Department of Computer & Electrical Engineering and Computer Science
Florida Atlantic University
Course Syllabus

1. Course title/number, number of credit hours	
Introduction to Data Science - CAP 5768 CRN 16312 / 16313	3 credit hours
2. Course prerequisites, co-requisites, and where the course fits in the program of study	
Prerequisites: Basic knowledge of at least one high-level programming language.	
3. Course logistics	
Term: Fall 2019 Thursdays – 4:20–7:00 pm – Room CM 130 (CRN 16312) or online (CRN 16313)	
4. Instructor contact information	
Instructor's name *Office address* *Office Hours* *Contact telephone number* *Email address*	Dr. Oge Marques EE 441 (Engineering East (96) building) Tuesdays 2-5 pm or by appointment. 561-297-3857 omarques@fau.edu
5. TA contact information	
TA's name *Office address* *Office Hours* *Contact telephone number* *Email address*	TBA
6. Course description	
This course will survey foundational topics in data science and reinforce practical programming skills in the context of data analytics. Students will learn fundamentals of computational data analysis using statistics and machine learning and gain experience working with data sets from a variety of domains. Instruction and assessment will rely heavily on computational resources, for example Python and Jupyter Notebooks. Specific topics are divided naturally into three overarching themes: 1. **Data Fundamentals**: Software tools of the trade (Python, Git, Slack), data wrangling, data mining and visualization, working with large datasets, and efficiency in data manipulation. 2. **Statistical Methods**: Modeling distributions, parameter estimation, hypothesis testing, simulation, correlations, regression, time series, survival analysis. 3. **Machine Learning Methods**: Supervised and unsupervised learning, classification and regression approaches, clustering and dimensionality reduction, feature selection, hyper-parameter optimization, model assessment.	
7. Course objectives/student learning outcomes/program outcomes	
Course objectives	In this course, students will: 1. Gain proficiency using the Python programming language and its associated modules to perform a wide variety of data analysis techniques. 2. Develop enough practical programming experience to comfortably transition to other software platforms.

	3. Gain experience using various collaborative development software platforms that are becoming ubiquitous in data driven industries. 4. Learn to effectively use data visualization to explore data and report results. 5. Understand what it is to develop statistical models, when and why models are needed, the limitations of models, and how models can be used to support conclusions. 6. Understand commonalities and practical differences between various machine learning methods. 7. Become resourceful and capable of navigating the web of online data analysis resources. 8. Become more discriminating in their assessment of published results.
Student learning outcomes & relationship to ABET objectives	N/A

8. Course evaluation method

Homework Assignments Midterm Exam Final Project	30% 30% 40%	○ Homework assignments will consist of data manipulation, visualization, and analysis exercises using simulated and real data sets.

9. Course grading scale

Grading Scale:
93 and above: "A", 90-92: "A-", 87-89: "B+", 83-86: "B", 80-82 : "B-", 77-79: "C+", 73-76: "C", 70-72: "C-", 67-69: "D+", 63-66: "D", 60-62: "D-", 59 and below: "F."

10. Policy on makeup tests, late work, and incompletes

Makeup tests are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam. Makeup exam should be administered and proctored by department personnel unless there are other pre-approved arrangements.

Late assignments **will be graded with a penalty of 10% of the maximum possible grade for each day after the assignment's due date, up to a maximum of 3 days late (i.e., 30% penalty), beyond which the assignment will receive a grade 0 (zero).**

Incomplete grades are given only if there is solid evidence of medical or otherwise serious emergency situation and the student is currently passing the class.

11. Special course requirements

N/A

12. Classroom etiquette policy

Students are required to comply with all requirements specified in the student code of conduct and not in any way disrupt the class or prevent other students from benefiting from the class. Students are to speak and behave respectfully to each other and to all FAU faculty and staff.

13. Attendance policy statement

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance.
Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

14. Disability policy statement

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

15. Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

16. Code of Academic Integrity policy statement

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001. If your college has particular policies relating to cheating and plagiarism, state so here or provide a link to the full policy—but be sure the college policy does not conflict with the University Regulation.

17. Required texts/reading

Textbooks (**REQUIRED**):

1. Python Data Science Handbook: Essential Tools for Working with Data, 1st Edition
   Author: Jake VanderPlas; ISBN-13: 978-1491912058
2. Think Stats, 2nd Edition
   Author: Allen B. Downey; ISBN-13: 978-1491907337

18. Supplementary/recommended readings

Additional reading materials will be provided during the semester.

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19. Course topical outline, including dates for exams/quizzes, papers, completion of reading

Week 1 • Lecture 1: Introduction to tools (Python/R)
Week2 • Lecture 2: Introduction to NumPy and Pandas/R basics
Week3 • Lecture 3: Data wrangling
Week4 • Lecture 4: Visualization and exploratory data analysis
Week5 • Lecture 5: Modeling distributions/parameter estimation
Week6 • Lecture 6: Correlations
Week 7 • Lecture 7: Classical hypothesis testing
Week8 • Lecture 8: Brief introduction to Regression analysis
Week9 • Lecture 9: Brief introduction to Time series analysis
Week 10 • Lecture 10: Brief introduction to Survival analysis
Week 11 • Lecture 11: Introduction to Machine Learning
Week 12 • Lecture 12: Unsupervised machine learning: Clustering
Week 13 • Lecture 13: Unsupervised machine learning: Dimensionality reduction and manifold learning
Week 14 • Lecture 14: Supervised machine learning: Naive Bayes
Week 15 • Lecture 15: Supervised machine learning: Decision Trees