MACROECONOMICS II
COURSE OUTLINE WINTER SEMESTER 2021-2022
Dr. Said Benjamin Bonakdar

CONTENT

The course will consider both economic theory and advanced mathematical techniques.
The first part of the course will cover continuous time dynamics (ordinary differential equations, systems of linear differential equations, the concepts of stability and phase diagrams), systems of difference equations, control theory and chaos theory. In the second part, we will cover economic applications of these procedures and build a macroeconomic model with heterogeneous agents to study business cycle fluctuations.
The software R is ideally suited for solving and plotting dynamic systems and its use and knowledge will be required to complete the problem sets in the course.

MODULE OBJECTIVES

- You deepen your knowledge and understanding of macroeconomic theories and dynamics.

- You improve your mathematical skills and concepts.

- You acquire solid practical skills in using the R software for computational purposes.

PREREQUISITES

You will need very good English skills. Knowledge of macroeconomic models and concepts at the principles to intermediate level is expected. If you are not familiar with basic concepts in macroeconomics, please consult textbooks such as Blanchard, "*Macroeconomics*" or Carlin & Soskice, „*Macroeconomics: Institutions, Instability, and the Financial System*" or
 similar books before taking this module.
We will work intensively with R software: it is not necessary to have previous experience with this software, but the willingness to learn how it is used is expected. For a better preparation and interaction with the tutor, it is necessary to bring your own laptop during the tutorials.

ORGANIZATION

This module consists of lectures and tutorials. The module take place as block class on Fridays and Saturdays.

Please note: Attending lectures will help you understand the material and also help you gauge what is important for the final assessment. I will cover material from the textbook which might be more challenging in class. You are responsible for the information in the textbook **AND** in the lectures.

Participants: no restriction
Registration: not required

Assessment:	The assessment will be as follows: 100% final written exam. Further details on the exam will be provided in due course in class and on Moodle.
	The exam will take place on February, 11th 2022, 14:00 – 16:00
	Registration period in FlexNow December, 13th 2021 to January, 7th 2022
	De-registration from FlexNow December, 13th 2021 to February, 4th 2022
Time and place:	All blocks take place from 09:00 to 18:00 incl. breaks
	First Block: Friday, November 19th 2021 and Saturday, November 20th 2021
	Second Block: Friday, December 10th 2021 and Saturday, December 11th 2021
	Third Block: Friday, January 14th 2022 and Saturday, January 15th 2022
Rooms:	11/19/2021: GD 04/620 11/20/2021: HGD 30 12/10/2021: GD 04/620 12/11/2021: HGD 30 01/14/2022: GD 04/620 01/15/2022: GD 03/230

COURSE MATERIAL

TEXTBOOK (COMPULSORY)

- Shone R. (2001), *Economic Dynamics. Phase diagrams and their economic applications.* (Second Edition), Cambridge University Press (selected chapters).
- Caiani, A., Palestrini, A., Russo, A., Gallegati, M. (2016), *Economics with Interacting Agents. A guide to Agent based Models.* Springer (Chapter 2)

Additional resources (optional):
- Chiang, A. Wainwright, W. (2005), *Fundamental Methods of Mathematical Economics,* McGraw- Hill International Publishing

SOFTWARE (REQUIRED)

R STUDIO: It can be downloaded at: https://www.rstudio.com/products/rstudio/download/
Make sure to choose the appropriate OS present on your computer and then follow the instructions. Additional information regarding the set up and the packages needed will be provided in class.

SELF-STUDY

This module contains 120 hours of self-study. You are expected to prepare the lecture by reading the relevant chapters of the textbook.

SCHEDULE

Please note that the following schedule is <u>preliminary</u> and subject to change. Any change will be announced on Moodle.

L = LECTURE, T = TUTORIAL

Date	Class Type	Chapters	Topic
19 November	T		Math Recap: Derivatives, Integrals, Taylor Expansion
	T		Math Recap: Derivatives, Integrals, Taylor Expansion
	L	Shone, 2	Introduction and Continuous dynamic systems
	L	Shone, 2 Shone, 4	Continuous dynamic systems Systems of first-order differential equations
20 November	T		Introduction to R
	T		Introduction to R
	T	Shone, 2	Differential equations analytically and with R
	L	Shone, 4 Shone, 14	Systems of first-order differential equations and economic applications
10 December	T	Shone, 4 Shone, 14	Systems of first-order differential equations and economic applications
	L/T		Second-order differential equations
	L	Shone, 3	Discrete dynamic systems
	T	Shone, 3	Discrete dynamic systems

11 December	L	Shone, 5	Discrete systems of equations
	T	Shone, 5	Discrete systems of equations
	L	Shone, 10	Demand and supply models
	T	Shone, 7	Demand and supply models
14 January	L	Shone, 11	The dynamics of inflation and unemployment
	T	Shone, 11	The dynamics of inflation and unemployment
	L	Shone, 7	Chaos Theory
	T	Shone, 7	Chaos Theory
15 January	L	Caiani et.al, 2	Macro model with heterogenous agents and credit network
	T	Caiani et.al, 2	Macro model with heterogenous agents and credit network
	L		Buffer / General Recap
	T		Buffer / General Recap