

COURSE FORMAT	In-Person, CEB 254 MoWe 2:00–3:20pm
INSTRUCTOR'S INFORMATION	Sungju Moon, PhD <b>Primary Contact:</b> Use the <a href="#">Inbox tool</a> within Canvas <b>Email:</b> <a href="mailto:sungju.moon@nevadastate.edu">sungju.moon@nevadastate.edu</a> <b>Office Phone:</b> (702) 992-2725 <b>Office Location:</b> Dawson 223  Please note that all official University communication is conducted using NS-issued email addresses (e.g., <a href="mailto:@students.nevadastate.edu">@students.nevadastate.edu</a> ) in order to comply with the Family Educational Rights and Privacy Act (FERPA). If you need assistance finding or accessing your NSU email account, please see the relevant section on the <a href="#">LASB Course Policies and Guidelines</a> page.
OFFICE HOURS	TuWe 12:30–1:30pm and whenever my office door is open Online meetings by appointment.
E-MAIL & CLASSROOM RESPONSE TIME	You can generally expect a response to e-mails within 24–48 hours (or slightly longer over weekends or holidays). Feedback for completed discussions, quizzes, and assignments depends on the length and complexity of the activity and could take up to 10 days. For questions on the status of a completed assignment, discussion, or test please contact me.
COURSE DESCRIPTION	Probability experiments; sample spaces, discrete and continuous random variables and distributions; mathematical expectation, central limit theorem; hypothesis testing and linear regression. Pre-requisite(s): MATH 182.
REQUIRED TEXT(S)	There are no required texts for this course. The following text is a recommended reference:  Casella, G. & Berger, R.L., <i>Statistical Inference</i> , 2nd Ed., Cengage Learning.
COURSE LEARNING OUTCOMES	After finishing this course, you will be able to: <ul style="list-style-type: none"> <li>• Construct probability models using sample spaces, events, and probability axioms</li> <li>• Work with discrete and continuous random variables, including computing and interpreting probability distributions, cumulative distribution functions, and key distributional families</li> <li>• Calculate and apply expected values, variances, and moment generating functions to characterize random variables and their transformations</li> <li>• Analyze joint, marginal, and conditional distributions, and assess independence and correlation.</li> <li>• Apply the Central Limit Theorem to understand its theoretical significance in statistical inference</li> <li>• Understand the theoretical foundations of hypothesis testing</li> <li>• Communicate probabilistic reasoning through rigorous mathematical arguments and appropriate notation</li> </ul>

PROGRAM  
LEARNING  
OUTCOMES

This course aligns with the following mathematics program learning outcomes.

Program Learning Outcomes (PLO)	Course Assignment or Activity	Level of Attainment
PLO 6 (Personal Development: Communication) Communicate their ideas to others with the appropriate level of rigor and clarity for the audience.	Topics Project	<ol style="list-style-type: none"> <li>1. The core ideas are communicated either incorrectly or incoherently.</li> <li>2. The core ideas are communicated, but the presentation is unclear.</li> <li>3. The core ideas are communicated clearly, but not at the appropriate level for the audience.</li> <li>4. The core ideas are communicated clearly at the appropriate level for the audience.</li> </ol>

CLASS  
SCHEDULE

See Page 8 of the course syllabus for the tentative course calendar.  
All dates are subject to change.

ASSIGNMENT  
DESCRIPTION  
& DUE DATES

**Problem Sets (30%):** Problem Sets will be assigned on a bi-weekly basis. From each problem set, two problems will be randomly chosen to be graded.

*Standard-based grading:* From each submitted assignments, I will sample 1 or 2 problems to grade. They will be graded on a scale of 1–5 as follows:

- 5—Correct solution with excellent writing
- 4—Correct solution but with flawed writing
- 3—Minor errors or omission in the solution with excellent writing
- 2—Major errors in the solution
- 1—Attempt has been made but the solution is incomplete or incorrect
- 0—Little or no progress has been made

Make your solutions as self-contained as possible. If you are referencing a theorem or a definition from class, fully reproduce the formal statement. Your solutions must be typed using  $\text{\LaTeX}$  or Markdown. If you are including a figure, be sure to label it and make clear references to it within your written solution.

Working together on homework problems is strongly encouraged with the following limitations: (1) Each student must submit their own solutions and disclose the collaborators. (2) You may not split the work (“divide and conquer”). (3) Prior to initial submission of your assignment, collaboration is limited to only with students enrolled in this class. Outside help (tutors, family, AI tools, online forums) is not permitted on assigned problems before the initial due date, though you may seek help with problems *similar* to the assigned ones.

