# COMPSCI 590N
# Lecture 1: Python Basics

Roy J. Adams

College of Information and Computer Sciences
University of Massachusetts Amherst

## Outline

## What is Python?

Python is an interpreted programming language designed to be readable, compact, and scalable.

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- Clear, readable syntax
- Interactive mode
- Modular and portable
- Automatic memory management
- Flexible code time vs. run time tradeoff
- A commonly used, well-documented set of numerical libraries

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- Algorithms underlying many basic numerical functions:
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    - probability
- Documentation, testing, and debugging in Python.

## Prerequisites

- The course has no formal prerequisites; however, an undergraduate level understanding of linear algebra and probability is expected. **No programming experience is expected.**

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- The course will be taught so that students can take it concurrently with other CICS data science courses.

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Readings will be posted to Moodle and are intended to be completed before class.

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- *Fast Lane to Python: A quick, sensible route to the joys of Python coding.* Norm Matloff. http://heather.cs.ucdavis.edu/ matlof-f/Python/PLN/FastLanePython.pdf

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Recommendation: **Anaconda** is a complete data science environment that ships with all of the above.
(https://www.continuum.io/downloads)

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This process is extremely flexible and powerful, but can be slow if you are not careful.

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```
>>> x = 1
>>> x
1
>>> y = float(x)
>>> y
1.0
>>> z = bool(y)
>>> z
True
```

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```
>>> 2.0 + 3.0
5.0
>>> 3.0**2.0
9.0
>>> 10.0 % 3.0
1.0
>>> x = 5
>>> x += 3
>>> x
```

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>>> 2 * 3
6
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```
>>> a = 2.0
>>> b = 3.0
>>> a > b
False
>>> not a > b
True
>>> (a > b) or (b == 3.0)
True
```

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```
>>> "abc" + "de"
'abcde'
>>> 2*"abc"
'abcabc'
>>> "abc" == 'abc'
True
>>> "a" < "b"
True
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```
>>> a = [1,2,'a','b'] # Lists use []
>>> a
[1, 2, 'a', 'b']
>>> b = (1,2,a,'string') # Tuples use ()
>>> b
(1, 2, [1, 2, 'a', 'b'], 'string')
>>> len(b) # Length of a sequence
4
```

## Accessing sequences

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>>> a = [1,2,'a','b']
>>> a[0] # Indexing is zero based
1
>>> a[2]
'a'
>>> a[1:4] # Returns positions 1 to 3
[2,'a','b']
>>> a[-1]
'b'
```

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```
>>> a = {'one':1,'two':2,'three':3}
>>> a['two']
2
>>> a.keys()
['three', 'two', 'one']
>>> a.values()
[3, 2, 1]
>>>
```

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- Multiple names may refer to the same object.

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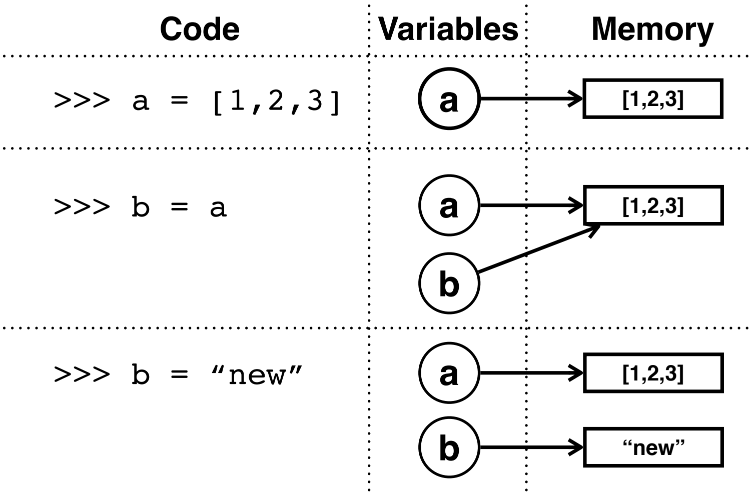

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