Program: CET Shanghai
Course Code / Title: (SH/ECON 380) Quantitative Methods
Total Hours: 45
Recommended Credits: 3
Primary Discipline / Suggested Cross Listings: Statistics / Economics, Finance, Political Science, Sociology, Social Sciences
Language of Instruction: English
Prerequisites/Requirements: Introductory Statistics, Introductory Economics

Description
Quantitative Methods consists of statistical and mathematical techniques that are essential in economics, finance, and other social sciences. For statistics, the course covers distributions of random variables, statistical analysis, estimation, hypothesis testing of different purpose (mean, difference in mean, variance, difference in variance, contingency table, ANOVA, etc.). For mathematics, the topics include basic matrix algebra, optimization (constrained and unconstrained), integration, and difference equations (economic dynamics), all of which have direct applications in economic modelling and analysis. Students study the applications of methods necessary for analyzing and solving practical problems encountered in careers such as economics, finance, and research. The course also provides participants with the required theoretical background of statistics and higher-level mathematics needed to pursue graduate studies that include advanced methodologies for research and analysis, and careers solving financial and economic problems.

Objectives
At the end of this course students will be able to:
• understand various quantitative analysis skills that deal with different problems.
• apply quantitative methods to analyze real empirical questions.
• solve matrix algebra, optimization, integration, and difference equations.
• conceptualize how to apply these mathematic models in economics and finance.

Course Requirements
Students are to attend each class as outlined in the CET Attendance Policy. Homework exercises and problems will be assigned and are to be completed before class. Active participation is essential in this course, and students are expected to come to class prepared to participate thoughtfully in discussions. Graded assignments include:

• Active class participation: Student contributions to class discussions are to demonstrate that they have thought about authors’ ideas and how their research connects to course themes and issues.
• In-class quizzes.
• Final exam that includes application of skills and problem solving.
Syllabus of Record

Grading
The final grade is determined as follows:

• Active course participation: 20%
• Quizzes: 40% (4 in class quizzes in total)
• Final exam: 40%

Readings


Outline of Course Content
Topic 1 – Introduction to Statistics: Central Limit Theorem and Normal Distribution
Topic 2 – Confidence Interval and Hypothesis Testing
Topic 3 – Test of Means and Difference in Means
Topic 4 – Chi-Square Distribution: Goodness of Fit and Contingence Table
Topic 5 – F distribution and ANOVA
Topic 6 – Linear System and Matrix Algebra
Topic 7 – Determinants, Eigenvalues, and Applications
Topic 8 – Unconstrained Optimization and Constrained Optimization
Topic 9 – Indefinite and Definite Integration
Topic 10 – Difference Equation: solution and dynamic trajectory
Topic 11 – Applications of Quantitative Methods in Economics and Finance