

**GTECH 38518/78518 – Environmental Data Science**  
**Spring 2019**  
**Tuesday and Friday 12:45 p.m. to 2:00 p.m.**  
**Hunter North 1090B**

**Contact Information**

<b>Instructor:</b>	Dr. Wenge Ni-Meister
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<b>Office hours</b>	Tuesday: 4:30pm-5:30pm or by appointment
<b>Depr. Information</b>	HN1006

**Prerequisites:** GTECH20100/70900, an introductory statistics course is strongly recommended. Background in remote sensing is a plus, but not required. You can also take GTECH 32100/71200 concurrently with this course.

**Required textbook** Python Data Science Handbook by Jake VanderPlas; the content is available on GitHub. <https://github.com/jakevdp/PythonDataScienceHandbook> to download for free.

**Course Description:** 3 credits/3 hours.

Data science is an emerging interdisciplinary field that combines elements of mathematics, statistics, computer science, and knowledge in a particular application domain for the purpose of extracting meaningful information from the increasingly sophisticated array of data available in many settings.

Scientific methods for environmental science are changing due to the advanced data acquisition technology and advancement of data science computing methods. Ever-increasingly data acquisition rates lead to vast amount of free environmental data readily available to use. This course offers an opportunity for students to learn the latest new data science computing and visualization methods through processing and interpreting large scale freely available environmental datasets. Students will develop an in-depth understanding of the basic computing principles behind data science. Through this course, students gain modern, practical, and useful skills that cover the full data analysis spectrum, from asking an interesting question to acquiring, processing, analyzing, and visualizing data, as well communicating findings in written, graphical, and oral forms.

This course includes heavy-hand on exercises focusing on learning to write computer programs in **Python**. The class will be mixed lectures and labs. The first half of the semester covers the basic python programming. The second half focuses on learning processing raster data and machine learning algorithms.

**Course Objectives and Learning Outcomes:** Upon successful completion of this course students will gain a variety skills of programming and conducting scientific research. More specifically students will be able to

- **Gather and organize** data programmatically using Python for deeper analysis.
- **Analyze** the trends and **discover** patterns in the data and **extract** conclusions.
- **Model** complex phenomena and **predict** future trends and **use** data to **automate decisions**.

- **Display** information visually and **communicate** your findings in a clear and compelling way.

### **Grading:**

Lab exercises	50%
Mid-term	20%
Final Exam/Final project	30%

Lab exercises consist of conceptual questions requiring written responses as well as computational questions requiring coding in python. **Late work will be accepted with 10% penalty for each day work is submitted .**

The mid-term will be open-book, and both an in-class and take-home exam focusing on writing basic python code.

The final project is a term project that students should complete and **present** at the end of the semester. It must be centered around analyzing environmental data using python programming skills learned in class. Graduate students are expected to do much more comprehensive final projects than undergraduate students. Different grading system will be used for undergraduate and graduate students. **The final presentations will be on 5/14/2019 and 5/17/2019 and the code are due the date of the final exam (5/17/2019). No late work will be accepted after the final exam date.**

**All required work is to submitted through BB. I do not take any submission by email.**

### **Grading Policy**

Grading will following Hunter College policy as outlined in the latest online undergraduate and graduate catalogs that can be found **at <http://catalog.hunter.cuny.edu/>**

I do not give incompletes (IN) except under the most extraordinary, and documented, circumstances. You must contact me within 48 hours of the final exam and request IN as a grade. At that time undergraduates will schedule a date to meet with me at the college and complete a Contract to Resolve Incomplete Grades. Otherwise, I will average the grades I have for you and record you the grade you have earned.

If you miss the final exam, you must (1) contact me within 48 hours of the missed exam, (2) present acceptable documentary evidence for your absence, and (3) be available for the make-up exam (Note: there will be one make-up exam day at the end of the semester held outside of class for those eligible). A make-up exam covers the same material as the regular exam but will not be the same exam given as scheduled. (i.e. DON'T MISS AN EXAM).

