Data Driven Decisionmaking (Fall 2017, APSC 490 (COLL 200))

Schedule
Tuesday and Thursday 9:30AM to 10:50AM *Phi Beta Kappa Hall 221*

Instructor
Dr. **Dan** Runfola
danr@wm.edu
ISC 1269
Office Hours: 11-1P R
757.221.1970

Please let me know if you have any documented disabilities that may impact your performance in this class.

Course Description: For the increasing volume of information being produced to be useful in decision-making processes, it needs to be systematically organized and analyzed. This course will provide students with an opportunity to apply quantitative methods to a wide variety of real-world problems defined by decision makers from federal and international policy making groups. Course work will include applying a wide set of techniques (such as the analytic hierarchy process, ordered weighting averaging) which integrate human preferences and perception with quantitative information, with an emphasis on uncertainty. Students will learn about and consider the challenges associated with data reduction how to balance between the limits of human perception, the value of additional information, and temporal constraints imposed by the decision making process.

Prerequisite(s): None.
Credit Hours: 3

Materials:
A free SciClone account is needed in order to access the William and Mary High Performance Cluster (HPC). Registration can be started at https://hpc.wm.edu/acctreq/ .

You must bring a laptop to class each day unless otherwise noted during lecture.

Course Objectives:

1. Provide students with a critical understanding of the decision making process and the use of data and intuition on short deadlines.

2. Develop students ability to communicate findings, analysis, and visualization skills for future courses (and jobs).
3. Expose students to real-world problems that are being engaged with by contemporary problem solvers and decision makers.
4. Provide an opportunity to earn credit towards the COLL 200 requirement in the Culture, Society, and the Individual domain (passing grade required).

Grade Distribution:

Reading Assignments	10%
Projects	60%
Final Report	30%

Letter Grade Distribution:

>= 93.00	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	<= 59.99	F

.

Time Commitment: Excelling in college level course work typically requires on average three to four hours per credit per week. Since this is a three credit course, in addition to the time we meet as a class each week, you should expect to spend nine to twelve hours on average reading, writing, or otherwise preparing for this class on a weekly basis.

Attendance: This class does not have an attendance policy. However, it will be difficult to learn enough to pass the class without regular participation, as the majority of course content relevant to tests and assignments will be covered in class.

Discussions and Reading Assignments: Most lecture sessions will begin with a discussion of the assigned materials. As such, most weeks students are required to write a short summary (no more than 1 page) reflecting on a given weeks assigned readings - these summaries can represent questions the material raised, commentary, or critiques.

Classroom Behavior: Please remain civil during discussions to promote the open exchange of ideas and foster a culture of open dialogue. Please bear in mind that all students are entitled to their own opinion. You are expected to listen attentively to each person speaking. Please refrain from eating during class (and, if you must, make sure it isn't loud!).

Teacher-student conferences: Students performing at a C level or below are required to schedule a meeting with the instructor to discuss class performance.

Late / Poor Performance Policy: Assignments will not be accepted late, excepting in documented circumstances (i.e., an illness with a doctor's note).

Final Project: The final report will involve the application of the skills taught throughout the

semester, and will represent your ability to provide an answer to a real-world question using the data and skills at your disposal. It will include a 5 page written report (inclusive of data visualizations and tables) designed as an executive summary for a decisionmaker.

Important Dates: The add and drop deadline this semester is September 8th, and withdrawal deadline is October 27th.

Do not cheat!

Academic dishonesty is taken very seriously. Make sure to cite all of your work, and do not turn in work that is not yours! Cases of academic dishonesty will be evaluated and acted upon in accordance with William and Mary policies, which can be found at http://www.wm.edu/offices/deanofstudents/services/ studentconduct/

Course Outline:
The course outline can be found below. The weekly content might change as it depends on the progress of the class.

Week	Content
Week 1	• 8/31 - Introduction
Week 2	• 9/5 - Eric Walter, HPC Account Setup; 9/7 - Interactive Learning
Week 3	• 9/12 and 9/14 - Asking the Right Questions • Reading (read before 9/12): Critical Questions for Big Data • Reading (read before 9/14): Algorithmic Accountability • Project 1 assigned, due midnight Fri Sept 22 - Defining and Simulating Uncertainty.
Week 4	• 9/18 and 9/21 - Non-traditional Data Sources • Reading (read before 9/18): "One Vast Index": Google Book Search • Reading (read before 9/21): Content Analysis in an Era of Big Data • Project 2 assigned, due midnight Fri Oct 6 - Retrieving Data from Non-traditional Sources
Week 5	• 9/26 and 9/28 - Picking the Right Data • Reading (read before 9/26): The parable of Google Flu • Reading (read before 9/28): Salmon and Red Herrings • Reading Assignment 1 due by Midnight Friday, September 29th.
Week 6	• 10/3 and 10/5 - Picking the Right Models • Reading (read before 10/3): An Introduction to Model Selection • Reading (read before 10/5): Model Selection: An Integral Part of Inference • Project 2 due midnight, Friday October 6th.
Week 7	• 10/10 and 10/12 - Distributional Assumptions • Reading (Read before 10/10): Same Stats, Different Graphs • Reading (Read before 10/12): The Insignificance of Statistical Significane Testing • Project 3 assigned, due midnight Monday October 23th - Integrating Disparate Data Sources
Week 8	• 10/17 - No Class (Fall Break) • 10/19 - Data Visualization (No Reading) • Project 3 due by midnight, Monday October 23. • Project 4 assigned, due midnight Friday 11/3 - Simulating a Solution

Week	Content
Week 9	10/24 and 10/26 - Quantifying Uncertainty - Reading (Read before 10/24): Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis pg 1-12. - Reading (Read before 10/26): Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis pg 13 - 24. - Reading Assignment 2 due by Midnight Friday, October 27th
Week 10	10/31 and 11/2 - Human Perception and Data Manipulation - Reading (Read before 10/31): Belief in the Law of Small Numbers - Reading (Read before 11/2): Visual Quality Metrics and Human Perception - Project 4 due by Midnight Friday, November 3rd. - Project 5 assigned, due midnight Friday 12/1 - Solution Set Optimization with Decisionmaker Input
Week 11	11/7 and 11/9 - Human Perception in Decision and Policymaking - Reading (Read before 11/7): Known Knowns, Known Unknowns, Unknown Unkowns: The Predicament of Evidence-Based Policy - Reading (Read before 11/9):The Monty Hall Problem - Reading Assignment 3 due by Midnight Friday, November 10th.
Week 12	11/14 and 11/16 - Nonparametric Modeling in Decision Making - Reading (Read before 11/14): Of Prediction and Policy - Reading (Read before 11/16): Dealing with Nonnormal Data - Reading Assignment 4 due by Midnight Friday, November 17th.
Week 13	11/21 - Hands on Learning, 11/23 - No class (Thanksgiving Break)
Week 14	11/27 and 11/30 - Communicating with Data - Reading (Read before 11/27):Distilling Meaning from Data - Reading (Read before 11/30): Social Influence of Big Data (a 61-million person experiment) - Project 5 due on Friday, December 1st by midnight.
Week 15	12/5 and 12/7 - Trust, Data, Decisions and Society - No reading assignment due this week. - Final project assigned, due on December 17th by midnight.
Final Project	Due on December 17th by Midnight