**MyFavProbs Presentations (20%; 10% ea.):**

Two “My Favorite Problems” (stylized *MyFavProbs*) sessions will be held prior to each exam. In these sessions, you will present 1–2 problems of your choice in depth. Problems may be selected from assigned problems sets or created by you, provided they cover theoretical foundations from the course (such as proofs of major theorems or applications demonstrating conceptual connections). All problems must be substantial and involve rigorous mathematical arguments.

You are required to upload your presentation materials (notes, slides, etc) including complete problem statements at least a week before your formal presentation to allow time for review. Exam problems will be drawn from the collection of problems presented during *MyFavProbs* sessions.

Regardless of the number of problems presented, your presentation time will be limited to 10 minutes, including Q&A. Consider focusing on the key ideas and mathematical insights rather than routine calculations. You may wish to provide an outline or sketch of your complete solution, then concentrate on the most interesting or challenging aspects.

**Topics Project (20%):** For the final project in this course, you will study a topic in probability and statistics beyond the core curriculum, give a presentation introducing the topic to your peers, and submit an expository paper on what you have learned. You may work individually or in groups of up to three students. You can choose from the following list of topics or propose your own topic with instructor approval:

- Theoretical Foundations of Regression Analysis
- Theoretical Foundations of Analysis of Variance (ANOVA)
- Introduction to Statistical Learning
- Connections Between Probability/Statistics and Other Disciplines
- History and Philosophy of Probability and Statistics
- Ethics and Statistics
- Case Study of Statistics in Practice
- Resampling Methods
- Time series Analysis
- Bayesian vs. Frequentist Framework
- Experimental Design and Randomization Theory
- Algorithms for Generating Random Variables

EXAM  
DESCRIPTION

**Exams (30%):** As this course is designed to establish solid theoretical foundations in probability and statistics, we will hold two closed-book exams to assess your understanding of core concepts.

LATE WORK  
POLICY

If you experience a serious or ongoing medical or extenuating circumstance (e.g., a major medical event, hospitalization, family emergency, or any situation that significantly impacts your ability to attend class for an extended period), please report it through the [Student Absence Notification System \(SANS\)](#).

SANS is not intended for one-time absences, brief illnesses, or situations where you can communicate directly with your instructor. Once a SANS report is submitted, it will be reviewed, and both you and your instructor will be notified. Your instructor will then determine if and how missed or late work can be addressed.

The following assignments may *not* be turned in late for credit without explicit permission from the instructor:

- Problem Sets
- *MyFavProbs* Presentation Materials
- Topics Project Deliverables
- Exams

You cannot receive a passing grade for the course without completing all major assessments, which include exams and mini-projects.

ATTENDANCE  
EXPECTATIONS

There may be days you do not to attend classes or leave early due to past or ongoing crises or distressing circumstances. Disclosure of specific reasons or details is not expected, but it will be helpful if you could communicate with me about instances of missed sessions or work; this is because (1) frequent or prolonged inactivity with regard to course contents will negatively impact your learning, and (2) open communication will help us reformulate missed assignments to suit your situation. Missing five consecutive class sessions or assignments without prior or follow-up notice will prompt me to check in with you for a ‘pulse check’. Please know that I am available to provide resources and connect you to support services.

GRADING  
CRITERIA

Your grade will be determined by the following rubric:  
(Course Point Totals)—100%

- Problem Sets (30%)
- *MyFavProb* Presentations (20%)
- Topics Project (20%)
- Exams (30%)

**Grading Scale (Letter Grade and Point Range):**

A	93% or higher	B-	80%–82.99%	D+	67%–69.99%
A-	90%–92.99%	C+	77%–79.99%	D	63%–66.99%
B+	87%–89.99%	C	73%–76.99%	D-	60%–62.99%
B	83%–86.99%	C-	70%–72.99%	F	less than 60%

**Accessing Grades and Instructor Feedback**

To access your grades and find the instructor’s feedback, click on Grades in the left menu. Scroll through the list until you find the new graded assignment (indicated by the blue dot to the left of the assignment name). Then click on the assignment name. You will see your grade. Below it you can click on Show Rubric to see the marked up rubric. Click on the paper title if you want to download the original document. (The instructor’s marks or comments will not appear on the downloaded document.) Click on the box to the right of the paper title to see the Turnitin report. Click on View Feedback to see the paper marked up with the instructor’s comments/corrections in DocViewer. The instructor’s feedback is on the right. [Accessing Grades](#) will take you step-by-step through how to find all instructor feedback and see the marked-up paper and rubric.

