School of Economics and Management

NEKP32, Economics: Mathematical Methods - Dynamic Optimisation, 7.5 credits

Nationalekonomi: Matematiska metoder - dynamisk optimering, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus is an old version, approved by The Board of the Department of Economics on 2011-06-07 and was last revised on 2019-09-10. . The revised syllabus applied from 2019-09-10. , autumn semester 2019.

General Information

This is a single subject master course in economics. The course is either obligatory or optional within a number of master programmes at Lund University.

Language of instruction: English
Teaching is in English. (Teaching may be in Swedish if all registered students have a good knowledge of Swedish).

Main field of studies	Depth of study relative to the degree requirements
Economics	A1F, Second cycle, has second-cycle course/s as entry requirements

Learning outcomes

Knowledge and understanding
Students shall:

- know and understand the basics of integral calculus for problems with one or more variables,
- be able to solve elementary difference and differential equations for functions of one variable,
- know and understand the classical calculus of variations and Pontryagin's maximum principle for solution of dynamic optimisation problems.

Competence and skills
Students shall have the ability to independently:

- be able to solve problems of integration for functions of one or more variables,
- be able to solve elementary difference and differential equations for functions of one variable,
- be able to use both the classical calculus of variations and Pontryagin's maximum principle in solving dymanic optimisation problems,
- assess the implications of theoretical assumptions for the applicability of the relevant mathematical metohds,
- give an account of and discuss their mathematical abilities.

Judgement and approach
Students shall master the relevant mathematical theory in such a way that the student is able to independently gain insights into economic theory based on the mathematical methods and be able to gain insights in more advanced mathematical theory within the areas covered in the course.

Course content

The course deals with the mathematical methods used for analysing dynamic problems in ordinary economic theory. The usage of the mathematical methods is exemplified by a selection of economic problems. The course deals with basic theory of integration for one and more variables. It also contains the theory for linera differential equations of the first order, the theory for linear difference and differential equations of higher order with constant coefficients and the solution of separable differential equations. Finally, the course deals with methods for solving dynamic optimization problems (the classical calculus of variations and Pontryagin's maximum principle).

Course design

1. Teaching: Tuition consists of lectures and exercises.

Assessment

1. Examination: Written exams take place at the end of the course. There will be further opportunities for examination close to this date. In addition, there is a number of home assignments. The marks from the home assignments are carried forward to examinations taken the same term.

2. Limitations on the number of examination opportunities: –

The University views plagiarism very seriously, and will take disciplinary action against students for any kind of attempted malpractice in connection with examinations and assessments. Plagiarism is considered to be a very serious academic offence. The

penalty that may be imposed for this, and other unfair practices in examinations or assessments, includes suspension from the University for a specified period.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, E, D, C, B, A.
1. Grading: Grade (Definition), Points or percentage out of maximum points, Characteristic
A (Excellent), 85–100, A distinguished result that is excellent with regard to theoretical depth, practical relevance, analytical ability and independent thought.
B (Very good), 75–84, A very good result with regard to theoretical depth, practical relevance, analytical ability and independent thought.
C (Good), 65–74, The result is of a good standard with regard to theoretical depth, practical relevance, analytical ability and independent thought.
D (Satisfactory), 55–64, The result is of a satisfactory standard with regard to theoretical depth, practical relevance, analytical ability and independent thought.
E (Sufficient), 50–54, The result satisfies the minimum requirements with regard to theoretical depth, practical relevance, analytical ability and independent thought, but not more.
U (Fail), 0–49, The result does not meet the minimum requirements with regard to theoretical depth, practical relevance, analytical ability and independent thought.
Students have to receive a grade of E or higher in order to pass a course.

2. Weighting grades from different parts of the course: –

3. Grading scales for different parts of the course: –

Entry requirements

Students admitted to the Master Programme in Economics or the Master Programme in Economic Research Methods and have passed the course NEKN21 "Advanced Microeconomic Analysis" are qualified for this course. For other students, at least 90 ECTS-credits in economics are required. These must include the course NEKN21 "Advanced Microeconomic Analysis" or an equivalent course.

Further information

1. Transitional regulations: This course replaces NEKM47 "Mathematical Methods – Dynamic Optimisation ".

2. Limitations in the period of validity: –

3. Limitations: This course may not be included in the same degree as NEK717 "Mathematical Methods – Linear and Dynamic Optimisation" or NEKM47 "Mathematical Methods – Dynamic Optimisation".

4. Similar courses: –

5. Limitations in renewed examination: –

Subcourses in NEKP32, Economics: Mathematical Methods - Dynamic
Optimisation

Applies from H11

1101   Mathematical Methods - Dynamic Optimisation, 7,5 hp
       Grading scale: Fail, E, D, C, B, A