



DEPARTMENT OF THE AIR FORCE

THE DEPARTMENT OF MATHEMATICAL SCIENCES

USAF ACADEMY, COLORADO

6 August 2025

MEMORANDUM FOR STUDENTS ENROLLED IN MATH 300Z/356Z/377Z, FALL 2025

SUBJECT: Math 300Z/356Z/377Z Course Letter

1. **Introduction.** Welcome to Math 300Z/356Z/377Z, *Foundations in Data-Driven Decision Making & Statistical Thinking (FD3M)*. This course is designed to provide you with statistical, mathematical and computational tools to answer questions from data by providing a solid foundation in probability and a strong introduction to statistical and descriptive modeling. This is the second iteration of this experimental course, which seeks to become the new core statistics and data science course for all cadets at USAFA.

Course Identity: You are now, just by being here, a statistician and a data-driven decision maker. This course will help us frame out exactly what it means to be a statistician and what it means to make data-driven decisions. We will also work to understand what statistics and probability are and the limitations of data and AI.

2. **Learning Goals.** The learning goals for this course are to use computational and mathematical statistical/probabilistic concepts, with assistance from generative AI, to:
 - a. Articulate the fundamentals of probability models, including discussions about data provenance and the downstream issues that arise due to choices concerning data,
 - b. Create data visualizations and numerical summaries to communicate about data for a variety of audiences,
 - c. Compare and contrast what typical and unusual means using a variety of definitions for centrality and spread,
 - d. Design and execute inferential tasks and precisely communicate the results for a variety of audiences, and
 - e. Detail the basics of the machine learning pipeline, specifically how it relates to linear regression.

Math 300, Math 356, and Math 377 are contributors to the development and assessment of USAFA's Critical Thinking institutional outcome.

3. **Experimental Section.** This is an experimental course in data science and statistics that seeks to replace the current three courses in the USAFA core fulfilling the statistical reasoning requirement. This course aims to provide a common experience for cadets while meeting The Department of the Air Force's articulated several priorities for Airmen and Guardians regarding data acumen. As such, this course will meet all graduation requirements for your major and is designed with your future as officers keenly in mind.

You were randomly selected to join this course based on your eligibility for Math 300, Math 356, or Math 377. This is not a "harder" version of Math 300 nor is it an "easier" version of Math 356 or Math 377. This course is designed so that success in learning the material and earning a high score is not predetermined based on one's major nor based on their prior experience with statistics and

data science. However, this is a new course, and we will be actively seeking your feedback throughout the semester to ensure that we meet our goals for this course.

4. **Course Materials.** We will make extensive use of computational methods which depend heavily on software. We will be using free software called R through a web-based platform called Posit Cloud. Grades and some assignments will be available in Gradescope. Course materials and course communications will be in Microsoft Teams. We prefer Teams as the primary method of communication to instructors.

In addition to assigned course readings and activities, we will utilize Generative AI tools such as ChatGPT and NotebookLM to help us understand concepts, generate and understand code, and interpret models and their output throughout the semester. To do so effectively, we must learn to write and iterate prompts and to validate responses from GenAI tools. These tools will be authorized resources for in-class work and projects, unless otherwise stated. We will not be using GenAI tools for GRs because you need to have a foundation in the course concepts, coding and communicating data analysis.

