Probability & Statistics I
Syllabus

MTH 461 Section A
Fall 2024
University of Portland

About the Class

Course Information

- Title: MTH 461: Probability & Statistics I
- Sections: A

Instructor Information

- Instructor: Dr. Alex John Quijano
- Office: Buckley Center 279
- Email: quijano@up.edu

Prerequisites

MTH 202 and MTH 311 with a grade of C- or higher or permission of instructor.

Lectures and Discussions

In-person lectures and discussions will occur synchronously during their scheduled time on Tuesday, and Thursday. Our lectures will typically consist of traditional lectures in the first 20 to 30 minutes of class, then followed by mini-activities in a form of group work, discussions, or worksheets.

The course schedule and location is:

- **Section A:** TuTh 2:30 PM - 3:55 PM, Dundon-Berchtold 230

Recommended Textbooks

This course uses the following two textbooks - which is free to access - for optional reading and practice.

Click on the link to access the resources.

- Speegle D, Clair B (2021). *Probability, Statistics, and Data: A Fresh, Approach Using R*. Chapman and Hall/CRC. https://probstatsdata.com/.
- Blitzstein JK, Hwang J (2019). *Introduction to probability*, 2nd, edition. Chapman and Hall/CRC. http://probabilitybook.net/.

Communication Tools

Class Website

The syllabus, tentative topics schedule, assignments, and all other class materials are posted on the course website.

> You can access the course website at mth-461a-fa24. The website can also be viewed in Teams.

Microsoft Teams

We will be using Teams as the main real-time communication tool for general announcements, assignment submissions, question-answering discussions, and direct messages. I added you to the Teams page already, so you just need to log in using your UP credentials. If not, then send a request when you log in. Let me know if you need any assistance.

> The Teams for this course is MTH-461A-fa24. I recommend that you install the Teams software on your own machine for easy and stable access, instead of accessing Teams on the browser.

Note that most of the content can be accessed in Teams which includes the course website, course Moodle page, Wolfram, and Posit Cloud.

Email

My UP email is quijano@up.edu.

> If you prefer communicating through email, note that I have set up an email filter for this course, and you must put the "MTH 461" keyword in your subject line.

It is easy for me to get notice of your email if you put the keyword in the subject line. Concise and specific messages are helpful, so I know how I can best help you.

Assignment Tools

Moodle

We will be using the course Moodle page for submitting assignments and receiving feedback.

> All assignments must be submitted through Moodle or physically. You are already listed in Moodle for this course using your UP account. The course Moodle page can also be accessed through Teams.

Note that you may submit your assignments physically in-person if you prefer. I will scan and upload your assignments to Moodle.

Posit Cloud

We will be using a computational tool (R) for some assignments. These tools are free and open-source. We will use the Posit Cloud service, an online computing environment.

> Create a free account at Posit Cloud Sign-Up using your UP email. Note that you must use your UP email for me to add you into the course's workspace in Posit Cloud. You will receive an email inviting you into the workspace at the first week of the semester.

R or Python instructions and materials will be provided ad hoc.

Note that the Posit Cloud computing service is free for you but it is metered by computation hours. Please only use the service for course related computations.

The advantage of cloud computing is that you don't need to worry about installation and updates, and I can fix any errors remotely. If you are interested in doing your own computation on your own machine, you can install R or Python environments yourself through R Studio or Jupyter.

Wolfram

We will be using Wolfram Mathematica and Alpha as a computational tool for some assignments. Wolfram Mathematica and Alpha instructions and materials for completing assignments will be provided ad hoc.

- *Wolfram Mathematica* is a powerful computational software system that combines numerical, symbolic, and statistical capabilities. It can solve equations, perform numerical simulations, and analyzing data. It can create graphs, charts, and animations to visualize data and results. It provides functionality of writing custom programs using Mathematica's built-in programming language.

  Mathematica software is installed on every machine in the UP computer labs.

- *Wolfram Alpha* is a computational search engine that provides facts and calculations about a wide range of topics. It can solve mathematical equations of varying complexity. It can create visual representations of data.

  You can access Wolfram Alpha website for free and the website can also be accessed through Teams.

