

MTH 448/563: DATA-ORIENTED COMPUTING (4 CREDITS)
SPRING 2018

COURSE INFORMATION

Instructor: Name: Dane Taylor
Office: 311 Mathematics Building
Phone: 716.645.8796
Email: danet@buffalo.edu

Lecture: T/R 9:30 - 10:50 AM Math 250

Office Hours: W 9:30 - 10:50 AM
F 9:30 - 10:50 AM

Prerequisites: MTH 337 (or instructor approval)

Webpage: <http://www.buffalo.edu/~danet/Sp18/MTH448/>

COURSE DESCRIPTION

This is a hands-on lab-style class, focused strongly on technical skills. You need to bring a laptop computer with you to class every day. If you do not have one, I will do my best to provide one for you. You will be spending a large fraction of the time in class writing computer code and manipulating data.

Major topics:

- Pure Python data wrangling (string-splitting, regular expressions)
- Structured data formats (json, xml, ...) and validation
- Data visualization
- Relational databases and SQL
- Python Pandas data analysis library
- Machine learning, supervised and unsupervised
- Geographic Information Systems software (GIS)
- Map-Reduce - a paradigm for large-scale data analysis

Application areas may include:

- Bioinformatics
- Economics
- Geophysics
- Public health
- Social networks
- Urban and regional planning
- Web mining

Expectations:

- Memorization effort, as in a foreign language class
- Collaboration with your classmates

Active participation in class
Self-driven exploration of class topics
Extensive writing of formal reports

COURSE REQUIREMENTS

Attendance: Attendance for lectures is mandatory, and will be tracked through your participation in pop quizzes. You are responsible for all information conveyed during the lectures, which might cover additional material not found in the textbook. If for some reason you must miss a class, you must discuss with me in advance. You will be responsible for learning the material covered during class. Classes missed due to illness require a note from your doctor.

Weekly homework assignments: Homework is assigned weekly and will be due Saturday nights by midnight.

Homework will be submitted to UBLearn.

GRADING POLICY

60%	Formal reports (Jupyter Notebook format)
20%	Quizzes, not necessarily announced in advance
20%	Homework, not necessarily announced in advance

A grade of incomplete (I/IU) indicates additional coursework is required for the course. For a full description of the Undergraduate Incomplete Grade Policy, see <http://undergradcatalog.buffalo.edu/policies/grading/explanation.shtml#incomplete>.

TECHNOLOGY IN THE CLASSROOM

The penalty for any and each instance of non-class-related use of computer, phone or tablet in class is 1/3 of a letter grade on your overall course grade.

SCHEDULE

Week	Topic
1 1/30/17	web scraping and text mining
2 2/6/17	text mining and Numpy
3 2/13/17	regular expressions
4 2/20/17	pandas and json
5 2/27/17	colormaps, choropleths
6 3/6/17	xml and schemas
7 3/13/17	sql
Spring Break	
8 3/27/17	sql
9 4/3/17	feature extraction
10 4/10/17	perceptrons, support vector machines
11 4/17/17	clustering and kmeans

12	4/24/17	pandas
13	5/1/17	graph mining and GIS
14	5/8/17	neural networks

NOTE

The instructor reserves the right to modify the syllabus and schedule as necessary during the course. Any modifications will be announced during class and a current version of the syllabus will be maintained on UBLearn.

ACADEMIC INTEGRITY

Academic integrity is a fundamental university value. Through the honest completion of academic work, students sustain the integrity of the university while facilitating the university's imperative for the transmission of knowledge and culture based upon the generation of new and innovative ideas. For a full description of the Undergraduate Academic Integrity Policy, see the following webpage:

<http://undergrad-catalog.buffalo.edu/policies/course/integrity.shtml>

ACCESSIBILITY RESOURCES

If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources, 25 Capen Hall, 645-2608, and also the instructor of this course. The Office of Accessibility Resources (<http://www.student-affairs.buffalo.edu/ods/>) will provide you with information and review appropriate arrangements for reasonable accommodations.