Capital University of Economics and Business
Overseas Chinese College
Course Syllabus

Year and Semester	2021 Fall(Junior)
Course Name	Statistics Theory
Course Code	MAT331
Course Type	☐ General Education (Required) ☐ General Education (Elective) ☐ Professional Course (Required) ☐ Professional Course (Elective) ☑ Basic Disciplinary Course
Course Credits	3
Course Hours	48
Prerequisites	Calculus, Linear Algebra, and Probability & Statistics
Instructor	Prof. Emma Zhu
Contact Information	Office: C217 Tele: (010)83951082 Email: zhuleilei@cueb.edu.cn
Office Hour	M: 15:30-17:30, W: 8:00-9:00, 11:00-12:00, TH: 8:00-9:00, 11:00-12:00
Learning Centre	M: 18:00-20:00, T: 10:00-12:00
Grade	2019BA, 2019IT, 2019CFA
Course Time/Place	2019BA; M: 10:10-12:00, W: 9:00-9:50/B312, B311 2019IT; T: 8:00-9:50, TH: 10:10-11:00/B208 2019CFA; M: 13:30-15:20, W: 10:10-11:00/B211

Textbook

David R. Anderson, Dennis J. Sweeney, Thomas A. Williams, *STATISTICS FOR BUSINESS AND ECONOMICS*; *13e*, Thomason Learning, ISBN:.978-7-111-57327-2

Reference Book

- M. R. Spiegel. *Schaum's outline of theory and problems of probability and statistics. Schaum's outline series.* McGraw-Hill, New York, 1975.
- L. Blank. *Statistical procedures for engineering, management, and science*. McGraw Hill, New York, 1980.
- K. Subrahmaniam. *A primer in probability, volume 111 of Statistics: textbooks and monographs.* Marcel Dekker, New York, second edition, 1990.

- W. Feller. *An introduction to probability theory and its applications. Wiley series in probability and mathematical statistics.* Wiley, New York, third edition, 1967-1968.
- N. C. Giri. *Introduction to probability and statistics (in two parts), volume 7 of Statistics: textbooks and monographs*. Marcel Dekker, New York, 1974.
- Y. G. Sinay. *Probability theory, an introductory course*. Springer-Verlag, Berlin; New York, 1992.
- David Salsburg. *The Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century.* Holt McDougal, 2002.

Course Description

Statistic theory is an applications-oriented, basic disciplinary course for students majored in information system management and business management. The main content is an introduction to mathematical statistics that emphasizes the probabilistic foundations required to understand probability models and statistical methods, topics covered will include confidence interval, hypotheses testing, analysis of variance, linear regression and applications in management. Students will not only develop skills of data analysis and ability of data-driven decision making, but also scientific thinking which are all indispensable for future study and professions.

Student Learning Objectives

After completing this course, students will be able to:

Knowledge:

- describe sampling process;
- estimate unknown parameters, including population mean, proportion and variance;
- identify situations of application of hypothesis testing procedures, including hypothesis testing about population mean, proportion and variance, and goodness fit;
- explain the concept of experiment design and the method of ANOVA;
- describe and interpret regression models;

Capability:

- analyze data using descriptive and inferential statistics;
- develop ability of data-driven decision making by statistical methods, including hypothesis testing, experimental design, and regression models;
- construct the scientific thinking and mindset, include systematic thinking, logic thinking, critical thinking and strategic thinking;

Value:

- develop the quality and morals of being objective, integrity and dedication;
- criticize the world with statistical philosophical view;
- enhance national identity and pride.

Website Source

- Statistics & Probability: http://42explore.com/statistics.htm
- Charles M. Grinstead and J. Laurie Snell's textbook Introduction to Probability:

http://www.dartmouth.edu/~chance/teaching_aids/books_articles/probability_book/book.html, an on-line textbook on probability and statistics.

- The Chance Website: http://www.dartmouth.edu/~chance/index.html

The goal of Chance is to make students more informed, critical readers of current news stories that use probability and statistics.

- Math Archives. Probability: http://archives.math.utk.edu/topics/probability.html. Statistics: http://archives.math.utk.edu/topics/statistics.html
- The Probability Web: http://www.mathcs.carleton.edu/probweb/probweb.html

Teaching Methods

This course consists of lectures, discussions, group projects, assignments, individual presentations and online activities. Students must be prepared to finish some small questions and small quiz during the class on Xuexitong application.

