

## M.Sc. Economics

<b>Code:</b>	017 904	<b>Type:</b>	Lecture, Msc 2 <sup>nd</sup> year
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<b>Title:</b>	Dynamic Optimization I
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<b>Lecturer:</b>	Christian Haefke
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<b>ECTS:</b>	3	<b>Contact hours (per semester):</b>	20
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<b>Semester:</b>	September 2011	<b>Frequency of the lecture:</b>	daily
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<b>Dates:</b>	September 1, 2011 until September 23, 2011
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<b>Prerequisites:</b>	Macro I, Micro I, Mathematics I and II, Computational Methods
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### Learning objectives (What are the intended learning outcomes? Which skills will be acquired?):

This course serves as a rigorous introduction to the methods and techniques used for the analysis of dynamic optimization problems using functional equations: dynamic programming. We will derive the main results in deterministic dynamic optimization and discuss methods of numerically solving such models.

After the course students should understand the assumptions underlying key dynamic programming results, the limits of its methods, and know how to apply these methods to a wide range of economic problems.

### Content (Which professional competence and which contents will be imparted?):

#### Search Model (Units 1 – 3)

- Recursive formulation, value function, policy function, functional equation
- threshold strategy, mean preserving spread, option values

#### Neoclassical Growth Model (Units 4 – 10)

- Assumptions, Steady State, (Log)Linearization
- Phase Diagrams, stable manifolds, guess and verify
- Dynamic Programming, Principle of Optimality, Bellman equations, Sequence and recursive problems and their equivalence, Contraction, Contraction Mapping Theorem, Blackwell's sufficient conditions,
- Value and Policy Function Iteration

### Teaching approach (Description of the learning and teaching methods):

Lecture and group work, programming exercises.

### Workload (Optional: definition of workload (ECTS), divided in pre-modules (e.g. pre-readings), core-modules (contact hours), post-modules (e.g. case studies)):

Class: 20 hours, Problem sets: 30 hours, preparation final exam: 10 hours, pre-and post processing of lectures: 30 hours, total: 90 hours

### Language of instruction (Information on the language of teaching):

English

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### Obligatory literature (E.g. scripts, books, articles, cases, papers):

- Sargent, T. J. and L. Ljungqvist (2004), Recursive Macroeconomic Theory, 2<sup>nd</sup> edition, MIT Press.
- Uhlig, H “A Toolkit for Analyzing Nonlinear Dynamic Stochastic Models Easily”, <http://www2.wiwi.hu-berlin.de/institute/wpol/html/toolkit/toolkit.pdf>

### Additional literature (E.g. books, articles, cases, papers):

- Acemoglu, D.: “Introduction to Modern Economic Growth”, Princeton University Press, 2009.
- Recursive Methods in Economic Dynamics, by Nancy L. Stokey and Robert E. Lucas Jr. with Edward C. Prescott (SLP). Harvard University Press, 1989.
- Alós-Ferrer, Carlos: Mathematics for Economists.

### Mode of examination (Mode of the examinations and tests (e.g. oral or written examination, lecture, homework, papers, class participation)):

Assignments, quizzes, and a final exam.

**Students are reminded that the use of somebody else's computer code without proper referencing is considered plagiarism and can lead to expulsion from the program.**

### Grading:

- 4 Assignments: 20%
- 1 Midterm (in class, Tuesday, September 6): 30%
- Final Exam: 50%

### Special features (E.g. excursion, guest speaker):

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### Office hours:

September 1 – September 16:  
weekdays 14.30 – 15.30  
Room A 315

### Course website:

<https://cecnet.tuwien.ac.at> and <http://ihs.ac.at/~haefke>