ARTIFICIAL  
INTELLIGENCE  
(AI) POLICY

**What Is AI?** AI tools are applications and other generative technologies capable of producing content (e.g., generating, summarizing), offering feedback (e.g., revising, translating), researching, assisting with coding, or other tasks typically done by humans. Examples include, but are not limited to, ChatGPT, Grammarly, Bing Copilot, Google Gemini, Grok, Answers.AI, Quillbot, Claude AI, DeepL, DeepAI, DALL-E, etc.

**AI Tools Banned on State-Owned Devices.** The State of Nevada has banned ([link](#)) some AI tools (and other technology) due to security or intellectual property concerns. You cannot use these tools on University-owned computers or other devices:

- Grammarly (public version)
- DeepSeek AI

The State updates the banned technology list occasionally, so other tools may be added. You are responsible for checking the most updated list to ensure you are not using any banned tools on state-owned devices.

**AI Use Policy for This Course.**

- *Prohibited Uses.* As a student in this course, you are not allowed to use AI assignments in the following ways:
  - Generating full presentations, reflections, or academic papers
  - Generating problem set solutions
  - Generating plots and graphs used in presentations and papers
  - Submitting wholly AI-created programming code
- *Permitted Uses.* You are allowed to use AI in the following ways:
  - Checking grammar and spelling
  - Tutoring or study help (e.g., generating sample questions)
  - Generating artificial data to be used in term projects (with AI attribution)
  - Research assistance or finding sources
  - Brainstorming or outlining ideas for papers or projects (with AI attribution)

If you are unsure how AI can be used for a specific assignment, talk to the instructor before you get started.

**AI Citation.** This class does not require a specific citation style. The example below, in AMS style, may be used for AI attribution:

[1] OpenAI ChatGPT-version chat response to prompt “Your prompt goes here,” 2025.

In text citation example: “...according to ChatGPT [1]...”

**Consequences for Misuse.** Misuse of AI may result in plagiarism or academic misconduct penalties outlined in the [NS Student Code of Conduct](#) and/or the [LASB Academic Conduct Policy](#) (found under Resources & Policies). Continued misuse of AI in coursework or across courses will result in escalating consequences based on the severity and frequency of the violation, which could include receiving an F in this course, academic probation, suspension, or expulsion.

LASB COURSE POLICIES & GUIDELINES	<p>All courses in the School of Liberal Arts, Sciences, and Business (LASB) are subject to <a href="#">LASB course policies and guidelines</a>. You are responsible for reading, understanding, and abiding by these policies and guidelines.</p>
STUDENT SUPPORT & RESOURCES	<p><b>Academic Success Center (Tutoring).</b> The <a href="#">Academic Success Center (ASC)</a> offers a range of services including free one-on-one and group tutoring sessions where students can review and practice course concepts and relevant study/test taking strategies with trained peer tutors.</p> <p><i>NetTutor Online Tutoring</i>—Did you know you can receive a free on-demand academic support at your convenience when the ASC is closed? You can submit a question or request a drop-in session for a specific subject with an e-instructor. The majority of NetTutor e-instructors have a Master’s or Ph.D. in the field. You can access NetTutor through Canvas by selecting the “NetTutor Online Tutoring” on the left-side navigation bar in each of your courses.</p> <p><b>Writing Center.</b> Supporting every NS student’s ability to improve their process and product, the <a href="#">Writing Center</a> provides trained readers for all writers, all projects, in all disciplines, and during all stages.</p> <p><b>Academic Advising Center.</b> The Academic Advising Center is a dedicated team of Advisors committed to your academic success at NS. By providing the right advice and guidance, we help students meet their educational and personal objectives. Please visit <a href="#">Academic Advising Center</a>.</p> <p><b>Scorpion Success Network.</b> If the instructor determines your performance in this class is placing you at academic risk, you may be referred to a member of the Academic Advising Center. An Academic Advisor will work with you to address issues and develop a student success strategy. Regardless of whether a referral has or has not been made, you are ultimately responsible for tracking your own progress in this course. If you would like to meet with an Advisor regarding any academic struggles you are experiencing, please contact Academic Advising at 702-992-2160 or at <a href="mailto:studentsuccess@nevadastate.edu">studentsuccess@nevadastate.edu</a>.</p> <p><b>Student Wellness Services.</b> If you are struggling with hunger, unstable housing, safety, mental health worries, or ANY other concerns, contact <a href="#">Student Wellness</a>. Email: <a href="mailto:studentwellness@nevadastate.edu">studentwellness@nevadastate.edu</a>   Call (702) 992-2514.</p> <p><b>STAR (Student Transition and Retention).</b> STAR (Student Transition and Retention) is the cornerstone of the student experience at Nevada State University. Our mission is to provide every Nevada State student with continuous support throughout their academic journey. Meet with our team to navigate campus resources, find a student community, develop time management skills and set and achieve personal and academic goals. Click on <a href="#">Student Transition and Retention</a>.</p>

