**Capital University of Economics and Business**

**Overseas Chinese College**

**Course Syllabus**

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| **Year and Semester** | 2022 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** | 51 |
| **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** | TBA |
| **Learning Centre** | TBA |
| **Grade** | 2020IT, 2020CFA |
| **Course Time/Place** | 2020IT; W: 9:55-12:20 /B2082020CFA; TH: 9:55-12:20 /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 |
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| **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. |
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| **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. |
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| **Student Learning Objectives** |
| After completing this course, students will be able to:**Knowledge:**• 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. |
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| **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 |
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| **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. |
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| **Grade Criterion** |
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| **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 anda 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% |  |

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| **Presentation Topics (Selective):**

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| **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
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| Hypothesis testing of population variance | 1. Determine whether the variations of GPA in two classes are the same.
2. Discuss whether the variations of mean month spending differ by gender.
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| Other Hypothesis Testing | 1. Investigate whether the marketing shares of HuaWei, Iphone and Vivo are the same in CUEB.
2. 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.
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| Experiment design | 1. Investigate whether the length of time playing video games differs by grade.
2. Discuss whether the learning attitude differs by grade.
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| Linear regression | 1. Find the influential factor of students’ GPA in CUEB.
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**Evaluation criterion for presentations**

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| **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. |

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| **Detailed Grade Computation** |
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|  | **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% |

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| **Grading Policy** |
| A+ 97-100 A 93-96 A- 90–92 B+ 87-89 B 83-86 B- 80–82C+ 75-79 C 70-74 C- 67–69 D+ 63–66 D 62-60 F 0- 59 |
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| **Exam Schedule** |
| Midterm Test: 9th weekFinal Exam: Jan. 9-13, 2023 |
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| **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. |
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| **Topical Course Outline** |
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| Week | Date | Content | Course Education  |
| 1 |  | ⚫ Syllabus & Orientation⚫ Review confidence interval⚫ Review hypothesis testing⚫ Ch10 Inferences About Means & Proportions With Two Populations• Inferences About the Difference Between Two Population Means: Independent Samples  | Relationships between the reliability and precision of confidence interval,Relationships between type I and type II error |
| 2 |  |  •Inferences About the Difference Between Two Population Means: Matched Samples⚫ Ch11 Inferences About Population Variances• Inference about one population variance |  |
| 3 |  | • Inference about two population variances⚫ Ch12 Comparing Multiple Proportions, Tests of Independence and Goodness of Fit• Testing the Equality of Population Proportions for Three or More Populations• Multiple comparison test | Discussion of application of variance in industrial world |
| 4 |  | • Test of Independence • Goodness of Fit Test, Multinomial distribution • Goodness of Fit Test, Normal distribution | How the three test in chapter 12 help a company provide better service to their customers |
| 5 |  | ⚫ Ch13 Experimental Design &ANOVA• Completely randomized design• ANOVA• Randomized block design |  |
| 6 |  | • Factorial experiment• Reviews and Midterm test | How experimental design changes both the academic and industrial world. |
| 7 |  | ⚫ Ch14 Simple Linear Regression• Simple linear regression model• Least Square Methods• Coefficients of determination | How regression help you to be a critical thinker? |
| 8 |  | ⚫ Review⚫ 数据分析师训练营 |  |
| 9 |  | ⚫ Mid-term Test⚫ 数据分析师训练营 |  |
| 10 |  | • Test of significance• Estimation and Prediction• Residual analysis⚫数据分析师训练营 |  |
| 11 |  | ⚫ Ch15 Multiple Regression• Multiple regression models• Least square methods• Coefficients of determination⚫数据分析师训练营 | Discussion of over-fitting and under-fitting |
| 12 |  | • Test of significance• Estimation and Prediction• Residual analysis⚫数据分析师训练营 |  |
| 13 |  | ⚫ Ch16 Regression Analysis: Model Building• General linear model• Determine when to add or delete variables• Variable selection procedure⚫数据分析师训练营 |  |
| 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 |  |

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| ***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.* |
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| **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. |
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| **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"** |
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| **Important Dates** |
| Fall Semester, 2022 September 5, 2022— January 16, 2023Sep.2-4 Registration（Sophomores，Juniors and Seniors） Sep.5 Classes Begin（Sophomores，Juniors and Seniors）Sep.9 Last Day to Drop or Add a Course Sep.10 Mid-Autumn FestivalSep.18 Registration（Freshmen）Sep.19-23 Entrance Education（Freshmen） Sep.26 Classes Begin（Freshmen）Oct.1 National Day Oct.31 – Nov.4 Midterm Test Dec.31- Jan.3,2023 Revision（Sophomores，Juniors and Seniors）Jan.1, 2023 New Year’s Day Jan.4- 13,2023 Final Exam Period（Sophomores，Juniors and Seniors）Jan.9-13 Final Exam Period（Freshmen）Jan.16 Winter Vacation Begins |
| **Instructor: Leilei Zhu Department Head: Jingning Li**  |

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