Stat 330A: Probability and Statistics for Computer Science

Lecture location: Marston 2300

Lecture times: MWF 12:10–1:00pm

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   Office hours: Tu 10:00am-11:00am, and Th 10:00am-11:00am.

Prerequisites: Math 166: Calculus II.

Course description: Topics from probability and statistics applicable to computer science. Basic probability; Random variables and their distributions; Stochastic processes including Markov chains; Queuing models; Basic statistical inference; Introduction to regression.

Learning outcomes:

1. Students will acquire knowledge of topics in probability including rules of probability, counting methods, Bayes' rule, random variables, expectation and variance, and common discrete and continuous distributions. Students will be able to apply these knowledge to some engineering applications such as computing system reliability.

2. Students will be acquainted with stochastic processes including Markov processes and be able to conduct basic analysis, e.g. computing average waiting time of queuing systems such as M/M/1 and M/M/k queue.

3. Students will know fundamental methods for statistical inference such as descriptive statistics, confidence intervals and hypothesis tests.

4. Students will learn about simple linear regression and be able to compute the least square estimates.

Text and references: The optional textbook for this class is *Probability and Statistics for Computer Scientists, Second Edition (2013)*, by Michael Baron. We will cover Chapters 1–4, and most of Chapter 5–9 and 11. Lecture notes prepared by Professor Heike Hofmann and slides by Dr Kevin Kasper based on Professor Hofmann's notes will also be provided on Canvas.

Course webpage: Announcements, homework assignments, solutions, slides, and grades will be posted on Canvas (`https://canvas.iastate.edu`).

Handwritten Lecture Notes: Handwritten lecture notes will be posted here: `https://iowastate-my.sharepoint.com/:o:/g/personal/xdai_iastate_edu/EqOQbdvmLSFGmCmzV-yHPicBV5K5DUtdN1LvHNzS8G631g?e=Jx25H7`. DO NO PRINT OUT THE HANDWRITTEN LECTURE NOTES, since they only look good electronically.

Assessment: Your final course grade is computed based on the following proportions: 20% homework, 50% in-semester exams and 30% final exam.

Homework: Homework assignments will be assigned throughout the semester. Assignments are due in the lecture on the due date. Late homework submissions are given half-credit and are only accepted until the lecture following the due date.

For each graded homework, only three problems will be graded. Two of these three problems will be indicated in advance. On the other hand, the worst homework will be dropped.

Homework is to be completed and submitted individually. Group work is encouraged but all answers must be unique to the student.

Computer Homework: Occasionally there will be ungraded homework questions requiring computer simulation. You can use any programming language to finish these questions, though solutions will be provided in R (`https://www.r-project.org/`) only.

Midterm exams: There will be three midterm exams. You can drop the lowest midterm score, but no make-up exams will be offered. The tentatively midterms dates are September 21 (Friday), October 19 (Friday), and November 14 (Wednesday). Changes, if any, will be announced at least one week before the exam dates. Each exam is 50 minutes, completed in lecture. All exams are cumulative.

Final exam: The University has tentatively set the final exam on Dec. 12 (Wednesday) from 2:15-4:15 p.m.

Dead Week: This class follows the Iowa State University Dead Week policy as noted in section 10.6.4 of the Faculty Handbook:

> `http://www.provost.iastate.edu/resources/faculty-handbook`

There will be one homework assignment due during Dead Week.

Academic dishonesty: The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office:

> `http://www.dso.iastate.edu/ja/academic/misconduct.html`

Disability Accommodation: Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact me to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before meeting with me, you will need to obtain a SAAR form with recommendations for accommodations from the Disability Resources Office, located in Room 1076 on the main floor of the Student Services Building. Their telephone number is 515-294-7220 or email `disabilityresources@iastate.edu`. Retroactive requests for accommodations will not be honored.

Harassment and Discrimination: Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, Student Assistance at 515-294-1020 or email `dso-sas@iastate.edu`, or the Office of Equal Opportunity and Compliance at 515-294-7612.

Religious Accommodation: If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the Dean of Students Office or the Office of Equal Opportunity and Compliance.