# EC9A2: Advanced Macroeconomic Analysis

Autumn 2025

## 1 Course Information


| | |
|---|---|
| **Email:** | christine.braun@warwick.ac.uk |
| **Office:** | S2.87 |
| **Office Hours:** | Tuesday 13-14 |
| **Course website:** | |
| **Teaching Assistant:** | David Boll |


## 2 Course Description

This course provides a rigorous treatment of dynamic optimization methods and their applications to macroeconomic problems at the PhD level. We will develop both theoretical foundations and computational techniques essential for modern macroeconomic research. The course covers dynamic optimization in discrete and continuous time, labor-leisure choice problems, decision-making under uncertainty, and heterogeneous agent models. Students will gain hands-on experience with computational methods, particularly value function iteration and other numerical solution techniques used to solve complex dynamic economic models. By the end of the course, students will have mastered the analytical and computational tools necessary to conduct independent research in quantitative macroeconomics.

## 3 Learning Objectives

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

1. Master the theoretical foundations of modern macroeconomic models
2. Analyze dynamic general equilibrium models using appropriate mathematical tools
3. Understand the microfoundations of macroeconomic phenomena

## 4 Resources

1. MACROECONOMICS, Azzimonti, Krusell, McKay, and Mukoyama
2. Quant Econ
3. Supplementary software: MATLAB, Python, or R for numerical exercises

## 5 Course Outline

### 5.1 Lecture 1: Foundations of Dynamic Optimization

- Lagrangian Method vs Dynamic Programming
- Simple Intertemporal Choice Problem

### 5.2 Lecture 2: Infinite Horizon Consumption-Savings Problem and Intro to Dynamic Programing

- Infinite Horizon and steady state analysis
- Mathematical foundations of dynamic programing
- MACROECONOMICS 4.3 and 4.4

### 5.3 Lecture 3: Neoclassical Growth with Exogenous Labor

- Ramsey-Cass-Koopmans Model
- Phase Diagram
- Recursive Competitive Equilibrium
- MACROECONOMICS 4.2, 4.3, 4.4, 5.4

### 5.4 Lecture 4: Neoclassical Growth with Labor-Leisure Choice

- Ramsey-Cass-Koopmans Model
- Leisure as a control variable
- Recursive Competitive Equilibrium
- MACROECONOMICS 4.2, 4.3, 4.4, 5.4

### 5.5 Lecture 5: Capital Taxes and Intro to Uncertainty

- Policy application: capital taxes
- Intro to uncertainty
- MACROECONOMICS 15.3, 7.1

### 5.6 Lecture 6: Consumption-Savings Under Uncertainty

- Expectations and stochastic Euler equation
- Value function iteration under uncertainty
- MACROECONOMICS 7.2 and 7.6

### 5.7 Lecture 7: Consumption-Savings Under Uncertainty Cont.

- Huggett (1993)
- MACROECONOMICS 11.4.1

### 5.8 Lecture 8: Consumption-Savings Under Uncertainty Cont. (Again)

- Aiyagari (1994)
- MACROECONOMICS 11.4.2

### 5.9 Problem Sets

There are four problem sets. These will involve both theoretical derivations and numerical exercises. Problem sets should be attempted (preferably completed) prior to the seminar meetings with David, who will go over the answers and answer any questions you may have.

*This syllabus is subject to change. Any modifications will be announced in class and posted on the course website.*