- a. **Course Text.** The readings for this course will come from four digitally available textbooks:
 - i. **David Diez, Mine Cetinkaya-Rundel, and Christopher D. Barr.** OpenIntro Statistics, 4th Edition. Free PDF available at <https://openintro.org/book/os/>.
 - ii. **Mine Cetinkaya-Rundel and Johanna Hardin.** *Introduction to Modern Statistics*, 2nd Edition. Free web-native version available at <https://www.openintro-ims.netlify.app> (may not work on MissionNet).
 - iii. **Chester Ismay, Albert Y. Kim, and Arturo Valdivia.** *Modern Dive* (v2). Free e-book available at <https://moderndive.com/v2/>.
 - iv. **Bradley Warner, Brianna Hitt, and Ken Horton.** *Computational Probability and Statistics*. Free e-book available at <https://ds-usafa.github.io/Quarto-Book/>.
 - v. *Additional readings provided by the instructor.*
- b. **Other Course materials.** Please invest in a standard 52-card deck and a set of gamer dice that includes at least 4 different types of die (e.g., 6-, 8-, 12-, and 20-sided), something like [this set](#).
- c. **Install/Setup.** Prior to the start of class, please complete the following:
 - i. Join the “FD3M – Fall 2025” workspace on Posit Cloud. Create a paid **Cloud Plus** account using your @afacademy.af.edu email address. The cost is \$5/month to gain access to unlimited project hours/workspaces. <https://tinyurl.com/FD3M-Fall25>
 - ii. Log in to Gradescope and verify that you can see our course: “Math 300Z/356Z/377Z: Foundations of Data-Driven Decision Making & Statistical Thinking”
 - iii. Create an account for accessing NotebookLM via <https://notebooklm.google.com/> (you should only need a free Google account). Create a free account for ChatGPT via <https://openai.com>. Other options include Google Gemini and Claude.ai. You have free access to GPT-4 through Microsoft Copilot using your @afacademy.af.edu email address. Paid versions of some GenAI tools are available for around \$20/month and provide improved access and additional tools. You will **not need** anything beyond free access to NotebookLM and ChatGPT for this course.
 - iv. Download and install R and RStudio on your local computer as a backup for GRs. You should be able to do this by downloading the R bundle from Taniun.

5. **Class.** We expect you to be conversant with the assigned readings prior to each class. The assigned readings (and the associated reading guides) are important learning assets, so use them to prepare for class. This course requires regular and active participation from every student. We will spend class time discussing concepts and working through examples/practice problems as a class, in small groups, or individually. Bring your computer to every class. For class time to be beneficial, you must be prepared and participate in each lesson.
6. **EI.** The instructors for this course are
- Professor Brianna Hitt (Office 6D-140)
 - Professor Jessica Hauschild (6D-186)
 - Lt Col Harris Butler (6D-104)
 - Maj Justin Merrick (6D-198)

You can schedule in-person or virtual EI with any instructor via Teams.

7. **Graded Events.** Your final grade will be based on how well you achieve the five learning goals for the course. Graded events fall into one of three categories: 1) Core Competencies, 2) Application, and 3) Professional Development. Each medal is assessed with one of four marks:
- **Gold** – The student understands the material deeply enough to teach to another person.
 - **Silver** – The student understands the material deeply enough to execute concepts on their own.
 - **Bronze** – The student is making progress towards understanding this concept, but further work is needed.
 - **Cannot Be Assessed** – The student has provided either incoherent evidence of understanding or the medal attempt is incomplete.

The following are brief descriptions of the medal categories and the associated graded events. More specific details will be provided at the time these assessments are administered.

- a. **Core Competencies.** There are 12 concepts that every student leaving this course should have proficiency with. Students will have at least 2 opportunities to demonstrate their understanding of each of these concepts during Graded Reviews (GRs). There are four GRs and a final exam. Each concept is assessed in isolation from the other concepts using a standards-based grading approach.

Each GR will have all medals that we have covered in class available for cadets to demonstrate their current understanding of those medals. Once a cadet is satisfied with the score for a particular medal, they do not have to reattempt questions related to that concept again. Cadets will have the opportunity to attempt each medal at least twice. The fourth GR and final exam will have all 12 core competency medals available.

- b. **Application.** There are three components in the application category: i) specialty concept medals, ii) semester-long group project, and iii) eight homework assignments. The application category has 10 medals.
- i. *Specialty Concept Medals (2 Medals).* In the first half of the semester, you will be asked to select one statistical specialty: communication and visualization, mathematical foundations, computational methods, or statistical extensions. Each of these four specialties have two concept medals associated with them. You will complete a reading guide, mini-project and reflection activity for the specialty medals.