Learning Goals

Description

Probability and Statistics is fundamental in many scientific disciplines. In this course, you will learn the concepts in probability, discrete and continuous random variables, expectation, variance, moment generating functions, known probability distributions, sampling, and estimation. This is a calculus-based probability and statistics course where we find analytical solutions to probabilistic and statistical problems, as well as simulation-based reasoning using R. Students who complete this course will have a calculus-based knowledge of probability theory and statistics and be able to confidently apply these ideas to data.

Learning Outcomes

By the end of the semester, you will be able to:

- Understand the theoretical underpinnings of probability, including conditional probability, independence, and random variables.
- Master the theoretical underpinnings of probability distributions including expectation, variance, and moment generating functions.
- Apply probability theory to model random processes.
- Apply statistical methods to make inferences about population parameters, including point estimation, interval estimation, and hypothesis testing.
- Write clear and concise mathematical solutions to probabilistic and statistical problems.

- Communicate effectively about probability and statistics with other students, instructors, and professionals.
- Work independently and as part of a team to solve probabilistic and statistical problems.

Learning Objectives

Upon completion of the course, you will be able to:

- Define conditional probabilities, independence, and Bayes' Theorem.
- Define random variables and probability functions.
- Calculate probabilities using known probability distributions such as the Bernoulli, Binomial, Geometric, Uniform, Normal, and Exponential Distributions.
- Calculate expected values and variances of random variables, which measure the central tendency and spread of a distribution.
- Use moment generating functions to calculate the moments of a probability distribution and to analyze its properties.
- Compute joint probability distributions for multiple random variables and calculate marginal distributions from joint distributions.
- Estimate parameters of probability distributions using the maximum likelihood method, which finds the parameter values that maximize the likelihood of observing the given data.
- Apply point estimation techniques to estimate population parameters based on sample data.

Academic Support

Help Hours

Dr. Alex John Quijano

- Walk-in Monday to Thursday at 1:00 PM - 2:00 PM, Buckley Center 279
- One-to-One, Buckley Center 279 or in Teams *Click on the link to sign-up for a 15-minute session.*

My walk-in help hours start week 2. Note that you can bring a fellow student with you when you sign-up for a session. Just click the "Add Guests" link when you sign-up, and add in your fellow student's UP email. If you need more than 15 minutes, you can book at least two consecutive sessions.

The Learning Commons

Students can get academic assistance through Learning Commons tutoring services and workshops. The Co-Pilot peer tutoring program provides students with opportunities to work with other students to get help in writing, math, group projects, and other courses. Schedule an appointment to meet with a Co-Pilot (tutor) by visiting the Learning Commons website. Students can also meet with a Co-Pilot during drop-in hours. Check the Learning Commons website or drop by the Learning Commons in BC 163 to learn more about their services. Find a tutor at the Learning Commons to get support on your academic journey.

Math Resource Center

Appointment-based tutoring accepts appointments starting week 1 and sessions start week 2. Visit the Math Resource Center website to sign-up for an appointment. Drop-in tutoring is Monday to Thursday,

3:00 PM - 7:00 PM in BC 163 and starts week 2. Check the Math Resource Center website or drop by the center for more information.

Help Hours Guidelines

It is strongly recommended that you attend the walk-in help hours or set up a one-to-one meeting with the me if you feel like you are falling behind during our in-person class activities, or if you just need to clarify concepts discussed in class. In order to be more productive during a one-to-one meeting (or the walk-in help hours), these are three recommendations before you come in:

- List all gaps in knowledge you have (missed concepts) or list all concepts that were unclear to you during class. We will address them one by one.
- Prepare questions you want answered and be ready to show relevant materials.
- Regarding assignments, prepare to show (a) what are the steps you have tried and (b) what are the errors you encountered and the strategies you have tried.

Note that these are recommendations so that you can get the most out of the help hours allocated for you. If you just want to come in and chat about something else, feel free to do so. If the dedicated time for one-to-one meeting does not work for you, send me a message to set up an appointment.

Collaboration Policy

I expect you to participate in the class through lectures, discussion, labs, and other engagements. I also expect you to make use of opportunities to get help outside of class (help hours, Teams, email, tutoring) if you need help. Concise and specific messages are the most helpful so I know how I can best help you.

Students are encouraged to participate in discussions with their peers (or each other) regarding homework and other assignments. However, each student must take responsibility and ownership of their work and submit their work individually.

Assessment

Assessment Disclosure Statement

Student work products for this course may be used by the University for educational quality assurance purposes. For reasons of confidentiality, such examples will not include student names.

