

COSC/MATH/MSCS 4931/5931: ADVANCED DATA SCIENCE

Spring 2018

Instructor:	Shion Guha	Office Hours:	MW 5-6:30 pm
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Description: This course focuses on developing data products and services within organizations. Parts of this course will be co-taught by senior data scientists from Northwestern Mutual as part of integrating class knowledge with best practices in industry. We will focus on the Javascript/D3/SVG stack as a lens of inquiry into interactive, data-driven, visual applications.

Prerequisites: cosc 1010 (intro programming) and math 4720 (intro statistics) or equivalent. It is helpful, but not required to have taken a data mining or machine learning class previously. You will write code everyday in class so please plan accordingly.

Class: MW, 6:30-7:45 pm, 412 Cudahy Hall

Github: <https://github.com/shionguha/cosc4931-advdatascience-sp18>

Piazza: <https://piazza.com/class/jcfbhqmuw6o4mv>

Books: There are no **required** textbooks for this class. Let's all save some money! If you'd like, you can purchase/borrow/rent [d3.js in action by elijah meeks](#). This is not mandatory.

Objectives: This course aims to develop skills that can translate to building data products and services within organizations. At the end of the course, a successful student should be able to:

- wrangle and process data using the Javascript/D3 stack,
- implement statistical models to understand data,
- understand and implement theories of data visualization,
- build interactive, data-driven web applications that use data in useful ways for organizations.

Timeline:

- Jan 17: introduction to the course; policies and expectations
- Jan 22-24: guest lecture by dave pahl (nml) on analytics lifecycle; very quick introduction to javascript
- Jan 29-31: introduction to svg and d3
- Feb 05-07: d3 imports and scales; agile analytics lecture by dan fuhrmann and matthias jonas (nml)
- Feb 12-14: d3 axes and plots
- Feb 19-21: d3 maps: projections and choropleth
- Feb 26-28: infonomics lecture by dan fuhrmann and matthias jonas (nml); perception and usability
- Mar 05-07: introduction to data visualization; initial project presentations
- Mar 10: **mid-term paper due!**

- Mar 19-21: linear models: loss functions and interactions
- Mar 26-28: visual analytics guest lecture by doug locke (nml)
- Apr 04: linear models: least squares and gradient updates
- Apr 09-11: naive bayes and computational stylometry
- Apr 16-18: clustering: k-means focus
- Apr 23-25: bootstrapping, randomization and permutations
- Apr 30-02: perceptron;**final project presentations**
- May 12: **final paper due!**

Grading Policy: Initial Project Presentation (10%), Mid Term Project Submission (20%), Final Project Presentation (20%), Final Project (30%), Class Performance (20%). This course will **not** be graded on a curve. The final grades will depend on the following scores:

A: 96 - 100; A-: 91 - 95; B+: 86 - 90; B: 81 - 85; B-: 76 - 80; C+: 71 - 75; C: 66 - 70; C-: 61 - 65; D+: 56 - 60; D-: 51 - 55; F: 0 - 50;

There are no regrade requests.

Course Policy:

- You are responsible for your own progress. Please check your marquette email, the course github repo and piazza about course announcements and news regularly.
- This is a course that utilizes active learning principles. As a result, there are no traditional lectures and you will be required to do readings for class everyday before arriving. These readings (for any week) will be posted the previous thursday by 12:00 pm except the first week, when it will be posted on saturday. You will be required to post reading responses on piazza as part of class participation.
- As part of active learning, you are required to participate in class activities. There will be individual and group learning every day followed by immediate, in-class evaluation. You will be required to evaluate your peers.
- You are expected to ask, discuss and contribute to questions on piazza. Not only does this help you and enrich the course, but this will also count towards your class performance grade.
- Please bring a computing device everyday to class. We will be writing code together everyday. This is necessary.
- If you don't already, each of you will create your own free [github](#) accounts to maintain your project and any code you write in class. This is part of a data science project's lifecycle and is expected to be shown to employers by data science job applicants.
- All submission of papers/project will be online via d2l. Any submission after the deadline will be considered late. I will post an exemplar and demonstrate in class, the right way to submit your mid term project.
- You must cite every reference in your papers and every library (if used) in your project in [ACM style](#). Failure to do so will be regarded as a violation of academic integrity. Please refer to the section on academic integrity for more details.
- The initial project paper should a maximum of 4 pages (excluding references), ACM extended abstract style adhering strictly to the [current CSCW conference norms](#). It will be due at 11:59 PM local time. I will inform you about the expected content at an appropriate time.

- The final project paper should a maximum of 6 pages (excluding references), ACM extended abstract style adhering strictly to the [current CSCW conference norms](#). It will be due at 11:59 PM local time. I will inform you about the expected content at an appropriate time.
- Regular attendance is essential to an active learning process. A student who incurs an excessive number of absences may be withdrawn from the class at the instructor's discretion.
- Please make sure your cell phone is turned fully off, or silent. No texting, reading emails, playing games, or anything else. I will reserve the right to ask you to leave the class if you are being distracting or disruptive.

Ott Memorial Writing Center: The Ott Memorial Writing Center offers free one-on-one consultations for all writers, working on any project, at any stage of the writing process. Marquette's writing center is a place for all writers who care about their writing, because every writer can benefit from conversation with an interested, knowledgeable peer. Writing center tutors can help you brainstorm ideas, revise a rough draft, or fine-tune a final draft. You can schedule a 30- or 60-minute appointment in advance (288-5542 or www.marquette.edu/writing-center), but walk-ins (in 240 Raynor or our other satellite locations) are also welcome. The Ott Memorial Writing Center also offers free workshops and hosts writing retreats.

Academic Integrity: Marquette University takes academic integrity very seriously. This is a core part of who we are as reflected by our Jesuit values. All students are required to take the [Academic Integrity Tutorial](#). If you haven't, please go take it right now. All students are required to adhere to the [Honor Pledge](#) and follow the Honor Code. Please familiar yourself with the [Academic Integrity](#) website. There is a lot of useful information there.

I take a zero tolerance policy with violations of academic integrity. All papers and projects are run through a plagiarism detection software. If you are flagged, be assured that we will have a conversation. Let's not have that conversation shall we? If I determine that you have indeed violated academic integrity, you will receive a failing grade for that component of the course or for the entire course depending on the nature and severity of the violation. Please help me to make sure that there are no such incidents.

Accessibility Policy: If you have any accessibility needs, please contact [Office of Disability Services](#) (ODS) to register them as soon as possible. ODS works with students with documented disabilities to provide accommodations for their educational needs. The course has been designed for multiple different styles of learning. However, if you have any specific learning styles that you want me to know about which would not be addressed by AES, please reach out to me within the first week of class so I can try to accommodate.