COURSE SYLLABUS

Mathematics for Doctoral Economics I, 7.5 credits

Mathematics for Doctoral Economics I, 7,5 högskolepoäng

Course Code:	FJMD139	**Education Cycle:**	Third-cycle level
Confirmed by:	Research Board Jun 12, 2019	**Research subject:**	Economics
Valid From:	Autumn 2019		
Version:	1		

Purpose

The Mathematics for Doctoral Economics I course is designed to help students be prepared for the
mathematical material typically found in the economics (especially microeconomics) and statistics courses
associated with doctoral programme in economics.

Intended Learning Outcomes (ILO)

On completion of the course, the students will be able to:

Knowledge and understanding

- Indicate economic or statistics information that is transmitted by mathematical derivations covered in this course.
- Demonstrate an understanding of topological definitions and theorems, in particular fixed point theorems.

Skills and abilities

- Perform static unconstrained and constrained multivariable optimization and determine whether that optimization leads to maximization or minimization given the constraint(s).
- Apply the envelope theorem.
- Apply calculus rules that involve log or exponential functions.
- Determine vector spaces for sets of vectors.
- Solve sets of simultaneous equations using matrix algebra.
- Find eigenvalues for square matrices and demonstrate their use in optimization or in statistics.
- Derive statistical functions and measures from continuous probability density functions, e.g. joint distributions, marginal distributions, expectations and variances.

Judgement and approach

- Carry out mathematical derivations within the mathematical material covered with sufficient thoroughness to avoid largely unnecessary mistakes given time constraints.

Contents

(i) constrained optimization with inequality constraints
(ii) the envelope theorem
(iii) calculus rules involving logs and exponentials
(iv) addition, multiplication, and inversion of matrices; vector spaces; solving sets of simultaneous
equations using matrices; and eigenvalues and eigenvectors
(v) unconstrained and constrained multivariable optimization
(vi) Taylor series expansion
(vii) the derivation of statistical functions and measures from continuous probability density functions
(viii) concavity, convexity, quasi-concavity, and quasi-convexity characteristics of functions
(ix) topological definitions and theorems, in particular fixed point theorems

Type of instruction

Lectures and homework assignments.

The teaching is conducted in English.

Prerequisites

Admitted to a doctoral programme in economics or a related subject of a recognized business school or
university.

Examination and grades

The course is graded Fail (U) or Pass (G).

The examination consists of three written examinations, with their contributions to the final overall grade
noted in parentheses below:
• Midterm examination (20%), which covers ILOs 1, 4, 5, 9, 10
• Final examination (80%), which covers ILOs 1, 2, 3, 6, 7, 8, 10
To pass the course the student needs to achieve at least 60% correct of the maximum possible points on
the final overall grade.

Course evaluation

A course evaluation will be conducted at the end of the course.

Other information

The course language is English.

Course literature

The primary textbook is Chiang, Alpha C. and Wainwright, Kevin C. (2005) Fundamental Methods of
Mathematical Economics 4th edition, McGraw Hill [ISBN: 007-123823-9]
The course also uses material from Sydsaeter, K., Hammond, P., Seierstad, A. and A. Strom

(2008) Further
Mathematics for Economic Analysis, 2nd ed, Pearson [ISBN: 978-0-273-71328-9], including chapters 13 and 14,
and Appendix A.
Supplementary material may also be assigned.