Standards-Based Grading

Learning mathematics takes hard work, thinking what you have learned, and making changes to your understanding. Students will be assessed on their proficiency in mathematics, and they will have opportunities to demonstrate their proficiency, revise their work and reflect on their learning.

This course follows the standards-based grading system which focuses on the mastery of specific learning standards. It is more accurate and motivating than traditional grading systems, and can help to create a more equitable learning environment. Here are some of the key features of this type of grading:

- Focuses on mastery of specific learning standards
- Uses a variety of assessment methods
- Provides feedback to students on their progress
- Helps students to set goals and track their progress

Grading

Each assignment will be graded according to the general grading guide detailed below. Each student will be given feedback on their assignment and learning process to improve their performance. Note that each assignment has its own rubric guided by these general guidelines and the assignment's learning objectives.

Given the following categorical grade, the student's work is able to:

Grade	Rubric Description
Outstanding (O)	Demonstrate full understanding of material, clearly and concisely explains concepts, applies them to solve problems correctly and efficiently, and may extend concepts to new situations.
Excellent (E)	Show approximate understanding of material, may have made minor errors but can correct them and explain reasoning, solves problems correctly, and may need more time or practice for efficiency.
Acceptable (A)	Show some understanding of material but makes errors, can solve some problems, may need help with more difficult ones, need to work on problem-solving skills and reasoning needed.
Needs Improvement (NI)	Show potential but needs more work, made a lot of errors or unable to solve any problems, need to work on understanding material and problem-solving skills.
Needs Major Improvement (NMI)	Little understanding of material and some parts are incomplete or missing. Made many errors, unable to solve any problems, need to work on understanding material from the ground up.
Missing (M)	Work is not submitted or missing

Note that these are categorical grades (not scores).

Final Grades

Assignment	Rank	Grade	A	B	C	D
Exams	1	O	80%	-	-	-
		E	-	70%	-	-
		A	-	-	60%	-
		NI	-	-	-	50%
Homeworks	2	O	100%	-	-	-
		E	-	90%	-	-
		A	-	-	80%	-
		NI	-	-	-	70%
Worksheets	3	Completed	90%	80%	70%	60%

The above table shows the percent of given assignments. These percentages are minimum requirements for each letter grade. The rank determines the importance of each assignment where 1 means high rank and 3 means low rank.

The percentages in the table are not set in stone. I will evaluate your overall performance, including your self-assessments, when making decisions. I will never raise the standards outlined in the table, but I may round down the minimum percentages to help you succeed.

Decisions about +/- cutoffs will be based on two things: your performance on the final exam and your overall achievements.

Assignments

Submission Guidelines

You can submit your assignments physically or online through Moodle. If you decide to submit online, your work can be hand-written or typed, but must be uploaded as a single pdf file. If you had handwritten your answers/solutions on a physical paper, make sure to label it properly and please scan your document using a scanner app for clarity. Suggestions: "Adobe Scan" for Android or iOS.

Worksheets

There will be worksheets for each non-exam week. The purpose of the worksheets is for in-class group work and activities. The group members must submit their completed worksheet individually by end-of-class or end-of-day. Worksheets are graded mostly on completion, and partially on correctness. Your name must exist in your worksheet and the names of your collaborators.

Homeworks

Homework is assigned every week and due every Friday by end-of-day, except for exam weeks. You must do and submit your homework individually. Homework is graded mostly on correctness and completion.

If you have not submitted a homework assignment, which usually means you missed the deadline, that homework is an automatic *M*. If you have received an *M* mark, you can still submit your work and it will be evaluated normally with feedback but you won't have the chance to revise.

Homework Revisions

You can revise your homework for an up-grade, meaning - for example - a grade of "NI" can be up-graded to "A".

Here are the qualifications and requirements for homework revisions:

- A homework grade of "NMI", "NI", "A", or "E".
- The revised homework must be completed, meaning all parts should have your full written solutions. Missing homework is disqualified for revisions, but you can still use them as practice.

Here are the rules for homework revisions:

- Homework revisions are accepted within one week of the homework being returned to you, otherwise the grade is set.
- Late revisions are not accepted unless the instructor allows.

Exams

Exams are given in two parts which are in written and oral forms. Below are the description of each part of the exams.