Grade Criterion

Component	Weight	Description
Final Exam	20%	A cumulative final examination will be given based on all of the contents of the class. The exam paper may be composed of multiple-choice questions, short answer questions, essay questions, problems, preparation of financial statements and a summary of gains from a particular course. Students should rely primarily on homework assignments to give them a sense of what they may see for material on exams.
Mid-Term Test	20%	A cumulative midterm test will be given based on all of the contents that have been taught in class. The test paper may be mainly composed of multiple-choice questions and it should be completed within 15 minutes in class.
Homework	15%	Most of the assigned homework is taken from the Exercises in the textbook. Assignments will be collected at the clearly stated date. Late assignments will not be accepted. The graded assignments will be kept by the tutor for reference and won't be returned to students.
Quizzes	15%	There will be at least 2 quizzes during the semester. Quizzes may or may not be announced in advance. It may also be used as a way to check the attendance. Quizzes will test your knowledge of both concepts and the application of those concepts.
Presentation	10%	The students will be divided into several groups to prepare a presentation. Each student is required to be involved in the presentation. The topics can be selected from the textbook or lectures. Each group need to finish a PPT related to the topic which is given and hand in the related resources to the teacher before the presentation.
Participation	10%	Individuals will be asked to participate individually in a question and answer at least 5 times during the semester. The performances should be counted in their participation.
Attendance	10%	Refer to attendance policy listed below

Total	100%	

Presentation Topics (Selective):

Key Points	**Projects**
Hypothesis testing of two population parameters	1. Determine whether attending Student Union and other communities is an influential factor of GPA 2. Explore whether the mean GPA differs by gender 3. Discuss whether the supporting proportion of two stars (actor, actress or sports stars) is different in our campus CUEB 4. Determine whether the preference of two games differs by gender
Hypothesis testing of population variance	5. Determine whether the variations of GPA in two classes are the same. 6. Discuss whether the variations of mean month spending differ by gender.
Other Hypothesis Testing	7. Investigate whether the marketing shares of HuaWei, Iphone and Vivo are the same in CUEB. 8. Discuss whether the amount of drinking water per day, amount of money spending per day, rate of pulse, length of time playing video games, etc. are normally distributed.
Experiment design	9. Investigate whether the length of time playing video games differs by grade. 10. Discuss whether the learning attitude differs by grade.
Linear regression	11. Find the influential factor of students' GPA in CUEB.

Evaluation criterion for presentations

Component	**Description & Requirement**
Content (50%)	Your presentation must start with a delivery of key conclusions and recommendations. It is not a recapitulation of your entire analysis. The subsequent parts of your presentation should clearly lead the audience to understand how you arrived at your conclusions and recommendations.
Coherence (10%)	You have a clearly developed message that flows naturally from your presentation. The transitions are smooth. The presentation is succinct and not choppy.
Organization (10%)	Follow the format provided in the outline. Introduce your team and the agenda you will follow. Provide handouts to the audience prior to beginning your presentation. Indicate when you would like to take questions.
Creativity (10%)	Require the use of Power Point, you can add originality to the presentation to capture and hold the audience's attention. You can also go too far in your creativity. If your presentation uses annoying or distracting sounds, for example, it negatively impacts on creativity.
Speaking skills (15%)	The criteria include: poise, clear articulation, proper volume, steady rate, good posture, eye contact, enthusiasm, and confidence. The speakers do not read (e.g., note cards, read the

	overhead transparencies).
Timeliness (5%)	You have 5-7 minutes to make your presentation. This is the typical amount of time that you can expect before a group of senior managers.

Detailed Grade Computation

	Before Midterm	After Midterm
Attendance	5%	5%
Participation	5%	5%
Homework	5%	10%
Quizzes	5%	10%
Presentation		10%
Midterm test	20%	
Final exam		20%
Total	40%	60%

Grading Policy

A+ 97-100	A 93-96	A- 90–92	B+ 87-89	B 83-86	B- 80–82
C+ 75-79	C 70-74	C- 67–69	D+ 63–66	D 62-60	F 0- 59

Exam Schedule

Midterm Test: 8th week

Final Exam: Jan. 5-14, 2022

Assessment of Student Performance

☞ Self-Study and Reading ability Practice

Instructor will give out the chapters or the reference books to read and use class hours to have discussion; students should be able to show a proactive attitude and ability for self-study and reading. Knowledge and oral English will be elements of homework or presentation score.

☞ Homework

Students should finish their homework by themselves. Copying from others will be treated as cheating and the homework scores will be lowered. Students should hand in all assignments on time. Late assignments will be accepted at the discretion of the instructor (i.e., when the student was ill or had an excused absence). Late assignments without reasonable proof will be reduced in score by 50%.

☞ Attendance

Because the course covers a great deal of material, attending every class session is very important for performing well.