Only undergraduate students are eligible for credit/no credit (C/NC) as a final course grade. Please see the college's policy on C/NC at **<http://catalog.hunter.cuny.edu/content.php?catoid=37&navoid=10489>**. You must meet submit your CR/NC form, in person, no later than 15 minutes before the final presentation period.

### **Resources**

- All class material will be posted on Bb.

### **Essential Policy Information:**

- Attendance/lateness policy: It is extremely important to attend the regular lectures and labs and take detail notes. Students who attend classes regularly are much more successful than those who are not.
- Email Policy
  - Please use GTECH 38518/78518 Environmental Data Science in the subject line when you email me. I do not answer email with insufficient subject lines.
  - Email me from your @myhunter account, not your personal email address.
  - Please sign your full name as it appears in CUNYfirst to any message. I do not answer unsigned email messages.
  - Students' email will be responded to within 24 hours. Please note there will be a delay for messages sent over the weekend or during non-business hours.
- Cell Phone Policy
  - Out of respect for preserving a positive learning environment, all cell phones, pagers, and other portable noise-making devices must be SILENCED for the duration of the class period. This includes a prohibition on texting of any kind.

### **Hunter College Statement on Academic Integrity**

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. Plagiarism, dishonesty, or cheating in any portion of the work required for this course will be punished to the full extent allowed according to Hunter College regulations.

### **ADA Policy**

In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical, and/or Learning) consult the Office of AccessABILITY, located in Room E1214B, to secure necessary academic accommodations. For further information and assistance, please call: (212) 772- 4857 or (212) 650-3230.

### **Hunter College Policy on Sexual Misconduct**

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College affirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationship. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

- a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, on contacting the College’s Public Safety Office (212-772-4444)
- b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College’s Title IX Campus Coordinator, Dean John Rose ([jtrose@hunter.cuny.edu](mailto:jtrose@hunter.cuny.edu) or 212-650-3262) of Colleen Barry ([colleen.barry@hunter.cuny.edu](mailto:colleen.barry@hunter.cuny.edu) or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.

CUNY Policy on Sexual Misconduct Link: <http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf>

**Syllabus Change Policy**

- Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.
- Any changes will be updated through Bb.

Tentative Daily Schedule

Week	Date	Lectures /Labs	Assignments
Week 1	January 25	Introduction to Data Science	
	January 29	Get Started with Open Reproducible Science	
Week 2	February 1	Get Started with Open Reproducible Science	
	February 5	Python Variables and Lists	
Week 3	February 8	Python Variables and Lists	Lab1 due
	February 12	<b>Lincoln’s Birthday – College is closed</b>	<b>Lincoln’s Birthday – College is closed</b>
	February 15	Numpy Array	
Week 4	February 29	Numpy Array	
	February 22	Pandas Dataframes	
Week 5	February 26	Pandas Dataframes	Lab2 due
	March 1	Working with Data Structure	
Week 6	March 5	Loops	
	March 8	Conditional Statements	Lab3 due
Week 7	March 12	Functions	
	March 15	DRY code	Lab4 due

Week 8	March 19	Introduction to Midterm Exam	
	March 22	<b>Midterm Exam</b>	
Week 9	March 26	Working with Raster Data	
	March 29	Working with Raster Data	
Week 10	April 2	Working with Raster Data	
	April 5	Working with Raster Data	Lab5 due
Week 11	April 9	Supervised Learning	
	April 12	Supervised Learning	
Week 12	April 16	Supervised Learning	Lab6 due
	April 19	<b>Spring Recess</b>	
	April 23	<b>Spring Recess</b>	
	April 26	<b>Spring Recess</b>	
	April 30	Unsupervised Learning	
Week 13	May 3	Unsupervised Learning	Lab7 due
	May 7	Final Project Preparation	
Week 14	May 10	Final Project Preparation	
	May 14	<b>Final Project Presentation</b>	
Week 15	May 17	<b>Final Project Presentation</b>	