Carnegie Mellon University
Master of
Software Engineering

17-611: STATISTICS FOR DECISION MAKING
IPE T,R 2:00pm-3:20pm
REO F 5:00pm – 6:20pm
A1 Fall 2025
6 Units

Instructor	Email	Office Location & Hours
Prof. Scott Pavetti	spavetti@cmu.edu	By appointment

Teaching Assistants	Email	Office Location & Hours
Nachiket Agni	nagni@andrew.cmu.edu	TBD
Suriyapriya Selvanathan	sselvana@andrew.cmu.edu	TBD
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Course Description. From the selection of a software package to the prioritization of requirements, decision making is central to the software engineering discipline. This course is designed to acquaint students with the limitations of unaided decision making and propose structured approaches to overcome them. This course is an active learning environment with concepts applied during weekly in-class group exercises, with an introduction to measurement and decision-making theory, to enable students to make better decisions. After completing this course, students will be able to describe the bias that affects the unaided decision-making process and be capable of formulating a decision problem in terms of a matrix of alternatives, preferences and consequences, as well as defining, collecting and synthesizing the data required to make the decision.

Prior Knowledge. An undergrad course on probability and statistics and some experience working teams in a professional or academic setting.

Learning Objectives. After completing this course, you will be able to:

- Recognize some cognitive biases that affect team and personal decision making.
- Use various statistical tools like A/B testing, decision matrices, Kano Analysis, and Monte Carlo simulations to achieve objective outcomes to their specific uses.
- Gain knowledge of and understand the utility of some industrial-strength statistical control frameworks.

Learning Resources. All reading material is provided via Canvas, and there are no textbooks. Some of the course readings are listed below, but the most up-to-date course literature is listed in a week by week reading page under the weekly course modules.

For the remote students:
Attendance for lecture days isn't required as all lectures will be recorded and posted on canvas, though it is encouraged, and all lecture days will be broadcast on Zoom. On in-class exercise days, there will be no recording, nor will there be a Zoom broadcast. The REO section's time will be spent doing the in-class exercise, which requires attendance, so be prepared to commit to attending.

Course and Grading Policies

This course will be graded using pass/fail criteria on assignments as well as class engagement. Results from all assessment types are rolled up into a final grade as outlined in the table below.

Assessment	Final Grade %
Quizzes	20%
In Class Exercises	30%
Analysis Assignments	35%
Final	15%

Grade	Percentage Interval
A-, A, A+	90-92, 93-97, 98-100%
B-, B, B+	80-82, 83-87, 88-89%
C-, C, C+	70-72, 72-77, 78-79%
D	60-69%
R (F)	59% or below

Assignments

- **Analysis Assignments** – In Analysis assignments, you will apply and analyze the course concepts for that week to solve a problem. The use of the technique will be in the context of learning the applications of that technique.
- **Group Assignments** – each week, in a team of other students, you will work together to analyze, apply, and evaluate a scenario with the goal of providing a rigorously made decision to a contrived problem based on industry experience meant to inspire critical thinking and creative use of technique. If you miss the group assignment's attendance, you'll be put into a team with others that have missed the day.
- **Canvas Quizzes** – standard-fare weekly quizzes intended to reinforce weekly reading and lecture material in the form of multiple choice or short answer questions.
- **Attendance** – your team needs you, so attendance will be marked once per week on the group assignment day.

Recording of Class Sessions. All lectures will be pre-recorded and posted to Canvas. The creation of recordings from Zoom class meetings is not planned.

Use of Zoom in the Class. In our class, we will be using Zoom for those students attending remotely. The link is available on Canvas. Please make sure that your Internet connection and equipment are set up to use Zoom and you can share audio and video during class meetings. (See this page for Computing Resources for information on the technology you are likely to need.) Let me know if there is a gap in your technology set-up email myself or the TA's as soon as possible, and we can see about finding solutions.

Sharing Video: In this course, being able to see one another helps to facilitate a better learning environment and promote more engaging discussions. Therefore, our default mode will be to expect students to have their cameras on during lectures and discussions. However, I also completely understand there may be reasons students would not want to have their cameras on. If you have any concerns about sharing your video, please email me as soon as possible and we can discuss possible adjustments. Note: You may use a background image in your video if you wish; just check in advance that this works with your device(s) and internet bandwidth.