- Being late for 15 minutes or more is considered an absence.
- Five hours or above of unexcused absences will result in the lower level of the final grade by one grade band (e.g. from C – to D +). Any excused absence must be discussed directly with the teacher.
- Absence which is more than 1/3 of the total teaching hours will cause an F (a failing grade) directly. but students are welcome to continue attending classes.
- An incomplete grade (I) will be considered in case of medical or family emergencies.

☞ ***Participation***

- Students should participate in classes actively. Half of participation grade is determined by their presentation in class. They are encouraged to ask questions relevant to the subject and express their own opinions. Every student should respect the ideas, opinions, and questions of their classmates.
- Students should also use office hours to ask questions or talk with the instructor for good communication and effective learning.
- Frequent visiting the instructor and chatting in English during office hours is highly recommended.
- Any misbehavior and non-class related activities in class will result in the lower level of the participation grade, including ringing cell phones.
- All above behaviors will be solely evaluated by the instructor for scoring.

Topical Course Outline

Week	Date	Content	Course Education
1		● Syllabus & Orientation ● Review confidence interval	Relationships between the reliability and precision of confidence interval
		● Review hypothesis testing	Relationships between type I and type II error
2		● Ch10 Inferences About Means & Proportions With Two Populations • Inferences About the Difference Between Two Population Means: Independent Samples	
		•Inferences About the Difference Between Two Population Means: Matched Samples	
3		● Ch11 Inferences About Population Variances • Inference about one population variance	Discussion of application of variance in industrial world
		• Inference about two population variances	
4		● Ch12 Comparing Multiple Proportions, Tests of Independence and Goodness of Fit • Testing the Equality of Population Proportions for Three or More Populations	How the three test in chapter 12 help a company provide better service to their customers
		• Multiple comparison test	
5		• Test of Independence • Goodness of Fit Test	
		• Goodness of Fit Test	
6		● Ch13 Experimental Design &ANOVA • Completely randomized design	How experimental design changes both the academic and industrial world.
		• ANOVA	
7		• Randomized block design	

		• Factorial experiment	
8		• Reviews and Midterm test	
		● Midterm test	
9		● Ch14 Simple Linear Regression • Simple linear regression model • Least Square Methods	How regression help you to be a critical thinker?
		• Coefficients of determination	
10		• Test of significance • Estimation and Prediction	
		• Residual analysis	
11		● Ch15 Multiple Regression • Multiple regression models • Least square methods	
		• Coefficients of determination	Discussion of over-fitting and under-fitting
12		• Test of significance • Estimation and Prediction	
		• Residual analysis	
13		● Ch16 Regression Analysis: Model Building • General linear model • Determine when to add or delete variables	
		• Variable selection procedure	
14		• Multiple regression approach to experimental design •Autocorrelation and the Durbin-Watson test	
		● Reviews	
15		● Reviews and Presentations	
16		● Presentations	
17		● Review	
18&19		● Final examination	

Note: *Some chapters or sections may leave for self-study, this is the students' duty to learn and understand, they may also be included in the quizzes or exams.*

A review in Chinese may be held during L.C. and O.H. in the semester.

Teacher's Office Hour

- The instructor's office hour is shown in the front of the office door.
- Students are suggested to use the instructor's office hour and learning center to ask questions or talk with the instructor once at least per week for good communication and effective learning, which is recorded in the students' participation.
- The time can be scheduled by instructors or students, or both.

Cheating and Plagiarism

Cheating is not tolerated. Any student caught cheating on a quiz; test or exam will be given a mark of zero (0) for the particular work. At the beginning of the semester the definition of plagiarism will be carefully explained, when any thoughts or writings of another person are used, they must be clearly identified (usually one uses quotation marks) and the source notes. **If any student is caught cheating on any homework assignment, the highest score the student can earn in that course is a "C"**

Important Dates

Sep. 5	Registration (Sophomores, Juniors and Seniors)
Sep. 6	Classes Begin (Sophomores, Juniors and Seniors)
Sep. 10	Last Day to Drop or Add a Course (Sophomores, Juniors and Seniors)
Sep. 18	Registration (Freshmen)
Sep. 20-24	Entrance Education (Freshmen)
Sep. 21	Mid-Autumn Festival
Sep. 27	Classes Begin (Freshmen)
Oct. 1	National Day
Nov. 1-5	Midterm Test
Jan. 1, 2022	New Year's Day
Jan. 1-4	Revision (Sophomores, Juniors and Seniors)
Jan. 5-14	Final Exam Period (Sophomores, Juniors and Seniors)
Jan. 10-14	Final Exam Period (Freshmen)
Jan. 17	Winter Vacation Begins

Instructor: Leilei Zhu **Department Head: Jingning Li**