Introduction to Mathematical Statistics

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Simon Fraser University

Fall 2020

What to do today?

A. Course Syllabus

B. Introduction to STAT-330

STAT-330: Introduction to Mathematical Statistics

Instructor: X. Joan Hu (`http://www.sfu.ca/~joanh/`;
email: joanh@stat.sfu.ca)

Lecture:
Mon 10:30 - 12:20 (PDT/PST); Wed 10:30 - 11:20 (PDT/PST)
(Remote Learning)

- An outline of each lecture will be posted in the course's webpage and canvas-page before the meeting time.
- A live lecture will be delivered during the scheduled time for each lecture via Bb Collaborate Ultra (`https://canvas.sfu.ca/courses/56956/external_tools/3544`).
- The live lecture will be recorded and then posted in the course's webpage and canvas-page througout the whole following week.

Course Webpage:
`http://www.sfu.ca/~joanh/stat330web`
Course Canvas-page:
`https://canvas.sfu.ca/courses/56956`

Office Hour:
Wed 11:30 - 12:20 (PDT/PST) via Zoom
(`https://sfu.zoom.us/j/95177443430`; Password: 892882)
or by appointment

Teaching Assistant:
Molly Cen (mca173@sfu.ca) for tutorial, and
Mandy Yao (mya107@sfu.ca) for marking

Tutorials: (starting from the week of Sep 14 2020)

- D101: Mon 8:30 - 9:20; D102: Mon 9:30 - 10:20; D103: Wed 9:30 - 10:20
- Each tutorial will take place during the scheduled time via Bb Collaborate Ultra (`https://canvas.sfu.ca/courses/56956/external_tools/3544`).

A. Syllabus (cont'd)

Textbook:

- "*Introduction to Mathematical Statistics* (8th Edn)" by Hogg, McKean and Craig. Publisher: PEARSON

References:

- "*Probability and Statistical Inference*," by Hogg and Tanis
- "*A Course in Probability Theory*," by K.L. Chung
- "*Statistical Inference*," by Casella and Berger

Computer Software: *R* and *SAS* are recommended; *R* will be used in class (`http://www.r-project.org/`)

A. Syllabus (cont'd)

Course Outline

1. **Introduction**

2. **Probability and Distributions (Chp 1-3)**
   - 2.1 Probability
   - 2.2 Random Variables and Distributions
   - 2.3 Multivariate Distributions
   - 2.4 Some Important Distributions

3. **Essential Topics in Mathematical Statistics (Chp 4-6)**
   - 3.1 Elementary Statistical Inferences
   - 3.2 Consistency and Limiting Distributions
   - 3.3 Maximum Likelihood Methods

4. **Further Topics, Selected from Chp 7-11**

A. Syllabus (cont'd)

Course Evaluation – Grading Scheme:

- Homework - 20% (six assignments: 5% per homework, and the four highest marks to be used)
- Midterm - 40% (two midterms: 20% per test)
- Final - 40%

Remarks: Medical document is required to evidence the missing of a homework due time, a midterm, or the final is due to illness. When applied, the credit will then be recovered by re-weighting the score at the final exam.

A. Syllabus (cont'd)

Course Evaluation – Homework (20%: six assignments)

- To be assigned in Weeks 2, 4, 6, 8, 10, 12: the assignments will be posted at the course's webpage and canvas-page, and emailed to the class's email list.
- To be collected by 17:30 on Wednesday of Weeks 3, 5, 7, 9, 11, and 13 via the course's canvas-page.
  - Late homework is not accepted: if the delay is due to illness, provide med note and hand in the homework at a later time for credit.
- Marked HW will be returned by the tutorials of the following week: key answers to the homework questions will be posted in the course web page before the tutorials if needed

A. Syllabus (cont'd)

Course Evaluation – Midterm (40%: two midterms; 20% per test)

- Midterm 1 covers Chp 1-4; Midterm 2, Chp 1-6.
- The test questions will be available in Week 5 for Midterm 1 or Week 10 for Midterm 2, during Wednesday 11:30 to Thursday 11:20.
- You have 2 hours (120 minutes) for each of the midterms: the clock starts right after you open the question sheets.

- Remarks:
  - Open-book, and calculators allowed; collaboration not allowed for working on the test questions.
  - No practice midterm is provided.
  - No makeups for midterms: if the missing is due to illness, provide a med note to recover the credit by re-weighting the final score accordingly.

A. Syllabus (cont'd)

Course Evaluation – Final Exam (40%)

- December TBA, 2020
- You have 4 hours (240 minutes) for the final exam: the clock starts right after you open the question sheets.
- Remarks:
  - Final exam covers all the material studied.
  - No practice exam is provided.
  - Open-book, and calculators allowed; collaboration not allowed for working on the exam questions.
  - Time to Review the Final Exam Papers: 10:00-13:00 (PST) Fri Jan 8, 2021

A. Syllabus (cont'd)

Course Evaluation

Evaluation options:

Option 1. 4 *HWs* + 2 *Midterms* + *FinalExam*

Option 2. 4 *HWs* + 1 *Midterm* + *FinalExam* $*$ 1.5

Option 3. 2 *Midterms* + *FinalExam* $*$ 1.5

The highest of the scores obtained by the three options will be used as the final one.

B. Introduction to STAT-330: Why to study it?

- **Data** are everywhere in this modern world.
- "*Statistics is the science of learning from data.*"
  - By processing/summarizing the data: tabulating/plotting (*Descriptive Analysis*)
  - By making inferences with the data
    $\Longrightarrow$ go beyond the data: to understand uncertainties using the limited information (*Statistical Inference*)
- Do the methods studied before, say, from STAT-270/STAT-285, work for us all the time?
  - to choose an appropriate approach from the available ones?
  - to develop an appropriate approach when needed?

B. Introduction to STAT-330: What to study in it?

STAT-330 provides a systematic and in-depth coverage of the material in STAT-270 and STAT-285.

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   - 2.4 Some Important Distributions
3. **Essential Topics in Mathematical Statistics (Chp 4-6)**
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   - 3.3 Maximum Likelihood Methods
4. **Further Topics, Selected from Chp 7-11**

What will we study in the next week?

1. *Introduction*

2. **Probability and Distributions**
   - **2.1 Probability (Chp1.1-4)**
   - **2.2 Random Variables and Distributions (Chp1.5-10)**
   - *2.3 Multivariate Distributions (Chp2)*
   - *2.4 Some Important Distributions (Chp3)*

3. *Essential Topics in Mathematical Statistics (Chp 4-6)*

4. *Further Topics, Selected from Chp 7-11*