ECON904

Introduction to Mathematical Economics

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<u>Instructor Contact Details</u>

Lecturer-in-charge: Dr. Qingbing Cai
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<u>Teaching Times, Modes and Locations</u>

Course Duration: 23 Dec 2024 to 10 Jan 2025
Modes: Online/Face-to-face
Location: Anywhere via online, or Huajiachi Campus, Zhejiang University via face-to-face

<u>Academic Level</u>

Postgraduate

<u>Credit Points:</u>

The course is worth 6 units of credit point.

<u>Credit Hours</u>

The number of credit hours of this course equals to the credits of a standard semester- long course.

<u>Contact Hours</u>

The course contains a total of 53 contact hours, which consists of orientation, lectures, seminars, quiz, discussion, research, case study, small tests, assignments, on-site field trip(s), in-class and after-class activities, revision, self-study, and final exam. Students will receive an official transcript which is issued by Zhejiang University when completing this course.

<u>Enrolment Requirements</u>

Eligibility requires enrollment in an overseas university as an undergraduate or postgraduate student, proficiency in English, and pre-approval from the student's home institution.

Course Description:

This introductory course in mathematical economics is designed to equip students with a solid foundation in mathematical concepts and methods essential for modern economics. The course aims to introduce and apply mathematical tools such as analysis, topology, convex analysis, linear algebra, and calculus in various economic contexts. Students will explore a range of topics including logic and set theory, topological principles, properties of real-valued functions, multi-dimensional differentiation, and classical and dynamic optimization techniques. The curriculum emphasizes the development of precise and rigorous logical reasoning skills necessary for economic analysis. Mathematical methods are thoroughly integrated with economic theories, demonstrated through applications in areas like consumer theory and game theory, to enhance students' understanding of economic dynamics and optimization in both static and dynamic systems.

Prerequisite:

Prior knowledge in fundamental accounting is required for taking this course.

Learning Resources

- Na, Na. Mathematical economics. Springer, 2016.
- Mittelhammer, Ron C., and Ron C. Mittelhammer. Mathematical statistics for economics and business. New York: Springer, 2013.

Learning Objectives

By the end of this course, you should be able to:

· Introduce students to the mathematical concepts and methods used by professional economists.

· Provide a comprehensive and rigoro1100us foundation that applies economic theories and concepts to complex problem-solving in both theoretical and practical contexts.

· Equip students with the necessary knowledge to express economic ideas with formal mathematical concepts.

Course Delivery:

- Online Lecture mode includes lectures, seminars, quiz, discussion, research, case study, small tests, assignments, online field trip(s), in-class activities,

revision, and final exam.

- Face-to-face Lecture mode includes lectures, seminars, quiz, discussion, research, case study, small tests, assignments, on-site field trip(s), in-class and after-class activities, revision, and final exam.

The following course will be taught in English. There will also be guest speakers and optional field trips available for students who would like to enhance their learning experience. All courses and other sessions will be run during weekdays.

Topics and Course Schedule:

WK	Topic	Activities
1	Orientation	
1	Introduction to Mathematical Economics	Lecture; Tutorial
1	Logic and Methods of Proof Functions and Graphs Euclidean Spaces	Lecture; Tutorial
1	Linear Functions Non-linear functions	Lecture; Tutorial
1	Mean Value Theorems Implicit Function Theorem Inverse Function theorem	Lecture; Tutorial
1	Convex Sets and Hyperplanes Operations with Convex Sets Elements of Topology	Lecture; Tutorial
2	Continuity and Differentiation	Lecture; Tutorial
2	Seminar	
2	Linear Algebra Finding the Best Solution	Lecture; Tutorial
2	Real-valued Functions Continuity of Functions	Lecture; Tutorial

	Sequences and Limits	
2	Quiz	Closed book
2	Derivatives of Real Functions Concavity and Convexity of Functions	Lecture; Tutorial
3	Integration	Lecture; Tutorial
3	Univariate Unconstrained Optimization Multivariate Unconstrained Optimization	Lecture; Tutorial
3	Probability Theory	Lecture; Tutorial
3	Constrained Optimization	Lecture; Tutorial
3	Dynamic programming	Lecture; Tutorial
3	Revision	Tutorial
3	Final exam	Closed book

Assessments:

Class participation	15%
Quiz	15%
Assignments	20%
Final exam	50%

Grade Descriptors:

HD	High Distinction	85-100
D	Distinction	75-84
Cr	Credit	65-74
P	Pass	50-64
F	Fail	0-49

High Distinction 85-100

• Treatment of material evidences an advanced synthesis of ideas Demonstration of initiative, complex understanding, and analysis.
• Work is well-written and stylistically sophisticated, including appropriate

referencing, clarity, and some creativity where appropriate.
- All criteria addressed to a high level.

Distinction 75-84
- Treatment of material evidences an advanced understanding of ideas Demonstration of initiative, complex understanding and analysis Work is well-written and stylistically strong.
- All criteria addressed strongly.

Credit 65-74
- Treatment of material displays a good understanding of ideas.
- Work is well-written and stylistically sound, with a minimum of syntactical errors.
- All criteria addressed clearly.

Pass 50-64
- Treatment of material indicates a satisfactory understanding of ideas Work is adequately written, with some syntactical errors.
- Most criteria addressed adequately.

Fail 0-49
- Treatment of ideas indicates an inadequate understanding of ideas Written style inappropriate to task, major problems with expression.
- Most criteria not clearly or adequately addressed.

Academic Integrity

Students are expected to uphold the university's academic honesty principles which are an integral part of the university's core values and principles. If a student fails to observe the acceptable standards of academic honesty, they could attract penalties and even disqualification from the course in more serious circumstances. Students are responsible for knowing and observing accepted principles of research, writing and any other task which they are required to complete.

Academic dishonesty or cheating includes acts of plagiarism, misrepresentation, fabrication, failure to reference materials used properly and forgery. These may include, but are not limited to: claiming the work of others as your own, deliberately applying false and inaccurate information, copying the work of others in part or whole, allowing others in the course to copy your work in part or whole, failing to appropriately acknowledge the work of other scholars/authors through acceptable referencing standards, purchasing papers or writing papers for other students and submitting the same paper twice for the same subject.

This Academic Integrity policy applies to all students of the Zhejiang University in all programs of study, including non-graduating students. It is to reinforce the University's commitment to maintain integrity and honesty in all academic activities of the

University community.

<u>Policy</u>

The foundation of good academic work is honesty. Maintaining academic integrity upholds the standards of the University. The responsibility for maintaining integrity in all the activities of the academic community lies with the students as well as the faculty and the University. Everyone in this community must work together to ensure that the values of truth, trust and justice are upheld.

Academic dishonesty affects the University's reputation and devalues the degrees offered. The University will impose serious penalties on students who are found to have violated this policy. The following penalties may be imposed:

- ✓ Expulsion
- ✓ Suspension
- ✓ Zero mark /fail grade
- ✓ Marking down
- ✓ Re-doing/re-submitting of assignments or reports, and
- ✓ Verbal or written warning.