Written The written part of the exam allows you demonstrate your understanding of the material in written form. This part will be evaluated on the details of your computations and solutions.

Written exams will be graded on 3 components:

Written Component	Description
Methodology	The method should be sound and well-founded. It should be based on a solid understanding of the underlying principles. The method should be applied correctly and consistently.
Reasoning	The solution method should be explained in a clear and logical way. The steps of the method should be justified and explained. The reasonableness of the solution should be justified.
Writing	The solution process should be written in a clear and concise way. The steps of the method should be easy to follow. The graphs/diagrams/equations should be clear and helpful. The mathematical notation should be used clearly and correctly.

Here are the rules for the written part of the exams:

- Written exams are take-home exam and given 24 hours before exam days.
- Written exams are due on exam days.
- Late submissions are not accepted unless the instructor allows.

Oral The oral part of the exam allows you to demonstrate your understanding of the material verbally. It is administered mostly in dialog style during exam days. The oral exam is only ten to fifteen minutes and it consists of one or two problems similar to the written exam with added questions from me. This part will be evaluated on your ability to explain key concepts and navigate through different ways to solve problems, rather than detailed solutions.

Oral exams will be graded on 3 components:

Oral Component	Description
Knowledge	This includes the student's ability to recall and apply mathematical concepts and procedures. The student should be able to answer questions about the material in a clear and concise way, and they should be able to solve problems using a variety of methods.
Communication	This includes the student's ability to explain their thinking clearly, concisely, and timely. The student should be able to use mathematical language fluently, and they should be able to communicate their ideas in a way that is understandable.

Oral Component	Description
Problem-solving	This includes the student's ability to identify and solve mathematical problems. The student should be able to think critically about problems, and they should be able to develop and implement strategies for solving them.

Here are the rules for the oral part of the exams:

- You must sign-up for a time slot on exam days 24 hours in advance.
- You must submit your written exam at the beginning of the oral exam.
- You may have all other resources with you during the oral exam, that includes books and online resources.
- You may not communicate with others during the exam except to me.
- You may not ask conceptual questions to me except for clarifying questions about the problem, and minor computations.

The grade you will receive for exams are a breakdown of your written and oral exam results with detailed feedback.

Here is how you can sign-up for the exam (oral part):

- Probability & Statistics I Exam Sign-Up *Click on the link to sign-up for a 15-minute session.*

Exam Retakes

Your exams can be revised and you can retake both written and oral parts. Exam retakes allows you to have your exams up-graded, meaning - for example - a grade of "NI" can be up-graded to "A".

Exam retake procedure are similar to the original exam. The written part is your revised exam and the oral part is explaining your revisions and responding to feedback from the last oral exam.

Here are the qualifications for exam retakes:

- An exam grade of "NMI", NI", "A", or "E".
- The revised exam must be completed, meaning all parts should have your full written solutions. Incomplete work is disqualified for revisions and retakes.

Here are the rules for exam retakes:

- Exam retakes must be done within one week of the exam being returned to you, otherwise the grade is set.
- If you need to retake an exam more than one week of the exam being returned to you, let me know for a discussion.
- The same written and oral exam part rules apply for exam retakes.

Here is how you can sign-up for the exam (oral part) retakes:

- Probability & Statistics I Exam Retakes *Click on the link to sign-up for a 15-minute session.*

Make-up Exams

You can make-up exams due to extenuating circumstances. Please let me know if you can't make it to an exam day. If you missed an exam day, please let me know as soon as possible to discuss the next steps.

Here are the rules of make-up exams:

- A missed exam day means that you will automatically receive a grade of M for that particular exam.
- You need to have a prior discussion with me before you can schedule a make-up exam.
- Make-up exams by appointment must be scheduled 24 hours in advance.
- Make-up exams must be done within one week of the original exam day.
- If you need to make-up an exam more than one week of the original exam day, let me know for a discussion.

  Here is how you can sign-up for the exam (oral part) make-ups:

  - Probability & Statistics I Exam Make-Ups *Click on the link to sign-up for a 15-minute session.*

Final Exam

The final exam includes the written and oral parts. This exam will be cumulative. Makeup exams are not allowed during finals week. The same written and oral exam part rules apply for the final exam, except that retakes are no longer allowed.

