Introductory Linear Algebra

Global Program on Economics and Finance (2021 Fall)

Course Title	Introductory Linear Algebra		
Credit	3	**Credit Hours**	48 credit hours
Course Objectives	The course is designed to let students understand basic theory of matrix and linear equations, which will be helpful for further economic lessons.		
Course Description	The course is divided into five parts. The first part is the concept, properties and computation of determinants. The second part is basic theory of matrix, including operation of matrices, special matrices, inverse matrix, rank and elementary transformation. The third part is basic theory of linear equations, and linear relations of vectors. The fourth part is basic theory of eigenvalues eigenvalues and eigenvectors, similarity of matrices. The last part is basic theory of quadratic forms, including methods to decide the sign of quadratic form and an application on optimization.		

Course Requirements:

Prerequisites: Calculus

Teaching Methods:

Lecture

Course Schedule

- **Chapter 1 Determinant, 8 hours**

The concept and properties of determinant, computation of high order determinant, expansion of determinant and Cramer's rule

- **Chapter 2 Matrices, 12 hours**

Concept and operations of matrices, special matrices and block matrices, inverse matrix, elementary transformations and rank of matrix

- **Chapter 3 Linear Equations, 12 hours**

Solutions of linear equations, linear combination, linear dependence and linear independence, rank of vectors, structure of the solutions of linear equations

- **Chapter 4 Eigenvalues and Eigenvectors, 8 hours**

Eigenvalues and eigenvectors and their properties, conditions of a matrix similarity to a diagonal matrix, particularity of eigenvalues and eigenvectors of symmetric matrices

- **Chapter 5 Quadratic Forms, 8 hours**

Relations between quadratic form and symmetric matrix, judgment of positive definition and semi- positive definition, extremum of multivariable function

The design of class discussion or exercise, practice, experience and so on:

Set homework every week, and half hour class exercise for each chapter

Grading & Evaluation: Homework and class exercises accounts for 30% of the grade. The other 70% is left for a close-book final examination.
Teaching Materials & References: Textbook: *Linear Algebra* (Chinese), Zhao Shuyuan, Press of Renmin University of China