- ii. *Semester-Long Group Project (4 Medals)*. Over the course of the semester, you will work in a small group to explore a data set. The project will involve individual tasks as well as group tasks, and it will leverage a range of skills from the different statistical specialties. One medal will be awarded at Prog. The final product will be assessed with two medals. The fourth project medal will be awarded based on the quality of the feedback you offer your group members.
 - iii. *Individual Homework Assignments (4 Medals)*. There will be 8 homework assignments throughout the semester, with two assigned during each block of the course. The four medals are tied to each pair of HW assignments per block. Homework questions will come from the daily practice problems provided in the course notetakers.
 - c. **Professional Development**. There are three components in this category: i) professional skills, ii) course participation, and iii) reflection. The professional development category has 8 medals.
 - i. *Professional Skills (4 Medals)*. Throughout the semester, you will develop professional skills that relate to your future, both as a military officer and as a life-long learner. Those skills are technical reading and productive group learning. Technical reading will be assessed through daily reading guides. Productive group learning will be assessed through daily group problem sets (GPsets), completed in groups of up to 4 cadets. There are two reading medals and two group work medals. One of each will be assessed at Prog and at the end of the semester. All daily work will be submitted via Gradescope. Completing 90% of reading guides or 90% of GPsets will result in a Gold score for the respective medals.
 - ii. *Course Participation (3 Medals)*. Just before Prog and at the end of the semester, you will have the opportunity to assess your own engagement in the course. Your assessments in combination with the instructor's assessment will be used to assign two of these participation medals. The third participation medal will be awarded based on feedback you give to other cadets in the course on two structured feedback activities.
 - iii. *Reflection (1 Medal)*. There are three reflection assignments throughout the semester. The associated medal is assigned based on the number you complete in good faith.
 - d. **Final Exam**. There is a final written exam that covers all course material. There are no final exemptions for this course. However, a student may choose to complete as many (or as few) of the final exam questions as they wish.
8. **Daily Course Rhythm**. Each lesson of this course will have a pre-class reading assignment with a reading guide. In class, after a short (10-15 minute) mini-lecture, we will be working with the ideas from the readings in small groups to complete the GPsets. If time permits, we will transition to practice problems in the daily notetaker. After class, in addition to reviewing your own notes from the day, we recommend that you work on the practice problems in the notetakers and come to EI to ask questions. Remember that the homework questions are a selection of the practice problems in the notetakers, and it is strongly recommended that you complete the practice problems as close to their associated lesson as possible.
9. **Grades**. This course uses a contract grading system designed to reward mastery and professional growth. Your grade will be determined based on performance in 30 total medals across three key areas: 1) Core Competencies, 2) Application, and 3) Professional Development.
- Each area contributes to an adjusted GPA score, which determines your guaranteed minimum final grade. The Core Competencies form the foundation of your score, while Application and Professional Development serve as refinements.

The following table shows the guaranteed minimum final grade corresponding to GPA points (without rounding):

GPA points	4.0	3.0	2.0	1.0
Guaranteed Minimum Grade	A	B	C	D

Core Competency (12 medals total) – Determines your base GPA score

GPA	Requirement
4.0	11 Gold or Silver, no more than 1 Bronze
3.0	9 Gold or Silver, no more than 4 Bronze
2.0	7 Gold or Silver, no more than 6 Bronze
1.0	5 Gold or Silver, no more than 2 Cannot be Assessed

GPA Adjustment	Application (10 medals total)	Professional Development (8 medals total)
+0.33	7 Gold, no more than 2 Bronze	
+0.16	5 Gold, 8/10 Bronze or higher	7 Gold, remainder Silver
0.00	3 Gold, 6/10 Bronze or higher	5 Gold, remainder Bronze or higher
-0.16	5/10 Bronze or higher	3 Gold, 6/8 Bronze or higher
-0.33		4/8 Bronze or higher

For example, suppose a cadet earns the following:

- Core Competency medals: 9/12 gold and silver (and the rest bronze) → 3.0
- Application medals: 7/10 gold (and the rest silver) → +0.33
- Professional Development medals: 4/8 Gold (and the rest Bronze) → -0.16
- The cadet's final GPA score is $3.0 + 0.33 - 0.16 = 3.17$, guaranteeing a B in the course.

You are encouraged to track your progress and use feedback to aim for the learning outcomes, not just the grade!

10. **Use of Artificial Intelligence/Large Language Model Tools.** We will be using Generative AI (GenAI) tools such as NotebookLM and ChatGPT to assist in our learning throughout this course. The responsible way to use these models is as an augmentation tool for coding, learning, and communication. We must learn to write and iterate prompts and to question and check responses.