Technical Difficulties: From time to time, we all experience unstable internet connections, unstable computers, etc. In those cases, you may find it necessary to turn your camera off. If you experience technical difficulties during class, please let me know via private chat in Zoom prior to turning your camera off. If technical difficulties are a recurring issue, please reach out to your HUB liaison who will help you access the appropriate resources.

Course Schedule. The following schedule provides a general overview of topics and assignments and may be updated during the course! For actual dates and changes, please refer to the online syllabus in Canvas.

No.	Date	Lecture topic
1	8/26	Introduction, bias testing, decision quality, policies explanation
2	8/28	Scales and Exploratory Data Analysis
3	9/2	Surveys, Analyzing Results
4	9/4	Exercise 1 - Survey Construction
5	9/9	GQIM and Metrics
6	9/11	Exercise 2 - GQIM
7	9/16	Measurement Frameworks and Kano Analysis
8	9/18	Exercise 3 - Framework Selection
9	9/23	Process Mining and A/B Testing
10	9/25	Exercise 4 - AB Testing
11	9/30	Monte Carlo and Decision Matrices
12	10/2	Exercise 5 – Decision Matrices
13	10/7	Decision Making in Practice
14	10/9	In-Class Final

Academic Integrity. Honesty and transparency are important for good scholarship. Plagiarism, cheating, and unauthorized assistance, however, are serious academic offenses with serious consequences. AI use or assistance is strictly forbidden for any reason, and this course has a zero-tolerance policy towards AI use or assistance of any kind. Detected AI use will result in an automatic AIV being filed, significant grade penalty and/or failure for the course. Any cheating, plagiarism, unauthorized assistance, or use of AI will result in negative points for the assignment and an Academic Integrity Violation. The second offense will result in course failure and possible dismissal from the program with the exception above for detected use of AI authoring tools.

For a clear description of what counts as plagiarism, cheating, and/or the use of unauthorized sources, please see the University's Policy on Academic Integrity.

If you have any questions regarding plagiarism or cheating, please ask me as soon as possible to avoid any misunderstandings. For more information about Carnegie Mellon's standards with respect to academic integrity, you can also check out the Office of Community Standards & Integrity website.

Accommodations for Students Disabilities. If you have a disability and have an accommodations letter from the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact them at access@andrew.cmu.edu.

Student Well-Being. The last few years have been challenging. We are all under a lot of stress and uncertainty currently. I encourage you to find ways to move regularly, eat well, and reach out to your support system or me if you need to. We can all benefit from support in times of stress, and this semester is no exception.

As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. CMU services are available, and treatment does work. You can learn more about confidential mental health services available on campus at the Counseling and Psychological Services website. Support is always available (24/7) from Counseling and Psychological Services: 412-268-2922.

If you are worried about affording food or feeling insecure about food, there are resources on campus who can help. Email (cmu-pantry@andrew.cmu.edu) or call (412-268-8704) the CMU Food Pantry Coordinator to schedule an appointment.

We must treat every individual with respect. We are diverse in many ways, and this diversity is fundamental to building and maintaining an equitable and inclusive campus community. Diversity can refer to multiple ways that we identify ourselves, including but not limited to race, color, national origin, language, sex, disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Each of these diverse identities, along with many others not mentioned here, shape the perspectives our students, faculty, and staff bring to our campus. We, at CMU, will work to promote diversity, equity, and inclusion not only because diversity fuels excellence and innovation, but because we want to pursue justice. We acknowledge our imperfections while we also fully commit to the work, inside and outside of our classrooms, of building and sustaining a campus community that increasingly embraces these core values.

Each of us is responsible for creating a safer, more inclusive environment.

Unfortunately, incidents of bias or discrimination do occur, whether intentional or unintentional. They contribute to creating an unwelcoming environment for individuals and groups at the university. Therefore, the university encourages anyone who experiences or observes unfair or hostile treatment based on identity to speak out for justice and support, within the moment of the incident or after the incident has passed. Anyone can share these experiences using the following resources:

- Center for Student Diversity and Inclusion: csdi@andrew.cmu.edu, (412) 268-2150
- Report-It online anonymous reporting platform: reportit.net username: *tartans* password: *plaid*

All reports will be documented and deliberated to determine if there should be any following actions. Regardless of incident type, the university will use all shared experiences to transform our campus climate to be more equitable and just.