



# Northeastern University

## College of Computer and Information Science

DS2000 – Programming with Data  
Fall 2018

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<b>Instructor</b>	Nate Derbinsky
<b>Office</b>	WVH 208B Monday, Thursday, Friday @ 10:30am – 11:30am and by appointment
<b>Contact</b>	(617) 373-7382 n.derbinsky@northeastern.edu <a href="http://derbinsky.info">http://derbinsky.info</a>
<b>Credits</b>	2 (2 lecture hours)

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### COURSE DESCRIPTION:

Introduces key concepts in programming and data analysis from a data-centric perspective, integrating the use of data analytics libraries and tools. The paired Practicum provides hands-on opportunities to apply weekly concepts, and explore an in-depth data-analysis & -visualization project, via case studies in a discipline of each student's choosing.

### COURSE COREQUISITES:

X2001 (Programming Practicum; e.g., DS2001, HLTH2002, INSC2001, INSH2001)

### LEARNING MATERIALS/RESOURCES:

Primary text: How to Think Like a Computer Scientist: Interactive Edition<sup>1</sup>. Additional readings and resources will be made available via the course website.

Students are encouraged to take advantage of the Digital Scholarship Group at Northeastern<sup>2</sup>. They offer a wealth of services – including digital data collections – and can offer advice on collecting and structuring digital data. They also offer a quiet space to work.

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<sup>1</sup><http://interactivepython.org/runestone/static/thinkcspy/index.html>

<sup>2</sup><https://dsg.neu.edu>

## COURSE LEARNING OUTCOMES:

At the completion of this course, the student should be able to:

- Apply programming techniques to solve problems
- Integrate data-analysis libraries and tools within a project
- Utilize computation as a tool in analyzing and visualizing datasets

## INSTRUCTIONAL METHODOLOGIES:

This course will involve hands-on assignments that reinforce the lecture material. To facilitate learning domain knowledge, course time will also involve discussions about assigned readings that explore a practical question or issue about the discipline of the Practicum.

## ATTENDANCE POLICY:

Each class meeting will involve learning skills and developing knowledge that builds on previous skills learned, so it is important to attend every class.

Each class period will include in-class exercises: if you miss a class you will lose the opportunity to get those points. If you know you are going to miss a class you should notify the instructor at least four days in advance to arrange a way to make up the material. Students must have access to a computer for each class session. If you do not have a personal laptop, contact the instructor for additional options.

## GRADING POLICY:

For most of the course there will be weekly homework assignments as well as quizzes every two weeks. Homework will apply conceptual knowledge via problems and code implementation. Quizzes will assess individual understanding of programming concepts.

The grade for this course is weighted as follows:

60%	Homework
40%	Quizzes

## ACADEMIC CONDUCT:

This class has very strict standards for borrowing code: if you borrow anything for use in your project, you must have a citation. A good guideline is that if you take more than three lines of code from some source, you must include the information on where it came from. A URL or a notation (e.g., “MATLAB help files”) is fine. If it is an entire function, note it at the beginning of the code segment and include any original credit information. Provide a qualitative description of what you used, and what you changed/contributed. If you have a question about what is considered a violation of this policy, **ASK!**

Unless stated otherwise (e.g., group project), assignments reflect individual work. While you may discuss concepts and ideas with other students, there is to be no direct collaboration. If you steal someone else’s work, you fail the class. If someone uses your work, you fail the class. If you are unsure about this policy, **ask the instructor**. The university’s academic integrity policy discusses actions regarded as violations and consequences for students<sup>3</sup>.

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<sup>3</sup><http://www.northeastern.edu/osccr/academic-integrity>

## CLASSROOM ENVIRONMENT:

To create and preserve a classroom atmosphere that optimizes teaching and learning, all participants share a responsibility in creating a civil and non-disruptive forum for the discussion of ideas. Students are expected to conduct themselves at all times in a manner that does not disrupt teaching or learning. Your comments to others should be constructive and free from harassing statements. You are encouraged to disagree with other students and the instructor, but such disagreements need to be respectful and based upon facts and documentation (rather than prejudices and personalities). The instructor reserves the right to interrupt conversations that deviate from these expectations. Repeated unprofessional or disrespectful conduct may result in a lower grade or more severe consequences. Part of the learning process in this course is respectful engagement of ideas with others.

## Title IX

*Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance.*

Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty and staff.

If you or someone you know has been a survivor of a Prohibited Offense, confidential support and guidance can be found through University Health and Counseling Services staff<sup>4</sup> and the Center for Spiritual Dialogue and Service clergy members<sup>5</sup>. By law, those employees are not required to report allegations of sex or gender-based discrimination to the University.

Alleged violations can be reported non-confidentially to the Title IX Coordinator within The Office for Gender Equity and Compliance at: [titleix@northeastern.edu](mailto:titleix@northeastern.edu) and/or through NUPD (Emergency 617.373.3333; Non-Emergency 617.373.2121). Reporting Prohibited Offenses to NUPD does NOT commit the victim/affected party to future legal action.

Faculty members are considered “responsible employees” at Northeastern University, meaning they are required to report all allegations of sex or gender-based discrimination to the Title IX Coordinator.

In case of an emergency, please call 911.

Please visit <http://www.northeastern.edu/titleix> for a complete list of reporting options and resources both on- and off-campus.

## Students With Disabilities

Students who have disabilities who wish to receive academic services and/or accommodations should visit the Disability Resource Center<sup>6</sup> at 20 Dodge Hall or call (617) 373-2675. If you have already done so, please provide your letter from the DRC to the instructor early in the semester to arrange those accommodations.

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<sup>4</sup><http://www.northeastern.edu/uhrs/>

<sup>5</sup><http://www.northeastern.edu/spirituallife/>

<sup>6</sup><http://www.northeastern.edu/drc>

**WEEKLY SCHEDULE:**

The following schedule is tentative and subject to change (including topics and assignments). It will benefit you greatly to complete the assigned reading *before* attending the lecture.

Week	Topic	Reading	Assignments/Notes
1	Administrivia: syllabus, websites What is programming? Why does it matter? What is a programming language? Why Python? The process of writing a program Code documentation	1, 3	
2	Values, Data Types, Variables Statements, Expressions, Functions Input/Output	2, 10.1-10.6	
3	<b>for</b> loops Boolean variables/expressions Conditional statements	4, 7.1-7.7	Homework 1
4	Functions, Scope, <b>main</b>	6.1-6.9, 7.8	Homework 2
5	Modules <b>while</b> loops Advanced string/list functions	5, 8, 9, 10.1-10.9, 10.14, 10.21	Homework 3
6	Objects and references Lists as parameters List comprehensions Tuples	10	Homework 4
7	Files	11	Homework 5
8	Dictionaries	12	Homework 6
9	Object-Oriented Programming	16, 17	Homework 7
10	Jupyter Notebooks Visualization via Matplotlib		Homework 8
11	Navigating documentation CSV Files APIs		Homework 9
12	Pandas		Homework 10
13	Machine Learning		
14	Advanced topics		

All students are strongly encouraged to use the TRACE (Teacher Rating and Course Evaluation) system<sup>7</sup> near the end of the course to evaluate this course. A reminder about TRACE should arrive via email about two weeks before the end of the course.

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<sup>7</sup><https://www.northeastern.edu/trace/>