2020/2021 Sem 1: ST2334 Syllabus and Policies

Last updated on

August 7, 2020

1 Course Catalog

1.1 Pre-requisites

- MA1102R or MA1312 or MA1505 or MA1507 or MA1521

1.2 Preclusion

- ST1131, ST1131A, ST1232, ST2131, MA2216, CE2407, EC2231, EC2303, PR2103, DSC2008. ME students taking or having taken ME4273. All ISE students.

1.3 Description

- Basic concepts of probability, conditional probability, independence, random variables, joint and marginal distributions, mean and variance, some common probability distributions, sampling distributions, estimation and hypothesis testing based on a normal population. This module is targeted at students who are interested in Statistics and are able to meet the pre-requisites.

2 Detailed Syllabus

2.1 Topics

- Basic Concepts of Probability
  Sample space and events. Permutation and combination. Definition of probability. Basic properties of probability. Conditional probability. Multiplicative rule. Total probability theorem. Independent events.

- Basic Concepts of Random Variables
  Concept of a random variable. Discrete and continuous probability distributions. Cumulative distribution function. Two-dimensional random variables. Joint probability

density functions. Joint cumulative distributions. Marginal and conditional probability distribution functions. Independent random variables. Definitions and properties of mean and variance.

- Some Common Probability Distributions
  Discrete uniform distribution. Poisson distribution. Binomial distribution. Geometric distribution. Negative binomial distribution. Continuous uniform distribution. Exponential distribution. Normal distribution.

- Sampling and Sampling Distributions
  Random sampling with and without replacement. Sampling distributions of the mean and variance. Central Limit Theorem and its applications. Sampling distribution of the difference of two means. The χ^2, t- and F-distributions.

- Estimation Based on Normal Distribution
  Point estimation of mean and variance. Confidence intervals for mean with (i) known variance and (ii) unknown variance. Confidence intervals for the difference between two means (i) for paired data, (ii) with known variance and (ii) unknown but equal variances. Confidence intervals for variance and ratio of two variances with unknown mean.

- Hypotheses Testing Based on Normal Distribution
  Null and alternative hypotheses. Type I and Type II errors. Level of significance. Two-sided and one-sided tests. Critical region. Relationship between two-sided test and confidence interval. Testing concerning mean with (i) known variance and (ii) unknown variance. Tests concerning the difference between two means (i) for paired data, (ii) with known variance and (iii) unknown but equal variances. Tests concerning variance and ratio of two variances with unknown mean.

2.2 References

- Walpole, R. E., Myers, R. H., Myers, S. L. and Ye, K. Probability and Statistics for Engineers and Scientists, 9th edition (2012), Pearson/Prentice Hall.

- Devore, J. L, Probability and Statistics for Engineering and the Sciences, 9th edition (2016), Cengage Learning.

3 Assessment

- 70% Final Exam
  The format is to be determined depending on the Covid situation. TBD by Week 8.

- 30% Quizzes
  There will be four scheduled online quizzes.

4 Teaching Mode

- We will be doing Online Blended Learning, using a mix of pre-recorded videos and live Zoom lessons.

4.1 Lectures

- Pre-recorded lecture videos will be released weekly.
- They are labeled by the week in the Multimedia Channels tool. You can also access them via Learning Flow.
- Lecture notes will be posted on LumiNUS by the chapter.

4.2 Lecture Discussions

- We will be having live lecture discussions via Zoom.
- This will take place on the latter lecture slot of the week. (L1: Fri 12-2p, L2: Thurs 4-6p, L3: Thurs 2-4p).
- Students are expected to have watched the lecture videos prior to attending the Lecture Discussion.
- Lecturers will discuss material related to the lecture videos.
- Students are encouraged to bring questions.
- Please attend the lecture group you have signed up for.
- The Zoom meetings will open at the scheduled time. You can access them via LumiNUS under the Conference tool. It is also linked under Learning Flow.
- The lecture discussion sessions will NOT be recorded.

5 Tutorials

- We will be having live tutorials via Zoom.
- You are expected to attend all your tutorial sessions.
- You are expected to have attempted all questions. Write down your attempt, thoughts and ideas even if you know you don't have the right answer.
- Solutions to the tutorials will be posted after the tutorial session.
- The tutorial sessions will NOT be recorded.

6 LumiNUS Discussion Forum and Shared Resources

- The LumiNUS discussion forum is a useful tool for students to have meaningful dialogues about the course material.
- The instructors will NOT actively participate, but instead will be monitoring the forum.
- Students are encouraged to ask and answer questions.
- We believe that crowdsourcing is powerful, but in the event that misinformation is posted, we will address it in Lecture Discussion/Tutorial time.
- There is an upload folder named "Student Shared Resources" in LumiNUS. Upload articles, links, study aids, and anything that (however remotely) relates to the class. *Please be mindful about copyrights.*

7 Feedback and Contact Info

- You are highly encouraged to send feedback on anything and everything about the course.
- L1 Yu Tao yu.tao@nus.edu.sg
- L2 Lim Chinghway lim.chinghway@nus.edu.sg
- L3 Chan Yiu Man chan.yiu.man@nus.edu.sg
- TA info.
  - To be added.