# ISE 261 Probabilistic Systems I
Spring 2023

1. **Course Contacts**

    - Class Meetings: TR 8:30 AM – 9:55 AM, Science Library 206
    - Instructor: Dr. Susan Lu
        - E-mail: slu@binghamton.edu
        - Office: R08 at Engineering Building
        - Office hours: M/W: 10:00 AM-12:00 AM
        - Location: Zoom
        https://binghamton.zoom.us/j/7337062769?pwd=elIMQUFIdkNEbzlMUTI3b0Rqd2tGUT09
    - Class Discussion: W 2:20 PM-3:20 PM, Science Library 306
    - Teaching Assistant: TBD
        - E-mail:
        - Office: TBD
        - Office hours: TBD
    - Final Exam:
        - Classroom: TBD
        - Time: TBD

2. **Required Textbook**

    - Devore, Jay L., 2015, Probability and Statistics for Engineering and the Sciences, 9th edition, Cengage Learning. ISBN-13: 978-0137273546. You can also subscribe to the Pearson Plus, if you feel that option is more cost effective for you at https://www.pearson.com/en-us/pearsonplus.html
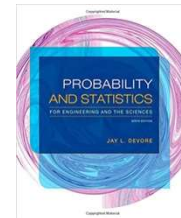
3. **Course Information**

Course Description: This course introduces probability models and statistical methods most likely to be encountered and used by students in their careers in engineering and the natural sciences. This introduction will emphasize, from the outset, that variation is the source from which all statistical methodology flows. Discussion includes the practical aspects of data collection and description statistics with an introduction to the basic concepts of Probability Theory and probability distributions, correlation, point estimation, confidence intervals, and test of hypothesis. Prerequisites: Sophomore standing in the Watson School or consent of department chair.

ABET Student Outcomes:

Introduce: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (1)

Reinforce: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts (4)

Introduce: an ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions

Course Objectives: To gain an understanding the concepts and principles of probability and statistics, and to enhance problem-solving and analytical reasoning skills.
- Lay solid foundation for the following courses
- Master important problem-solving tools

Learning Outcomes: After successfully completing the course, students should be able to do the following:
- Perform descriptive Statistics
- Understand probability theory
- Compare common types of discrete and continuous distributions
- Conduct parameter estimation (point estimation, confidence intervals)
- Perform hypothesis test for single sample and two samples

4. **Tentative Schedule**

Lecture	Date	Content
01	1/17	Chapter 01: Introduction, Descriptive statistics
02	1/19	Chapter 01: Graphical methods
03	1/24	Chapter 01: Measures of central tendency
04	1/26	Chapter 02: Sample space, events and probability axioms
05	1/31	Chapter 02: Permutations and combinations
06	2/2	Chapter 02: Independence and Bayes theorem
07	2/7	Chapter 03: Discrete probability functions
08	2/9	Chapter 03: Discrete RV & Probability Distributions
09	2/14	Chapter 03: Expected value, PDF and CDF
10	2/16	Chapter 03: Distributions
11	2/21	
12	2/23	Midterm 1
13	2/28	Chapter 04: Continuous probability distributions
	3/2	No classes
14	3/7	Chapter 04: Uniform, Normal, Standard normal distributions
15	3/9	Chapter 04: Exponential, Weibull distributions
16	3/14	Chapter 04: Gamma, and lognormal distributions
17	3/16	Chapter 04: Beta and Chi square distributions
18	3/21	Chapter 05: Joint probability functions
19	3/23	Chapter 05: Joint probability functions
20	3/28	
21	3/30	Midterm 2
	4/4	Spring Break
	4/6	Spring Break
22	4/11	Chapter 07: Point estimation, Random sample and Statistical inference

	4/12	Monday class meet instead of Wednesday. No discussion
23	4/13	Chapter 07: Point estimation, Random sample and Statistical inference
24	4/18	Chapter 07: Central limit theorem, normal probability plots
25	4/20	Chapter 08: Sampling distribution, Hypothesis testing
26	4/25	Chapter 08: CI Student T, Chi-square
27	4/27	Chapter 08: Errors and testing
	5/2	Friday classes meet (not Tuesday classes)
28	5/4	
29	5/5-5/11	Final Exam

25 lectures; 2 midterm exams; 1 final exam

- This is a tentative schedule of the class. These dates are subject to change, which will be decided by the instructor based upon the teaching schedule and other conditions, e.g., course cancellations announced by the university.
- **Expectation for Work Outside Class:** This is a 4-credit hour course. Students are expected to spend at least 9.5 hours per week outside class to do homework assignments and prepare for quizzes and exams.
- *The date of the final exam will be scheduled/decided by Binghamton University, which will be announced around the middle of the semester.*

5. Homework Assignments, Quizzes, and Exams

Homework Assignments (HW): There will be assignments and in-class activities (ICA) for each week. While students are welcome to discuss homework problems with fellow students, however, each student must submit his or her own work in the form of a word document or pdf file. Handwritten copies (or scanned version of handwritten submissions) will not be accepted.