The final exam is on:

- **Section B:** December 11, W 8:00 AM - 10:00 AM, Dundon-Berchtold 230

Expectations

Withdrawal Procedures

It is the student's responsibility to drop the course if he or she is no longer planning on attending the course or filling the other course requirements. In order to drop, the student must use and Add/Drop form available at the Registration Office. If a student does not properly withdraw from a course, he or she may receive an **F** for the course. A properly withdrawn student will receive a **W**. The last day to withdraw is **Monday, November 25th**.

Appointment Cancelation Policies

You can cancel your appointments, but it is strongly recommended that you cancel 12 hours before your scheduled time so that other students can schedule when a spot opens. You can reschedule for a different day and time if you need to.

Please try to show-up to any of your appointments. If you have extenuating circumstances, please let me know as soon as possible to discuss next steps.

Attendance and Participation

Attendance is not tracked. However, participation is highly recommended. You are expected to actively participate in this class. Participation includes coming to class on time, being prepared, being willing to ask questions and share ideas, setting up study groups outside of class, attending tutoring sessions,

posting helpful resources online, and contributing to the Teams discussion channels. Group and individual presentations of ideas is a suggested component of participation.

Absences

Generally, students are expected to attend all class sessions according to the instructor's direction. Students who feel unwell should NOT attend class in person. These students should inform their instructor as soon as possible.

Should the instructor need to miss class, the course may be temporarily conducted remotely. Should the instructor be unable to teach for an extended period of time, the respective department or unit will find a substitute to continue the course.

Late Assignments

You are expected to turn in all completed assignments on time. Circumstances that may disallow you to turn in your work on time - such as a medical reason - are understandable. Please let me know if you are unable to submit your work and have missed the deadline way beyond its original posted date. Because every assignment is an important aspect of your learning in this class, we will discuss when you will turn in the assignment as well as decide upon an acceptable consequence for your turning it in late. I am committed to successfully helping you learn from this course.

Incompletes

An incomplete *I* will only be considered when the quality of a student's work is satisfactory (C- or better), but for some essential reason the course has not been completed by the student. An (I) is reserved for emergency situations only. To request an incomplete, the student must submit a typed, signed and dated letter stating the reason(s) why an incomplete is appropriate. The letter should also contain the conditions for the completion of work. Acceptance of the request shall be at the discretion of the instructor, Department Chair, and/or Dean of the College of Arts & Sciences.

Accessibility Statement

The University of Portland strives to make its courses and services fully accessible to all students. Students are encouraged to discuss with their instructors what might be most helpful in enabling them to meet the learning goals of the course. Students who experience a disability are also encouraged to use the services of the Office for Accessible Education Services (AES), located in the Shepard Academic Resource Center (503-943-8985). **If you have an AES Accommodation Plan**, you should meet with your instructor to discuss how to implement your plan in this class. Requests for alternate location for exams and/or extended exam time should, where possible, be made two weeks in advance of an exam, and must be made at least one week in advance of an exam. Also, if applicable, you should meet with your instructor to discuss emergency medical information or how best to ensure your safe evacuation from the building in case of fire or other emergency. All information that students provide regarding disability or accommodation is confidential. All students are responsible for completing the required coursework and are held to the same evaluation standards specified in the course syllabus.

Code of Academic Integrity

The University of Portland is a diverse academic community of learners and scholars who are dedicated to freely sharing ideas and engaging in respectful discussion of those ideas to discover truth. Such pursuits require each person, whether student or faculty, to present truthfully our own ideas and give credit to others for the ideas that they generate. Thus, cheating on exams, copying another student's assignment, including homework, or using the work of others without proper citation are some examples of violating academic integrity.

Especially for written and oral assignments, students have an ethical responsibility to properly cite the authors of any books, articles, or other sources that they use. Students should expect to submit assignments to Turnitin, a database that ensures assignments are original work of the student submitting. Each discipline has guidelines for how to give appropriate credit, and instructors will communicate the specific guidelines for their discipline. The Clark Library also maintains a webpage that provides citation guidelines at https://libguides.up.edu/cite.

The misuse of AI to shortcut course learning outcomes will be treated as a violation of academic integrity comparable to plagiarism or cheating. Faculty are responsible for including a written "Course AI Policy" in their syllabi that clearly states what they consider appropriate and inappropriate uses of AI in the context of their courses. Students are responsible for using AI in ways that do not detract from the established learning outcomes of the course. All members of the scholarly community are responsible for demonstrating sound judgment in discerning when and how to utilize AI in their work, upholding standards of citation, originality, and integrity.

