



**Shanghai Jiao Tong University**  
**EC313 Introduction to Statistics**

<b>Instructor Information</b>	Jackson Jinhong Mi Home Institution: Shanghai Maritime University Email: <a href="mailto:jhmi@shmtu.edu.cn">jhmi@shmtu.edu.cn</a> Office Hours: Determined by Instructor		
<b>Term</b>	September 13, 2021 - December 3, 2021	<b>Credits</b>	4 units
<b>Class Hours</b>	Twice per week, 120 mins per teaching day		
<b>Discussion Sessions</b>	1 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>	Elementary Statistics, by Triola, Pearson Publishing, 13th edition ISBN: 978-0134462455		
<b>Prerequisite</b>	N/A		



## Course Overview

An introduction to the discipline of statistics, emphasizing both statistical thinking and its application to analyzing data. Topics include sampling, design of experiments, organizing and exploring data, probability distributions such as the normal distribution, sampling distributions, hypothesis testing and confidence intervals, correlation and regression. Students are expected to express results of statistical procedures in ordinary non-technical language. Real world applications of statistical topics are emphasized throughout the course.

This course covers the essentials of statistics. Students learn descriptive and inferential statistics; charts (histograms, frequency polygons, ogives, and pie charts); measures of central tendency (mean, median, mode, and weighted mean); and measures of dispersion (range, variance, and standard deviation). Additional areas of study include discrete and continuous random variables; basic probability theory; the binomial distribution and its application in binomial experiments; standard and non-standard normal distributions; the Central Limit Theorem; confidence intervals for means, proportions, and variances; linear correlation and regression; and the one sample hypotheses test for mean (large and small sample), proportions, and variances.

## Learning Outcomes

This course is designed to achieve the following student outcomes and objectives:

- Interpret and build Frequency distributions
- Interpret and build Frequency tables
  - ✧ histograms, frequency polygons, ogives and pie charts
- Calculate and interpret Measures of Center
  - ✧ mean, median, mode
  - ✧ weighted mean
  - ✧ mean of a frequency table
- Calculate and interpret the Measures of variation
  - ✧ range
  - ✧ standard deviation and variance of samples and populations
  - ✧ the empirical rule
  - ✧ Chebyshev's theorem
- Calculate the measures of Relative Standing
  - ✧ z-scores
  - ✧ percentiles and quartiles
  - ✧ boxplots
- Introduction to Probability
  - ✧ the complement rule
  - ✧ addition rule of probability
  - ✧ multiplication rule
  - ✧ conditional probabilities



- ◇ applications
- Discrete Probability Distributions
  - ◇ discrete random variables
  - ◇ mean, standard deviation and variance
  - ◇ mathematical expectation
- Binomial Distribution
  - ◇ binomial probability formula and its applications
  - ◇ computing the mean and the standard deviation of a binomial distribution
- Standard Normal Distribution
  - ◇ z-scores and normal distribution probabilities with applications
  - ◇ non-standard Normal Distributions: applications
  - ◇ Central Limit Theorem: applications (sample means)
  - ◇ normal approximation to binomial (if time permits)
- Estimating Population Proportions
- Estimating the mean
  - ◇ estimators
  - ◇ critical values: sigma known
  - ◇ critical value: sigma unknown. The t distribution
  - ◇ confidence intervals (SIGMA known and unknown)
- Estimating the variance
- Hypothesis testing: Proportions
  - ◇  $H_0$ ,  $H_1$  and significance level
  - ◇ sample's test statistic
  - ◇ using P-value and critical value to test hypothesis.
  - ◇ Conclusions
  - ◇ errors: alpha and beta (if time permits)
- Testing hypothesis about the mean
  - ◇  $H_0$ ,  $H_1$  and significance level
  - ◇ sigma unknown: critical t values. P-values (using technology)
  - ◇ conclusions
  - ◇ errors (if time permits)
- Testing hypothesis about the variance
- Correlation
  - ◇ calculation and meaning of the correlation coefficient
  - ◇ coefficient of determination



- ◇ testing for correlation in the population
- Regression

### Grading Policy

Mid-semester Exam	25%
Attendance	10%
Homework	25%
Final Exam	40%

### Grading Scale is as follows

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 TO STATISTICS	Chapter 1
Day 2	EXPLORING DATA WITH TABLES AND GRAPHS	Chapter 2
Day 3	DESCRIBING, EXPLORING, AND COMPARING DATA	Chapter 3
Day 4	DESCRIBING, EXPLORING, AND COMPARING DATA	Chapter 3
Day 5	PROBABILITY	Chapter 4
Day 6	DISCRETE PROBABILITY DISTRIBUTIONS	Chapter 5
Day 7	NORMAL PROBABILITY DISTRIBUTIONS	Chapter 6
Day 8	NORMAL PROBABILITY DISTRIBUTIONS	Chapter 6
Day 9	Mid-semester exam review	Lecture notes and supporting material
Day 10	<b>Mid-semester Exam</b>	
Day 11	ESTIMATING PARAMETERS AND DETERMINING SAMPLE SIZE	Chapter 7
Day 12	ESTIMATING PARAMETERS AND DETERMINING SAMPLE SIZE	Chapter 7
Day 13	HYPOTHESIS TESTING	Chapter 8
Day 14	HYPOTHESIS TESTING	Chapter 8
Day 15	INFERENCES FROM TWO SAMPLE	Chapter 9
Day 16	INFERENCES FROM TWO SAMPLE	Chapter 9
Day 17	CORRELATION AND REGRESSION	Chapter 10
Day 18	CORRELATION AND REGRESSION	Chapter 10
Day 19	Course review	Lecture notes and supporting material
Day 20	<b>Final Exam</b>	