

CAS MA116 B1 Statistics II

Summer II 2020

Instructor: Wan-Chi Hsin
Department of Mathematics and Statistics
111 Cummington Mall, Room B46B
Email: whsin@bu.edu
Office Hours: Mon 8:30-10:30 am & Tue 1-2:30 pm
Zoom PMI: [check Blackboard](#)

Facilitator: Qiao Pan
Email: qpan0316@bu.edu
Office Hours: Wed & Thur 1-3 pm
Zoom PMI: [check Blackboard](#)

Class Meetings: Mon, Tue, Wed, Thur 11:00 am – 1:00 pm EDT via Zoom
Zoom meeting ID: 945-0206-3091 (password: in Blackboard announcement)

All times listed in this document, whether specifically annotated or not, are for the EDT time zone. Please plan accordingly.

Course Description: This course serves as an introduction to basic statistical modeling techniques. It is expected that the students have knowledge of basic concepts and tools in elementary statistics and probability: descriptive statistics, introductory probability, sampling, point and interval estimation, and hypothesis testing (MA115 or equivalent). In this course, we will take the statistical inference one step further. We will consider two or more variables in a population, and explore relationships between these variables. The basic objectives are: building and analysis of statistical models; fitting these models to the data and evaluation of the performances of the models; distribution-free (nonparametric) methods of statistical inferences.

Prerequisites: CAS MA115; or equivalent.

Text: “STATISTICS: Informed Decisions Using Data” by Michael Sullivan, **Fifth** Edition, Pearson, 2017. Note: The textbook **MUST** be 5th edition but we do NOT need any codes or cd’s or extras.

Course Website: Course information including syllabus, homework questions and announcements will be available at <http://math.bu.edu/people/whsin/ma116-2020sum2.html>. BlackBoard (<http://learn.bu.edu>) will be used for lecture slides, grades, Zoom recordings and class-wide email messages.

Discussion Sessions: Tue & Thur: 12-1 pm. These two time slots are reserved for discussion sessions, which are designed to make you familiar with the concepts taught in the classes. The facilitator will guide students to work on practice exercises during the discussion sessions.

Homework Assignments: Homework will be assigned weekly and you need to upload your homework on Blackboard. The due date of each homework will be announced. **No late homework will be accepted.** Everyone is expected to write and turn in his or her own work. Solving the problems assigned for homework is fundamental to succeed in this class. Please make sure to label the question numbers; otherwise, the grader will not be able to grade your work. All work must be shown to receive full credits of the homework.

Quizzes: Biweekly quizzes will be given on **Monday** (July 13, July 27 and August 10) during the last 30 minutes of the class unless otherwise stated. Quizzes will be based on lectures and homework problems, so it is important that you spend time on completing the homework and understand the material. The lowest quiz grade will be dropped.

Exam Dates: There will be three in-class exams, including two midterm exams and one final exam. The dates for the exams are as follows. (For students in different time zones, please see the next section.)

Midterm 1: 11am-1pm, Thursday, July 16
Midterm 2: 11am-1pm, Thursday, July 30
Final Exam: 11am-1pm, Thursday, August 13

Different Time Zones: Considering that there are several students in different locations, we will record every class and make it available on Blackboard. As for the exams, we schedule another time window, 3-5 am EDT, for students in Asian/Australian time zones. Below are the exact times.

Midterm 1: 3-5 am, Thursday, July 16
Midterm 2: 3-5 am, Thursday, July 30
Final Exam: 3-5 am, Thursday, August 13

The quizzes for students in different time zones will be held on Monday, July 13, July 27 and August 10, from 4:30-5:00 am EDT. Please note that for those who take the quizzes and the exams in this extra time window, you indeed take them (8 hours) earlier than your classmates. Please plan accordingly.

Make-up Policy: I will not accept any make-up work unless for a truly exceptional and documented reason. Quizzes and exams cannot be made up. **Do not make arrangements to leave before the final exam.**

Grading: Course grades will be assigned as follows:

20% Homework assignments
15% Quizzes
20% Midterm 1
20% Midterm 2
25% Final examination

Attendance: You are expected to attend classes. Attendance and participation in both lectures and discussion sessions are vital. Any material covered in lecture may be included as questions on examinations. Arriving on time, being prepared for the new material, and leaving at the end of class, are absolutely necessary to get the most out of this course.

Important dates:

Monday, July 6	Classes begin
Friday, July 10	Last day to drop without a “W” grade
Wednesday, July 29	Last day to drop with a “W” grade
Thursday, August 13	Last day of classes

Academic Conduct: Students are expected to be familiar with the BU Academic Conduct Code, which can be found at <http://www.bu.edu/academics/files/2011/08/AcademicConductCode.pdf>

During examinations, no collaboration is allowed! BU has a strict policy against academic dishonesty (in its myriad of forms). Any form of cheating, plagiarism, collusion, pilfering, or ghost-writing will not be tolerated. Penalties for violating the Academic Conduct Code may include suspension or expulsion from the University.

Special Needs: If you have any special needs, whether a physical handicap or learning disability or family emergency that arises during the course of the semester, please don't hesitate to let me know. I will deal with each situation on a case-by-case basis.

Note: The instructor reserves the right to make any changes she considers academically advisable. Such changes, if any, will be announced in class and/or on Blackboard. Please note that it is your responsibility to attend the class and keep track of the proceedings.

Course Outline (tentative):

1. Review MA115

- (a) **Random variables and probability distributions.** The Binomial and Normal distributions.
- (b) **Sampling distributions** of sample mean, proportion; CLT (the central limit theorem); Z -, t -, and χ^2 - distributions.
Reading: Chapter 5-8
- (c) **One-sample statistical inferences.** Point and interval estimation, and hypothesis testing for population unknown mean, proportion and variance.
Reading: Chapter 9-10

2. Power and Type II Error

Reading: Chapter 10, Section 10.6

Midterm 1.

- 3. Two-sample statistical inferences.** Point and interval estimation, and hypothesis testing of the differences between two normal population means and proportions. F - distribution. Comparing two population variances.

Reading: Chapter 11

- 4. Categorical data analysis.** Cross-Tabulation Tables. Goodness-of-Fit Tests: Tests of Independence and Homogeneity.

Reading: Chapter 12

- 5. Analysis of Variance (ANOVA).** Comparing more than two means. One-Way Analysis of Variance. Multiple comparison procedures. Repeated measures Analysis of Variance.

Reading: Chapter 13

Midterm 2.

- 6. Correlation and Regression.** Correlation Analysis. Simple and Multiple Regression Analysis.

Reading: Chapter 4 & 14

- 7. Nonparametric Methods.** Distribution-free tests. The sign test. The Wilcoxon signed-rank test. The Mann-Whitney test.

Reading: Chapter 15

Final Exam.