Late submission: No late submissions for assignments are allowed.

Quizzes: There will be quizzes during the regular class hours.

Exams: Two mid-term exams and one final exam. Exams focus on recent materials and are not cumulative. No make-up exams will be allowed.

6. Grading

The grading will be determined as follows:
- Assignments and quizzes: 20%
- Midterm Examination 1: 25%
- Midterm Examination 2: 25%
- Final: 30%
- Extra credits: Bonus points can be awarded based on the submission of in-class activities, regular attendance.

Notes:
- No make-ups for homework assignments, quizzes, and exams. For medical emergencies or comparable conditions, please discuss with the instructor.
- When writing up your solutions, you must always explain your answers and show all

reasonable steps. It is your responsibility to convince the grader that you understand how to solve the problem.
- The final grade may not exceed 100 points.

Letter Grade	Weighted Score
A	>= 94
A-	>= 90 and <94
B+	>= 86 and <90
B	>= 82 and <86
B-	>= 79 and <82
C+	>= 76 and < 79
C	>= 72 and <76
C-	>= 65 and <72
D	>= 50 and <65
F	< 50

7. Academic Honesty and Integrity

Students in this course must not violate the Watson School's policy on academic honesty found here https://www.binghamton.edu/watson/about/academic-honesty.html. Please note that the use of Chegg or other similar pay for service homework (and/or other assignments - e.g., exams, projects) providers is a violation of this policy which prohibits, among other things, the submission of other's work as your own.

8. Campus Safety for In-person Classes

Please consider wearing a mask when you live with or have social contact with someone at high risk for severe illness.
- Students with medical or religious exemptions will continue to be required to undergo regular surveillance testing at the University surveillance testing site unless they are in a program that does not require an on-campus presence. The University will no longer offer courtesy surveillance testing to vaccinated students. Home test kits will be available on campus while supplies last.
- Decker Student Health Services will provide diagnostic testing for students with symptoms by appointment.
- Students may request a medical or religious exemption from the vaccination. Students with exemptions will be required to undergo regular surveillance testing at the on-campus site. The process for requesting exemptions has been automated. Find information on how to request an exemption on the Decker Student Health Services website at https://www.binghamton.edu/health/covid-19/index.html.

Should these requirements change, a campus-wide announcement will be made and please refer to the most up-to-date announcement. During this time of intense preparation and to coordinate responses, direct all questions to fall2022@binghamton.edu.

9. **Support Services from Binghamton University**

If you are experiencing undue personal or academic stress at any time during the semester or need to talk with someone about a personal problem or situation, I encourage you to seek support as soon as possible. I am available to talk with you about stresses related to your work in my class. Additionally, I can assist you in reaching out to any one of a wide range of campus resources, including:
- Dean of Students: 607-777-2804
- Decker Student Health Services Center: 607-777-2221
- University Police: On-campus emergency, 911
- University Counseling Center: 607-777-2772
- Interpersonal Violence Prevention: 607-777-3062
- Watson Advising: 607-777-6203
- Office of International Student and Scholar Services: 607-777-2510
- Ombudsman:
    - Main campus: 607-777-2388
    - University Downtown Center office: 607-777-2388
- Services for Students with Disabilities: 607-777-2686 (Voice, TTY)

10. **Accommodations**

Students requesting disability-related accommodations should register with the Services for Students with Disabilities office (SSD). They are the appropriate entity on campus to determine and authorize disability-related accommodations. The office is in the University Union, room 119. Phone number 607-777-2686. For students already registered with SSD, please provide your academic accommodation letter as soon as possible so that we can discuss the implementation of your accommodations.

11. **Civility Statements**

Please be respectful of all students' right to learn without disruptions. In line with this statement, please make an active effort to keep the talking to a minimum during lectures and presentations. Also, make an active effort to either turn cell phones off or turn them to vibrate mode prior to the start of class. Appointments with the instructor should be made in advance.

12. **Email**

You are responsible for all email messages sent by the instructor. Public messages intended for the entire class are sent automatically to campus email accounts (your_id@binghamton.edu). If the student elects to forward campus mail to an off-campus account, the student remains responsible for these messages regardless of whether they are successfully delivered. I will be communicating a variety of important course information to you via email, so I would encourage you to get in the habit of regularly checking your email account. At minimum, you should check your email at least once per day, every day.

13. **Computer Information:**

This course has been designated to use computers. Most class activities will be conducted using laptops. You will need to bring your laptop every class unless otherwise noted explicitly. In general, I assume that each student has a laptop with the appropriate software. The software used in class

can be accessed using bingview (https://bingview.binghamton.edu/). Student users are required to connect to VPN before using BingView.