

ISYE 335: Probability and Statistics for Engineers

Syllabus

Term: Spring 2022

Credit hours: 3

Classroom: EB 241 or online

Time: Tuesday, Thursday 2:00pm - 3:15pm; Asynchronous if online.

Instructor: Dr. Ziteng Wang

- **Office:** EB 240
- **Email:** zwang3@niu.edu

Office hour: Tuesday 3:30pm – 4:30pm, or by appointment.

Teaching assistant: See Blackboard

Course description: (NIU Undergraduate Catalog) Sampling and descriptive statistics; random variables; discrete and continuous probability distributions and its applications to engineering problems; fitting data to distributions; confidence intervals; hypothesis testing using both nonparametric and parametric methods; and simple regression. Emphasis is given to engineering applications.

Prerequisites:

- MATH 230

Textbook:

- *Applied Statistics and Probability for Engineers*, 7th edition, Douglas C. Montgomery and George C. Runger, Wiley, 2018.

Course objective: To provide students with basic knowledge of probability and statistics and their applications in engineering problems.

Learning outcomes: Upon completion of this course, a student should be able to do the following:

- Understand the role of probability and statistics in engineering.
- Understand basics of probability: random variables, discrete and continuous distributions, and their applications in engineering problems.
- Understand basics of statistics: descriptive statistics, parameter estimation, statistical intervals, hypothesis testing, statistical inference, and simple linear regression.
- Have the basic skills of analyzing data by using statistical methods.

Relation to undergraduate program outcomes. This course contributes to the following outcomes of the undergraduate program:

1. An ability to identify, formulate, and solve complex Industrial and Systems engineering problems by applying principles of engineering, science, and mathematics

- 1.4. Applies appropriate science principles to solve complex Industrial and Systems engineering problems.
3. An ability to communicate effectively with a range of audience.
 - 3.2. Communicates information, concepts, and ideas effectively through well-organized and high quality presentations.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
 - 5.1. Shares responsibilities and duties, and takes on different roles when applicable.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.
 - 6.2. Uses and documents measurement techniques to collect data.
 - 6.3. Applies appropriate tools and techniques to analyze data.

Assignments and Grading:

- Homework: 30%
 - Homework must be completed individually.
 - No late homework will be accepted.
- Midterm exam: 30%
 - Date and time: **Thursday 03/10/2022, 2:00pm – 3:15pm**
 - Location: classroom if in-person; take-home if online
 - Format: Closed book. A one-sided 8.5x11 cheat sheet is allowed. Calculator is allowed.
- Final exam: 40%
 - Date and time: **Tuesday 05/10/2022, 2:00pm - 3:50 pm**
 - Location: classroom if in-person; take-home if online
 - Format: Closed book. A two-sided 8.5x11 cheat sheet is allowed. Calculator is allowed.
- Bonus points
 - Bonus points will be available for optional assignments. Details will be posted on Blackboard.
- Each student will receive a letter grade based on his or her cumulative percentage score according to the following scales:
 - A 94 – 100
 - A- 88 – 93.99
 - B+ 82 – 87.99
 - B 76 – 81.99
 - B- 70 – 75.99
 - C+ 64 – 69.99
 - C 58 – 63.99
 - C- 52 – 57.99
 - D 46 – 51.99
 - F 0 – 45.99

Tentative course schedule:

Week	Date	Topics	Reading	Assignments
1	01/17 – 01/23	Course overview; Statistics and probability in engineering	Ch 1	HW 1
2	01/24 – 01/30	Probability	Ch 2	HW 2; HW 1 due
3	01/31 – 02/06	Probability	Ch 2	
4	02/07 – 02/13	Discrete random variables	Ch 3	HW 2 due
5	02/14 – 02/20	Discrete random variables; Continuous random variables	Ch 3, 4	HW 3
6	02/21 – 02/27	Continuous random variables	Ch 4	HW 4; HW 3 due
7	02/28 – 03/06	Joint probability distributions; Midterm review	Ch 5	HW 5 (no due); HW 4 due
8	03/07 – 03/13	Joint probability distributions; Midterm exam	Ch 5, 6	
9	03/14 – 03/20	Spring recess		
10	03/21 – 03/27	Descriptive statistics	Ch 6	HW 6
11	03/28 – 04/03	Point estimation	Ch 7	HW 6 due
12	04/04 – 04/10	Statistical intervals	Ch 8	HW 7
13	04/11 – 04/17	Tests of hypotheses for a single sample	Ch 9	HW 8; HW 7 due
14	04/18 – 04/24	Statistical inference for two samples	Ch 10	HW 9; HW 8 due
15	04/25 – 05/01	Simple linear regression	Ch 11	HW 10; HW 9 due
16	05/02 – 05/08	Additional topics	Ch 12-15	
17	05/09 – 05/15	Exam week		Final exam: Tuesday 05/10 2:00pm - 3:50 pm

Academic integrity: Good academic work must be based on honesty. The attempt of any student to present as his or her own work that which he or she has not produced is regarded by the faculty and administration as a serious offense. Students are considered to have cheated if they copy the work of another during an examination or turn in a paper or an assignment written, in whole or in part, by someone else. Students are guilty of plagiarism, intentional or not, if they copy material from books, magazines, or other sources without identifying and acknowledging those sources or if they paraphrase ideas from such sources without acknowledging them. Students guilty of, or assisting others in, either cheating or plagiarism on an assignment, quiz, or examination may receive a grade of F for the course involved and may be suspended or dismissed from the university.

Each student is responsible to know and observe the university academic regulations that can be found in the Undergraduate Catalog.

Accommodations for students with disabilities: If you need an accommodation for this class, please contact the Disability Resource Center as soon as possible. The DRC coordinates accommodations for students with disabilities. It is located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 (V) or drc@niu.edu.

Also, please contact me privately as soon as possible so we can discuss your accommodations. The sooner you let us know your needs, the sooner we can assist you in achieving your learning goals in this course.

Syllabus change policy: This syllabus is a guide and every attempt is made to provide an accurate overview of the course and its requirements. However, certain circumstances may make it necessary for the instructor to modify the syllabus during the semester for the benefit of the students and the changes may depend, in part, on course progress and students' needs. Changes to the syllabus will be made with advance notice to students and approval by the department.