



## Shanghai Jiao Tong University

### EC313 Introduction to Statistics (Online)

|                                    |  |                 |         |
|------------------------------------|--|-----------------|---------|
| <b>Instructor Information:</b>     | Gexin Yu<br>Home Institution: College of William & Mary<br>Email: <a href="mailto:gyu@wm.edu">gyu@wm.edu</a><br>Office Hours: Determined by Instructor   |                 |         |
| <b>Term:</b>                       | June 29, 2020 –<br>July 24, 2020   | <b>Credits:</b> | 4 units |
| <b>Class Hours:</b>                | Monday through Friday, 120 minutes per teaching day  |                 |         |
| <b>Discussion Sessions:</b>        | 2 hours each week, conducted by teaching assistant(s)  |                 |         |
| <b>Total Contact Hours:</b>        | 66 contact hours (1 contact hour = 45 mins, 3000 mins in total)  |                 |         |
| <b>Required Texts (with ISBN):</b> | Business Statistics—A First Course, David Levine, Kathryn Szabat, and David Stephan, 7th edition (global edition), ISBN 10: 1-29-209593-8.<br>ISBN 13: 978-1-292-09593-6 (Print)<br>ISBN 13: 978-1-292-09602-5 (PDF) |                 |         |
| <b>Prerequisite:</b>               | Calculus or approved by the instructor   |                 |         |



### Course Overview

This course is an introduction to the basic concepts and procedures behind probability and statistics. Some of the topics covered are descriptive statistics, experimental design, regression, probability, discrete random variables including the binomial distribution, the normal distribution, confidence intervals, hypothesis tests for a single parameter, inference on two samples and the chi-square distribution to test goodness-of-fit and independence. Knowledge in calculus is preferred.

### Course Goals

After the course, students should learn some basics concepts and methods in statistics to analyze simple problems in business.

### Grading Policy

|                      |     |
|----------------------|-----|
| Quizzes and Homework | 30% |
| Midterm Examination  | 30% |
| Final Examination    | 40% |

### Grading Scale

| Number grade | Letter grade | GPA |
|--------------|--------------|-----|
| 90-100       | A            | 4.0 |
| 85-89        | A-           | 3.7 |
| 80-84        | B+           | 3.3 |
| 75-79        | B            | 3.0 |
| 70-74        | B-           | 2.7 |
| 67-69        | C+           | 2.3 |
| 65-66        | C            | 2.0 |
| 62-64        | C-           | 1.7 |
| 60-61        | D            | 1.0 |
| ≤59          | F (Failure)  | 0   |



### Class Schedule

| Date   | Lecture  | Readings     |
|--------|--|--------------|
| Day 1  | Introduction, Defining and collecting data           | Chapter 1    |
| Day 2  | Organizing and visualizing variables                 | Chapter 2    |
| Day 3  | Numerical description measures                       | Chapter 3    |
| Day 4  | Basic probability 1                                  | Chapter 4    |
| Day 5  | Basic probability 2                                  | Chapter 4    |
| Day 6  | Discrete probability distribution                    | Chapter 5    |
| Day 7  | Normal distribution                                  | Chapter 6    |
| Day 8  | Sample distribution                                  | Chapter 7    |
| Day 9  | Midterm review                                       |              |
| Day 10 | <b>Midterm Examination</b>                           | Chapter 1-7  |
| Day 11 | Confidence interval estimation                       | Chapter 8    |
| Day 12 | Fundamentals of hypothesis testing: one sample tests | Chapter 9    |
| Day 13 | Two-sample tests                                     | Chapter 10   |
| Day 14 | One-way ANOVA  | Chapter 10   |
| Day 15 | Chi-square tests                                     | Chapter 11   |
| Day 16 | Simple linear regression 1                           | Chapter 12   |
| Day 17 | Simple linear regression 2                           | Chapter 12   |
| Day 18 | Multiple regression                                  | Chapter 13   |
| Day 19 | Final Review   |              |
| Day 20 | <b>The Final Examination</b>                         | Chapter 1-13 |



### More Detail Topics

1. Defining and collecting data: how to define and collect data, identify the ways to collect a sample (completely randomized design, randomized block design), and understand the types of survey errors;
2. Organizing and visualizing data: Methods to organize and visualize variables, principles of proper visualizations;
3. Numerical descriptive measures: Describe the properties of central tendency, variation, and shape in numerical variables, covariance and the coefficient of correlation;
4. Basic probability: Basic probability concepts, conditional probability, Bayes' rules, counting rules;
5. Discrete probability distributions: Properties of probability distribution, expected value and variance, binomial distribution and Poisson distribution;
6. Normal Distribution: Continuous probability distribution, normal distribution, evaluating normality;
7. Sampling distributions: Sampling distributions, probability related to the sample mean and the sample proportion, Central Limit Theorem;
8. Confidence Interval Estimation: Confidence interval estimate for the mean and for the proportion;
9. Fundamentals of Hypothesis Testing: One-sample tests: Fundamentals of hypothesis-testing methodology, t-test. One-tail test, Z test;
10. Two-sample Tests and One-way ANOVA: Comparing the means of two independent or two related populations, compare the proportions and variances of two independent populations, One-Way ANOVA, F-test for the ratio of two variances;
11. Chi-square tests: Chi-square test, the Goodness-of-Fit Test, the Chi-square test of independence and homogeneity;
12. Simple Linear Regression: Least-square method, measures of variation, assumption of regression, residual analysis, inferences, estimation of mean values and prediction of individual values;
13. Multiple Regression: Develop a multiple regression model, interpret the regression coefficients, coefficient of multiple determination, overall F test, ANOVA, residual analysis and inference, Dummy variable and interaction terms.