Please see the University Bulletin for further information: up.smartcatalogiq.com/en/2023-2024/bulletin/.

Course AI Policy

The use of generative AI — such as Copilot, Gemini, or ChatGPT — is encouraged and allowed in all of its capacity. However, students must use these tools ethically and responsibly. To use generative AI responsibly in this class, students should grasp underlying concepts, acknowledge AI's assistance, protect data privacy, verify information, and uphold academic honor code. AI should be seen as a learning aid, not a replacement for critical thinking.

Referencing and Citation Guidelines

In your written work for this course, you must cite all sources of information that you use, whether they are direct quotes, paraphrases, or summaries. The style of citation that you use should be consistent throughout your paper. The citation styles for this course are APA or CSE.

- APA style is used in the social sciences and psychology. It is characterized by parenthetical citations that include the author's last name and the year of publication. For example, "According to Smith (2023), the average height of a man in the United States is 5'10"."
- CSE style is used in the natural sciences and engineering. It is characterized by numbered citations that are listed at the end of the paper. For example, "[1] Smith, J. (2023). The average height of a man in the United States. Journal of Human Biology, 55(2), 123-132."

If you are unsure which citation style to use, please consult with me. You can also find more information about APA and CSE style in the Clark Library citation guidelines: libguides.up.edu/cite

Plagiarism is the act of using someone else's work without giving them credit. It is a serious academic

offense that can result in a failing grade or even expulsion from school. By following these guidelines, you can help to avoid plagiarism and ensure that your work is properly cited.

Mental Health Statement

Anyone may sometimes experience problems with their mental health that interfere with academic experiences and negatively impact daily life. If you or someone you know experiences mental health challenges at UP, please contact the University of Portland Counseling Center in the upper level of Orrico Hall (down the hill from Franz Hall and near Mehling Hall) at 503-943-7134 or hcc@up.edu. Their services are free and confidential. In addition, confidential phone counseling is available at the Pilot Helpline by calling 503-943-7134 and pressing 3. The University of Portland Campus Safety Department (503-943-4444) also has personnel trained to respond sensitively to mental health emergencies at all hours. Remember that getting help is a smart and courageous thing to do – for yourself, for those you care about, and for those who care about you. For more information on health and wellness resources at UP go to https://linktr.ee/wellnessUP.

Non-Violence Statement

The University of Portland is committed to fostering a safe and respectful community free from all forms of violence. Violence of any kind, and in particular acts of power-based personal violence, are inconsistent with our mission. Together, all UP community members must take a stand against violence. Learn more about what interpersonal violence looks like, campus and community resources, UP's prevention strategy, and what we as individuals can do to assist on the Green Dot website, www.up.edu/greendot. Further information and reporting options may be found on the Title IX website, www.up.edu/titleix.

Ethics of Information

The University of Portland is a community dedicated to the investigation and discovery of processes for thinking ethically and encouraging the development of ethical reasoning in the formation of the whole person. Using information ethically, as an element in open and honest scholarly endeavors, involves moral reasoning to determine the right way to access, create, distribute, and employ information, including: considerations of intellectual property rights, fair use, information bias, censorship, and privacy. More information can be found in the Clark Library's guide to the Ethical Use of Information at Ethical Use of Information at libguides.up.edu/ethicaluse.

Diversity and Inclusion Statement

In the study of natural and mathematical sciences, often perceived as objective disciplines aimed at understanding the world, it is crucial to recognize the historical biases embedded within these fields, stemming from a limited set of privileged populations. Acknowledging the potential existence of overt and covert biases within the course, I emphasize that science is a human endeavor necessitating the incorporation of diverse experiences in the pursuit of knowledge and skill. Valuing every student irrespective of background, origin, race, religion, ethnicity, sexual orientation, disability status, etc., I am committed to fostering an inclusive climate throughout the course. Encouraging open communication about concerns or challenges, I assure confidentiality, except for instances of academic integrity violations or sexual harassment, which are legally mandated to be reported. Within our classroom, diversity and individual differences are celebrated as strengths, and the use of mathematics as an analytical tool to challenge power, privilege, and oppression is supported. It is our collective responsibility to create a welcoming space where ideas can be challenged while maintaining respect for individuals.

