



DEPARTMENT OF THE AIR FORCE

THE DEPARTMENT OF MATHEMATICAL SCIENCES

USAF ACADEMY, COLORADO



18 June 2018

MEMORANDUM FOR STUDENTS ENROLLED IN MATH 377, FALL 2018

SUBJECT: Math 377 Course Letter

1. **Introduction.** Welcome to Math 377, Advanced Probability and Statistics. This course is designed to provide you with tools to answer questions dealing with uncertainty by providing a solid foundation in probability and a strong introduction to statistical inference. This course is at a higher mathematical level, in terms of theory and computational requirements, and includes more topics on probability theory than Math 356. The follow-on course, Math 378, will focus on predictive modeling using traditional statistical techniques as well as methods from machine learning; it serves as an introduction to data science.
2. **Learning Goals.** The learning goals for this course are to use modern data science software and statistical/probabilistic ideas for:
 - a. Exploration – input, manipulate, summarize and visualize data
 - b. Inference – draw conclusions about populations based on sampled data
 - c. Prediction – make sound predictions based on collected data
3. **Course Materials.**
 - a. **General Information.** Course materials are hosted on GitHub, a repository hosting site used widely in the Data Science community. You will need to create an account on GitHub. You will be allowed access to the Math 377 GitHub repository, where you can find the syllabus, course letter, and other relevant material.
 - b. **Course Text.** The textbook for the course is Computational and Inferential Thinking: The Foundations of Data Science by Ani Adhikari and John DeNero (available for free online at <https://www.inferentialthinking.com>). This text provides an introduction to inferential statistics in the context of data science in the Python programming language.
 - c. **Computers/Software.** We will make extensive use of the computer so bring it to class every lesson. We will be using a free software package called Python. This package is an interpretive language and will require more skill than just point-and-click. We will primarily use Jupyter notebooks, but I encourage you to explore Spyder as well. Both are part of Anaconda, which you will install on your computer (<https://www.anaconda.com/download/>), version 3.6.
 - d. **EdX.** This course is modeled after “Data 8: The Foundations of Data Science,” a course offered at UC Berkeley. EdX hosts an online version of this course (<https://www.edx.org/professional-certificate/berkeleyx-foundations-of-data-science>), divided into three parts. As part of Math 377, you will audit these courses, giving you the ability to watch the videos and take part in the activities. In order to audit these courses, you will need to create an edX account.
4. **Preparation.** At USAFA, we like to emphasize critical thinking and independent learning. We don’t want to spend too much class time lecturing. We would rather assume that you can make a decent

effort preparing for each class; we can spend class time working through example problems. Complete reading and video assignments prior to class so that you will be prepared for the discussion of the problems.

5. **Course Policy Expectations.** You are responsible for being familiar with the policies described or listed below.
 - a. USAFAI 36-2014 documents the order of precedence of cadet activities. If you have an obligation that requires you to miss class, send your instructor an e-mail at least one lesson in advance with the SCA number and text along with the date or lesson you want to miss. If the SCA requires approval, ask for it; if the SCA requires coordination, then state you are coordinating the absence.
 - b. At the end of an in-class graded event, your instructor will stop the event with the command ‘**Cease Work!**’ **No work, writing or erasing on the examination thereafter is permitted.** If work, writing or erasing continues after the cease work command, then a violation of academic standards as defined in USAFA Instruction 36-3534 has occurred.
 - c. Cadets must be familiar with the Dean’s Policy on Academic Integrity and Documentation, the Dean’s letter on Academics with Honor, and the Dean’s Classroom Standards Letter.
6. **Graded Reviews.** GRs will be based on materials from the Data8 sequence and your homework submissions. The only authorized resource is a blank Jupyter notebook. You are responsible for scheduling make-ups at least one lesson prior to being absent.
7. **Project.** There is one individual effort project in this course, divided into two parts.
8. **Homework.** Homework problems will be assigned during each lesson. You will be given time during class to work on homework problems, but you will be expected to complete and professionally present these problems in a Jupyter notebook that will be hosted on your own GitHub repository. We will check your repository at 5 pre-determined times throughout the semester, and once at the end of the semester. Each check is worth 25 points except for the last one, which is worth 50. Your homework grade will be based completion and accuracy of your Jupyter notebooks.
9. **Final.** There is a final examination that covers the entire course. There are no final exemptions.
10. **Grades.** If you want to guarantee an “A” grade, you will need to earn at least 90% of the total points. You will need at least 80% to guarantee a “B” and 70% to guarantee a “C”. If you finish below a 60% average, you will most likely fail the course. The distribution of the course points are as follows:

Graded Events	Points per graded event	Total Points	Overall Percentage
GRs (3)	125	375	37.5%
Project (2)	100	200	20%
HW-Checks (5)	25	125	12.5%
HW-Final	50	50	5%
Final Exam	250	250	25%
Total		1000	100%

11. **Final Comments.** If you have any questions or concerns, don’t hesitate to ask for help.

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