Intermediate Probability and Statistics

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spring 2023

What to do today (Jan 6, 2023)?

A. Course Syllabus

B. Introduction to STAT-285

STAT-285. Intermediate Probability and Statistics

Instructor: X. Joan Hu (email: joanh@stat.sfu.ca)

Lecture: (Jan 4 - Apr 11, 2023)
Tue 10:30 - 12:20, BLU9920; Fri 10:30 - 11:20, SWH10041.

Office Hour:
Tuesday 13:30 - 14:20, or by appointment; SSC K10555

Course Webpage:
`http://www.sfu.ca/~joanh/stat285web.html`;
`http://canvas.sfu.ca/courses/75996`

Teaching Assistant:
Quinn Forzley (qjf@sfu.ca) for tutorial: *Office Hours.* TBA;
Trevor Thomson (tta51@sfu.ca) for marking.

Tutorial: (starting from the week of Jan 16 2023)

- Mo 13:30 - 14:20, WMC3511; Mo 14:30 - 15:20, BLU10901.

A. Syllabus (cont'd)

Textbook:

- "*Probability and Statistics for Engineering and the Sciences* (9th Ed), by Jay L. Devore. Publisher: Duxbury Press

References:

- "*Introduction to Mathematical Statistics*," by Hogg and Craig
- "*Mathematical Statistics*," by Freund and Walpole

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

A. Syllabus (cont'd)

Course Outline

Part 1. Introduction and Review (Chp 1-5)

Part 2. Basic Statistical Inference (Chp 6-9)

- 2.1 Point Estimation
- 2.2 Confidence Interval
- 2.3 One-Sample Test
- 2.4 Inference Based on Two-Samples

Part 3. Important Topics in Statistics (Chp 10-13)

- 3.1 One-Factor Analysis of Variance
- 3.2 Multi-Factor ANOVA
- 3.3 Simple Linear Regression Analysis
- 3.4 More on Regression

Part 4. Further Topics (Selected from Chp 14-16)

A. Syllabus (cont'd)

Course Evaluation – Grading Scheme: Letter grades (with +/-) are determined based on

- Homework - 10% (11 assignments)
- Midterm - 40% (two midterms in class; 20% per test)
- Final - 50%

Calculation options for the final grade:

10 HWs + 2 Midterms + Finalexam, or

10 HWs + 1 Midterm + Finalexam*1.5

The higher score will be used to determine the final grade.

Remark: Nonscheduled in-class quizzes may be given to check how well some important material is understood. The credits will be counted as bonus in the final evaluation.

A. Syllabus (cont'd)

Course Evaluation – Homework (10%: 11 assignments)

- Assigned once **everyweek** except Weeks 5 and 10: the assignments will be posted at the course's web page, the course's canvas page, and emailed to the class's email list.
- Collected by **17:00 on Monday** of the following week via canvas.
  - Late homework is not accepted: if the delay is due to an evidenced medical issue, you may hand in the homework at a later time for credit.
- Marked homework will be returned by the Monday of the next week: key answers to the homework questions will be posted in the course webpage/canvas page by the tutorials

A. Syllabus (cont'd)

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

- **Midterm 1**. at the class on Fri of Week 5 (Feb 3 2023); material to be covered TBA.
- **Midterm 2**. at the class on Fri of Week 10 (Mar 10 2023); material to be covered TBA.

- Remarks.
  - Open-book, calculators allowed but laptops/cell phones.
  - 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 using the other midterm score. (In the case where both midterm are missed, an oral exam will be held to obtain the midterm credit.)

A. Syllabus (cont'd)

Course Evaluation – Final Exam (50%)

- Time and classroom TBA

- Remarks.
  - Final exam covers all the material studied.
  - No practice exam is provided.
  - Close-book; each student is allowed to use one letter sized sheet of notes, two sided if needed, and a calculator during the final exam.
  - Official exam conflict?
  - Time to Review the Final Exam Papers: 10:00-12:00 Fri May 19, 2023

B. Introduction to STAT-285: 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
  - By making inferences with the data
    $\Longrightarrow$ go beyond the data: to understand uncertainties using the limited information

- Do the methods we studied in STAT-270 or earlier work for us all the time? *not always.*
  Why? When do they work?
  - to choose an appropriate approach from the available ones?
  - to develop an appropriate approach when needed?

B. Introduction to STAT-285: What to study in it?

It provides a systematic introduciton to statistical inference. (After STAT270, STAT285 starts to teach something "real" on statistics.)

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Part 4. Further Topics (Selected from Chp 14-16)

B. Introduction to STAT-285: How to study it?

By attending **lectures** and **tutorials**, and exercising **HW questions**,

- to understand the concepts, and
- to know the procedures and be able to apply them.

Remark.

- Don't fall behind: the material of a next topic will use the current and the previous material.
- My teaching style: slow at the beginning and speeding up later

Moreover ... ...

- **What are data?**
  - Numbers in context, and
  - Dynamic, complex, structured/unstructured collections of pictures and sounds

- **What to emphasize in studying statistics?**
  Statistical Problem-solving

  (1) formulate a statistical investigative question,
  (2) develop a design for collecting data,
  (3) plan for an analysis and conduct it, and
  (4) interpret the analysis and connect it back to the statistical investigative question.

– *Significance*, Feb 2020

What will we do next?

Part 1. Introduction and Review (Chp 1-5)

- *Introduction*
- **Review 1: Basic Concepts**
- **Review 2: Sampling Distributions**

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