Probability & Statistics I
Tentative Topics Schedule

MTH 461 Section A
Fall 2024
University of Portland

See Books & Online Resources Lists for the readings & practice materials.

The reading materials are not mandatory but it is encouraged.

The "Reading" column in the table below contains page numbers (Pg.) or chapters (ch.) on which it refers to a label in the Books & Online Resources List. For example "Pg. 1-5 [S]" refers to pages 1-5 of the first item in the list, which is the textbook titled "Probability, Statistics, and Data: A Fresh Approach Using R".

Topics and Materials

Week	Day	Topic	Worksheet	Homework	Reading
1	Tu 8/27	Introduction and Orientation to Probability & Statistics	Review Set Theory & Calculus	-	Syllabus
	Th 8/29	Basic Definition of Probability	TBA	-	TBA
2	Tu 9/3	Counting and Arranging	TBA	Assigned: Homework 1	TBA
	Th 9/5	General Definition of Probability	TBA	-	TBA
3	Tu 9/10	Independence of Events	TBA	Assigned: Homework 2	TBA
	Th 9/12	Conditional Probability &Baye's Theorem	TBA	-	TBA
4	Tu 9/17	Random Variables &Law of Large Numbers	TBA	-	TBA
	Th 9/19	Functions of Random Variables	TBA	-	TBA
5	Tu 9/24	*Review*	Exam 1 Examples	-	Exam 1 Topics
	Th 9/26	**Exam 1**	-	-	-
6	Tu 10/1	Discrete Random Variables &Probability Mass Functions	TBA	Assigned: Homework 3	TBA
	Th 10/3	Bernoulli, Binomial, and Geometric Distributions	TBA	-	-
7	Tu 10/8	Expectation and Variance of Discrete Random Variables	TBA	Assigned: Homework 4	TBA
	Th 10/10	Continuous Random Variables &Probability Density Functions	TBA	-	TBA

Week	Day	Topic	Worksheet	Homework	Reading
8	Tu 10/15	*Fall Vacation*	-	-	-
	Th 10/17	*Fall Vacation*	-	-	-
9	Tu 10/22	Uniform, Normal, and Exponential Distributions	TBA	-	TBA
	Th 10/24	Expectation and Variance of Continuous Random Variables	TBA	-	TBA
10	Tu 10/29	*Review*	Exam 2 Examples	-	Exam 2 Topics
	Th 10/31	**Exam 2**	-	-	-
11	Tu 11/5	Moment Generating Functions	TBA	Assigned: Homework 5	TBA
	Th 11/7	Joint and Marginal Distributions	TBA	-	TBA
12	Tu 11/12	Conditional Distributions	TBA	Assigned: Homework 6	TBA
	Th 11/14	Conditional Expectation and Variance	TBA	-	TBA
13	Tu 11/19	Maximum Likelihood Estimation	TBA	-	-
	Th 11/21	*Review*	Exam 3 Examples	-	Exam 3 Topics
14	Tu 11/26	**Exam 3**	-	-	-
	Th 11/28	*Thanksgiving Vacation*	-	-	-
15	Tu 12/3	Statistical Inference	TBA	-	TBA
	Th 12/5	Statistical Learning	TBA	-	TBA
16	Tu 12/11	Final Exam Section A	-	-	-

Along with textbooks [S] and [B], some of the course materials (contents of worksheets and homework) of each topic was taken from these following sources:

- The elements of statistical learning: data mining, inference, and prediction by Hastie et al. (2009)
- An introduction to statistical learning with Applications in R by James et al. (2013)

Books & Online Resources Lists

Click on the link to access the resources.

Textbooks

[S] Speegle D, Clair B (2021). *Probability, Statistics, and Data: A Fresh, Approach Using R*. Chapman and Hall/CRC. https://probstatsdata.com/.

[B] Blitzstein JK, Hwang J (2019). *Introduction to probability*, 2nd, edition. Chapman and Hall/CRC. http://probabilitybook.net/.

References

Hastie, T., Tibshirani, R., Friedman, J. H., & Friedman, J. H. (2009). *The elements of statistical learning: Data mining, inference, and prediction* (2nd ed.). Springer. https://hastie.su.domains/ElemStatLearn/

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An introduction to statistical learning with applications in r* (2nd ed.). Springer. https://www.statlearning.com/