《描述统计学与概率》课程教学大纲

一、课程基本信息

英文名称	Descriptive Statistics & Probability	课程代码	FIAI0005
课程性质	大类基础课程	授课对象	国际金融专业
学　分	3.0	学　时	54
主讲教师	外教	修订日期	2023.3
指定教材	Anderseon, David R. et al. (2017). Statistic for Business & Economics 13th Edition. Cengage Learning		

二、课程描述

In this course we learn the fundamentals of probability and statistics. Topics we will cover include the basics of what data is, types of data, probability, random variables, discrete and continuous distributions, data visualization, numerical measures, correlation, and sampling. There is a strong emphasis on both solving problems by hand and using software for analysis. This is because it is important both to understand the math and the concepts of what you are doing, but also be able to effectively use software to analyze real world data.

三、课程大纲

Topic 1: Introduction to Data and Statistics
Application in Business and Economics
Data & Data Sources
Descriptive Statistics
Statistical Inference
Analytics
Computers and Statistical Analysis

Topic 2: Descriptive Statistics: Tabular and Graphical Displays
Summarizing Data for a Categorical Variable
Summarizing Data for a Quantitative Variable
Summarizing Data for Two Variables Using Tables
Summarizing Data for Two Variables Using Graphical Displays
Data Visualization: Best Practices in Creating Effective Graphical Displays

Topic 3: Descriptive Statistics: Numerical Measures
Measures of Location
Measure of Variability
Measures of Distribution Shape, Relative Location, and Detecting Outliers
Measures of Association Between Two Variables

Topic 4: Hypothesis Testing: Sample Population
Concepts of Hypothesis Testing
Tests of the Mean of a Normal Distribution: Population Variance Known
Tests of the Mean of a Normal Distribution: Population Variance Unknown
Tests of the Population Proportion
Assessing the Power of a Test
Tests of the Variance of a Normal Distribution

Topic 5: Hypothesis Testing: Additional Topics
Tests of the Difference Between Two Normal Population Means: Dependent Samples
Tests of the Difference Between Two Normal Population Means: Independent
Samples
Tests of the Difference Between Two Population Proportions
Tests of the Equality of the Variances Between Two Normally Distributed
Populations
Some Comments on Hypothesis Testing

Topic 6: Simple Linear Regression
Simple Linear Regression Model
Least Squares Method
Coefficient of Determination
Model Assumptions
Testing for Significance
Using the Estimated Regression Equation for Estimation and Prediction
Computer Solution
Residual Analysis: Validating Model Assumptions
Residual Analysis: Outliers and Influential Observations

Topic7: Multiple Regression
Multiple Regression Model
Least Squares Method
Multiple Coefficient of Determination
Model Assumptions
Testing for Significance
Using the Estimated Regression Equation for Estimation and Prediction
Categorical Independent Variables
Residual Analysis

Logistic Regression

Topic 8: Regression Analysis: Model Building
General Linear Model
Determining When to Add or Delete Variables
Analysis of a Larger Problem
Variable Selection Procedures
Multiple Regression Approach to Experimental Design

Topic 9: Analysis of Variance
Comparison of Several Population Means
One-Way Analysis of Variance
The Kruskal-Wallis Test
Two-Way Analysis of Variance: One Observation per Cell, Randomized Blocks
Two-Way Analysis of Variance: More Than One Observation per Cell

Topic 10: Time-Series Analysis and Forecasting
Time Series Patterns
Forecast Accuracy
Moving Average and Exponential Smoothing
Trend Projection
Seasonality and Trend
Time Series Decomposition

