Boston University Metropolitan College

NOTE: The template below lists the minimum requirements for all syllabi at Metropolitan College. Instructors may add to this as their course and instruction styles require. Please discuss with your department chair any department-specific requirements, as well as questions you may have regarding writing your syllabus.

ALL SYLLABI MUST BE SUBMITTED EACH SEMESTER TO THE DEAN'S OFFICE IN ADDITION TO THE DEPARTMENTS.

Course Title: Data Science with Python

Course Number: BU MET CS 677

Course Format: On Campus/Blended

Instructor Name: Eugene Pinsky
epinsky@bu.edu

Computer Science Department,

Metropolitan College, Boston University

1010 Commonwealth Avenue, Room 327,

Boston, MA 02215

Course Times: Monday 6:00 – 8:45
HAR rm. 304

TA/Grader: TBA

Office hours: by appointment

Course Description

At the present time, there is a growing need for specialists with background in Python who can apply data science methods to practical problems at their workplace. Working in data science requires an understanding of

many interdisciplinary concepts, involves data mining and application of various methods.

The proposed course is designed to fill this need. Students will learn major Python tools and techniques for data analysis. There are weekly assignments and mini projects on topics covered in class. These assignments will help build necessary statistical, visualization and other data science skills for effective use of data science in a variety of applications including finance, text processing, time series analysis and recommendation systems. In addition, students will choose a topic for a final project and present it on the last day of class.

The proposed course can be taken by students with not exclusively computer science backgrounds who have basic knowledge of Python.

Books

Required:

"Python for Data Analysis", by W. McKinney, O'Reilly Publishing, 2017 (2-nd edition), ISBN-13: 978-1491957660, purchased from Barnes & Noble

Recommended:

"Python Data Analysis" by Armando Fandango, Packt Publishing, ISBN-**13:** 978-1787127487

"Python Data Science Handbook" by Jake VanderPlas, O'Reilly Publishing, ISBN-13: 978-1491912058

Give complete citation, as well as where to purchase (Barnes & Noble or alternative)

Courseware
Blackboard
Course Notes

Class Policies

1) **Attendance & Absences** – clearly state your attendance policy, limit to absences, etc. List all unusual required meetings (e.g. exhibits, guest lectures, field trips, etc.)

2) **Assignment Completion & Late Work** – detail your policy regarding how students should submit completed assignments (in person, by email, on courseware site, etc.), as well as how you will address late work.

Weekly programming assignments submitted through blackboard on-line. Late homework is accepted with 50% penalty. Final projects are submitted through blackboard on-line. Students will present their projects on the last day of class. Both quiz and final are closed-book and are in-class

3) **Academic Conduct Code** – Please use the following wording, or an equivalent, in your syllabus: "Cheating and plagiarism will not be tolerated in any Metropolitan College course. They will result in no credit for the assignment or examination and may lead to disciplinary actions. Please take the time to review the Student Academic Conduct Code:

Academic conduct code as specified below:

http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.

NOTE: [This should not be understood as a discouragement for discussing the material or your particular approach to a problem with other students in the class. On the contrary – you should share your thoughts, questions and solutions. Naturally, if you choose to work in a group, you will be expected to come up with more than one and highly original solutions rather than the same mistakes.]

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Grading Criteria

Give a detailed list of percentage weights for assignments, papers, class participation and examinations as applicable. If you have complex grading criteria, please spell this out here as clearly as possible. Remember: the syllabus is a contract between you and your students, and will be referred to as such in the event a dispute arises.

35% homework, 20% quizzes, 30% final, 15% final project

Class Meetings, Lectures & Assignments

List in a legible format all of the class meetings, lectures, and assignments. One example, based on a computer science course:

Lectures, Readings, and Assignments subject to change, and will be announced in class as applicable within a reasonable time frame.

Date	Topic	Readings Due	Assignments Due
Week 1	Review of Python and data analysis libraries	Chapters 1,2 Course notes	n/a
Week 2	IPython Computing and Development Environment	Chapter 3 Course notes	
Week 3	Numeric Python (Numpy) and vectorized computations, arrays, matrices, indexing, searching and sorting	Chapter 4 Course notes	
Week 4	Pandas functionality, structures and operations, indexing and selection, data aggregation and grouping, pivot tables	Chapter 5 Course notes	
Week 5	statistics and linear algebra with Python	Course notes	

Week 6	data retrieving, outlier detection, cleaning and reprocessing (files, JSON, HTML)	Chapter 6, 7 Course notes	
Week 7	plotting and visualization (matplotlib, line, scatter, barchart plots, histograms, subplots)	Chapter 8	
Week 8	Data aggregation and group operations, working with data bases (SQL and no-SQL data retrieval with Pandas and SQLAlchemy	Chapter 9 Course notes	
Week 9	signal processing and time series analysis, shifting and windowing (linear regression, moving averages, filtering, outlier detection, autocorrelations)	Chapter 10	
Week 10	financial applications (financial time-series, price/volatility forecasting, trading algorithms)	Chapter 11	
Week 11	analyzing textual and social media (analyzing frequencies, bag-of-words modeling, sentiment analysis)	Course notes	
Week 12	predictive analytics (forecasting, classification with logistic regression, decision trees, clustering)	Course notes	
Week 13	collaborative filtering and recommender systems (user and item-based filtering, similarity measures, nearest-neighbor methods)	Course notes	
Week 14	Final Exam Project Presentations		