics for which there are many well-written codes available, such as https://quantecon.org/. ***Please DO NOT use these outside sources without consulting me. I consider such actions as plagiarism and handle such cases accordingly.*** For details, please refer to the Academic Integrity section below.

ACADEMIC INTEGRITY

All acts of academic dishonesty (including, but not limited to, plagiarism, cheating, fabrication, facilitation of acts of academic dishonesty by others, unauthorized possession of exam questions, or tampering with the academic work of other students) are serious offences.

All work (whether oral or written) submitted for purposes of assessment must be the student's own work. Penalties for violation of the policy range from zero marks for the component assessment to expulsion, depending on the nature of the offense.

When in doubt, students should consult the instructors of the course. Details on the SMU Code of Academic Integrity may be accessed at http://www.smuscd.org/resources.html.

ACCESSIBILITY

SMU strives to make learning experiences accessible for all. If students anticipate or experience physical or academic barriers due to disability, please let the instructor know immediately. Students are also welcome to contact the university's disability services team if they have questions or concerns about academic provisions: included@smu.edu.sg.

Please be aware that the accessible tables in the seminar room should remain available for students who require them.

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CLASS TIMINGS

Class sessions are of 3-hour duration per week. Each session will involve a lecture and a discussion of assignments and readings.

EMERGENCY PREPAREDNESS FOR TEACHING AND LEARNING (EPTL)

Where there is an emergency that makes it infeasible to have classes on campus, classes will be conducted online via WebEx, with no disruption to the schedule. To familiarise students with the WebEx platform, part of this course may be conducted online. The instructor will inform students of which classes, if any, will be conducted as part of this EPTL initiative.

RECOMMENDED TEXT AND READINGS

There is no required textbook. I will provide my own lecture notes. You may find the following textbooks useful.

1- Recursive Macroeconomic Theory (2004) by Ljungqvist and Sargent, The MIT Press, 2nd Edition. (You may obtain the newer version.)
2- Applied Computational Economics and Finance (2002) by Miranda, The MIT press.
3- Numerical Methods in Economics (1998) by Judd, The MIT Press.

WEEKLY LESSON PLAN (TENTATIVE)

Week		Topic
1		Introduction to Quantitative Macro: Estimation vs. Calibration Computation Basics
2		Setting up the Julia environment Working with notebooks
3		Random processes, Discretization, and Quadrature *Assignment 1: Distributions, random draws, and integrals*
4		Root Finding *Assignment 2: Calibrating the basic DMP model and the volatility puzzle*
5/6		(Un)constrained Optimization, and Numerical Differentiation *Assignment 3: Utility maximization with random income*
7		*Midterm: 2 hours during class hours*
8		Recess
9/10		Perturbation methods, linearization, and Dynare *Assignment 4: Application to a representative agent RBC model*
11/12		Value/Policy function iteration *Assignment 5: Neoclassical growth model*
13		Value/Policy function iteration with heterogeneous agents and incomplete markets *Assignment 6: The Aiyagari Model*
14		Review *Final Exam: TBA*