**Disability Resources.** At Nevada State University, we recognize our responsibility and embrace the opportunity to meet the unique educational needs of students with documented disabilities. The staff of the [Disability Resource Center \(DRC\)](#) is dedicated to providing a coordinated program of support services for students qualifying with disabilities under the Americans with Disabilities Act (ADA) and Section 504 Guidelines. Our mission is to ensure that all students qualifying with disabilities have equal access to participate in, contribute to, and benefit from all university programs, classes and activities.

Confidential, sensitive, and individualized services are provided free of charge, on a case-by-case basis.

Any student who believes s/he may need accommodations, based on the impact of a documented disability, should contact the DRC Office to speak privately with the Director of the DRC about specific needs. To make an appointment, please contact the DRC office at (702) 992-2180 or by email at [drc@nevadastate.edu](mailto:drc@nevadastate.edu).

**Veteran Concerns.** If you are a veteran who is struggling academically or have concerns please contact the DRC office at (702) 992-2180 or by email at [drc@nevadastate.edu](mailto:drc@nevadastate.edu).

**Course Schedule**

ALL DATES ARE SUBJECT TO CHANGE

<b>Date</b>	<b>Agenda</b>
Wed, Jan 21	Intro/Syllabus. Unit 1. Probability Foundations: Set theory, Axiomatic foundations
Mon, Jan 26	Unit 1. Probability Foundations: Conditional probability and Bayes' Rule
Wed, Jan 27	Unit 1. Probability Foundations: Random variables
Mon, Feb 2	Unit 2. Distributions and Expectation: Probability distributions and transformations
Wed, Feb 4	Unit 2. Distributions and Expectation: Expectation, moment generating function
Mon, Feb 9	Unit 2. Distributions and Expectation: Discrete distributions
Wed, Feb 11	Unit 2. Distributions and Expectation: Continuous distributions
Mon, Feb 16	President's Day
Wed, Feb 18	Unit 2. Distributions and Expectation: Families of distributions
Mon, Feb 23	Unit 3. Joint Distributions and Dependence: Joint pdfs and marginals
Wed, Feb 25	Unit 3. Joint Distributions and Dependence: Conditional distributions
Mon, Mar 2	Unit 3. Joint Distributions and Dependence: Covariance and correlation
Wed, Mar 4	Unit 3. Joint Distributions and Dependence: Bivariate distributions
Mon, Mar 9	Unit 3. Joint Distributions and Dependence: Some useful inequalities
Wed, Mar 11	MyFavProbs Presentations 1 + Exam 1 Review
Mar 16–20	Spring Break
Mon, Mar 23	Exam 1
Wed, Mar 25	Unit 4. Convergence and Sampling: Mean squared error and bias
Mon, Mar 30	Unit 4. Convergence and Sampling: Inequalities revisited
Wed, Apr 1	Unit 4. Convergence and Sampling: Sample distributions and sampling
Mon, Apr 6	Unit 4. Convergence and Sampling: Convergence in distribution
Wed, Apr 8	Unit 4. Convergence and Sampling: Central Limit Theorem
Mon, Apr 13	Unit 4. Convergence and Sampling: Maximum likelihood estimators
Wed, Apr 15	Unit 4. Convergence and Sampling: Evaluating estimators
Mon, Apr 20	Unit 4. Convergence and Sampling: Hypothesis testing
Wed, Apr 22	MyFavProbs Presentations 2 + Exam 2 Review
Mon, Apr 27	Exam 2
Wed, Apr 29	Topics Presentations 1
Mon, May 4	Topics Presentations 2 <sup>†</sup>

<sup>†</sup>We may choose one of the two available dates here.