四、教学进度

周次	教学内容 Teaching content	学时 分配 Class hour	目的要求 Purpose requirements
1	Introduction to the Course	3	Introduce students to the course and the teacher. Student introductions, students learn the basic types of variables and the scales on which they can be measured.
2	Basics of Probability: Notation, Axioms, Sample Space, Basic Probability	3	Students are taught the basic foundation of probability, including sample space, notation, and some of the axioms of probability. Students are introduced to Excel and to seeing data in tabular form and learn to use Excel to make contingency tables to

			calculate basic probabilities. The first problem set - on using Excel to create contingency tables and calculate probabilities - is given. Read PPT.
3	Basics of Probability: Set Theory	3	Students continue to get a solid basis in the foundation of probability by learning set theory and the relationship between probabilit and counting. Students learn set theory notation, union, intersection, and how to use set theory and ven diagrams to calculate probabilities for coplex events. Read PPT.
4	Independence and Conditional Probability	3	This week introduces students to more complex types of probability, including conditional probabiilities. Students learn the definition of independence and how to calculate whether two events are independent or not. Read PPT.
5	Conditional Probability and Bayes's Theorem	3	This week continues with conditional probability and builds up to Bayes's theorem. Students learn to use Bayes's theorem to calculate posteror probabilities. The class also introduces how to calculate combinations and permutations. Read PPT.
6	Bernoulli Trials, Binomial Random Variables	3	Students are refreshed on combinations and permutations and counting. They then learn some discrete statistical distributions, especially the Binomial distribution. Students get practice calculating probabilities of complex events using the Binomial Distribution. Time permitting, students are also introduced to the Poisson and Negative Binomial Distributions. The second problem set - on using the bionmial distribution to calculate probabilities - is given. Read PPT.
7	Continuous Distributions		Students will learn about random variables and

			continuous distributions, primarily the normal distribution. Students learn about z-scores and how to use the normal distribution to calculate probabilities. We return to Excel, where the students get practice generating normally distributed and discrete variables. Read PPT.
8	Continuous Distributions	3	Students continue to learn about continuous distributions, including the exponential distrbution and the uniform distribution. Students also learn how the normal distribution can be used to approximate discrete distributions like the binomial.
9	Mid-Term	3	
10	Graphs and Tables for Descriptive Statistics	3	After the mid-term the course shifts from probability to statistics. In this week students are taught how to display data and graphs for single variables. Topics include stem and leaf plots, bar charts, histograms. Students use Excel to conduct some basic data analysis and plotting. Read p. 32-41
11	Graphs and Tables for Multiple Variables	3	Students learn methods for displaying two variables, with a heavy focus on contingency tables. Students practice making contingency tables in Excel and transforming continuous or discrete data to be categorical for the sake of easy representation. Read p. 55-64.
12	Numerical Measures	3	This week finishes discussion of graphical displays. Students are taught about scatterplots and lines of best fit and how to interpret them. Students make a scatterplot and fit a trend line in Excel. Students also are refreshed about descriptive measures of data, including summary statistics of central tendency and spread. Read p. 104-117.

13	Numerical Measures and Outliers	3	Students continue to learn about summary statistics, with a special emphasis on statistical measures of spread. Students get practice calculating standard deviations and variance by hand. The third problem set - on summation notation and standard deviations - is given. Read p. 118-121.
14	Variance and Covariance	3	Students will learn and get comfortable with statistical measures of the relationship between two varables. The formulas for covariance and correlation are explained and students again practice calculating these by hand. This week also involves teaching students how to use Excel to find covariance, correlation, standard deviations, and other measures. Read p. 130-137
15	Correlation	3	Student continue to learn about descriptive measures of the relationship between two variables. The final problem set - on calculating correlation and ovariance by hand - is given. Read p. 144-148.
16	Sampling	3	We conclude the course with discussing the relationship beteen descriptive statistics and inferential statistics, and how to sample in order to be able to make inferences about a larger population. Read p. 175-183
17	Review		What we covered in the course is reviewed in preparation for the exam. The students also learn about how to further their statistical skills.
18	**Final Exam**	3	

五、考核方式及评定方法

◆ Attendance and Participation　　10%
◆ Problem Sets　　30%
◆ Mid-Term　　30%
◆ Final Exam　　30%

课程	评分标准

90-100	80-89	70-79	60-69	＜60
优	良	中	合格	不合格
A	B	C	D	F

六、参考书目

Statistics for Business and Economics, 8th edition, Paul Newbold, William L. Carlson, Betty M. Thorne, Pearson.