Unless otherwise stated, your authorized GenAI resources for all Math 300Z/356Z/377Z assignments completed outside of class are Level 4: Use of GenAI to co-create and/or revise work per the Dean's Guidance for Academically-related GenAI at USAFA. Remember, never copy verbatim the work of another (including GenAI) and submit it as your own, even if you document it as such. The authorized resources for all Math 300Z/356Z/377Z GRs will be Level 0: No use of GenAI because you need to have a foundation in the course concepts, coding and communicating data analysis.

- a. Use of AI tools to learn content is encouraged at any time. (for example, "Explain the bootstrap to an undergraduate Biology major.")
- b. Use of AI for editing your work is equivalent to asking your friend for editorial feedback on your work and should be documented as such. (for example, "Help me to make my confidence interval interpretation clearer and more concise.")

- c. Use of AI to solve a problem or complete an analysis is equivalent to asking your friend to do your homework for you, which is not permitted under the honor code. (for example, “Answer the following question: <INSERT HOMEWORK PROBLEM HERE>.”)
- d. You will be asked to provide an explanation and reflection on how LLMs were used on various assignments in this course. Be certain to document this tool just as you would any other additional resource, and NEVER attempt to pass off someone or something else’s work as your own. Your documentation statement should include the name of the GenAI tool and the following:
 - i. What you provided the GenAI tool (a summary of your prompts),
 - ii. What the GenAI tool provided you (a summary of the output), and
 - iii. How you altered the GenAI tool’s output (e.g., how you iterated on prompts or how you edited the response before using it).
 - iv. A full transcript (link or pdf file) of your interaction with GenAI tools should be provided whenever possible.

Example: I used ChatGPT to help write code for a scatterplot with a regression line. I asked: “How can I plot a scatterplot of height vs weight in R using ggplot2 and add a regression line?” ChatGPT gave me a full ggplot() code snippet. I edited the code to use my dataset name (cadet_data) and customized axis labels and colors.

- e. If your instructor suspects you utilized GenAI tools with insufficient documentation, they will meet with you to discuss, and you will be asked to redo any graded work as deemed appropriate by your instructor and/or the course director. Recurrent issues related to GenAI usage or documentation may result in initiation of the honor process and/or an academic penalty.
11. **Violations of Academics Standards:** In accordance with the Dean’s Policy on Academic Integrity and Documentation and USAFA Instruction 36-3534, *Violations of Academic Standards*, violations of academic standards will result in an academic penalty. Academic penalties are independent of the Cadet Honor System. The default penalty will be no credit for the graded event. Penalties that deviate from this default may be considered on an individual basis.
 12. **Absent/Late Events.** To receive credit for graded events, you must turn them in by the provided deadline. No credit will be provided for late submissions without prior coordination. Absences or late arrivals for GRs must be coordinated with your instructor prior to the in-class graded event. Unexcused absences from GRs will result in a mandatory 25% penalty per FOI 36-173.
 13. **Dignity and Respect.** You are a valuable member of our Academy and deserve to be treated with dignity and respect. Likewise, you are expected to treat your classmates and instructors with dignity and respect. Our goal is to create an environment where everyone is valued and has an equal opportunity to be heard and contribute. Be thoughtful, considerate, aware, forgiving, kind, and willing to admit mistakes. Your instructors will do the same. If you have any concerns talk with your instructor, or go directly to the Department Head, Col Scott Williams, or his Deputy, Lt Col Chris McGrath. There are also Ombuds in DF outside of the Mathematical Sciences Department that will address your concerns. Whatever avenue you choose, please know that Col Williams is committed to dignity and respect for all cadets and faculty.
 14. **Acknowledgements.** Material for this course will come from a variety of sources, including courses here at USAFA and at other colleges. We will acknowledge our sources when possible (noting that at times acknowledgements may have to come after an assignment is completed) and be transparent about our motivations for using materials generated by other teacher-scholars. For example, we

acknowledge that this course letter is based on the Math 300Z/356Z Course Letter from Spring 2025 to maintain alignment with the course designed by Dr. Katherine Kinnaird of Smith College.

15. **Final Comments.** We are confident in your ability to succeed in this course, but we expect you to have a positive attitude, put in the work and take responsibility for your own learning. Stay engaged, make suggestions for improvement, ask questions, and maintain professionalism. It is up to you what you get from the course. If you have any questions or concerns, please don't hesitate to ask for help. I'm looking forward to learning and working with you this semester!

//signed/BDH/4 August 25//

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