

Python for Analytics

Course Introduction
Syllabus, Software, Tutorials, etc.

Topics

- Introductions
- Why this course?
- Developers vs Analysts
- Course Syllabus, etc.
- Software Tools

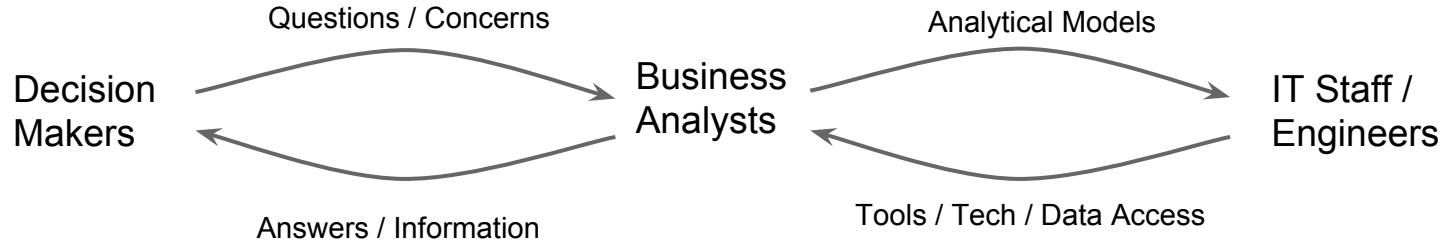
Welcome

- Dr. Christopher L. Huntley
 - PhD in Systems Engineering (UVa, 1995)
 - At Fairfield U since 1997, before that (mostly) in industry
 - Mastered over a dozen programming languages so far
- Questions for you:
 - Name? (Given name and nickname)
 - Background? (Degrees and professional experience)
 - Something ***distinctive*** about yourself that we can't tell by looking at you?

The Big Picture

Python and Business Analytics

The Role of the Business Analyst



Computers: Fast but Dumb!

- Can perform millions (even billions or trillions or quadrillions) of calculations per second
 - Compute weather predictions
 - Search terabytes of Google indexes
 - Simulate a nuclear explosion
- However, they continue to struggle with things we do every day
 - Process and interpret visual input
 - Understand the meaning of human language/behavior
 - Determine mood by watching a person's face

Why Learn to Program?

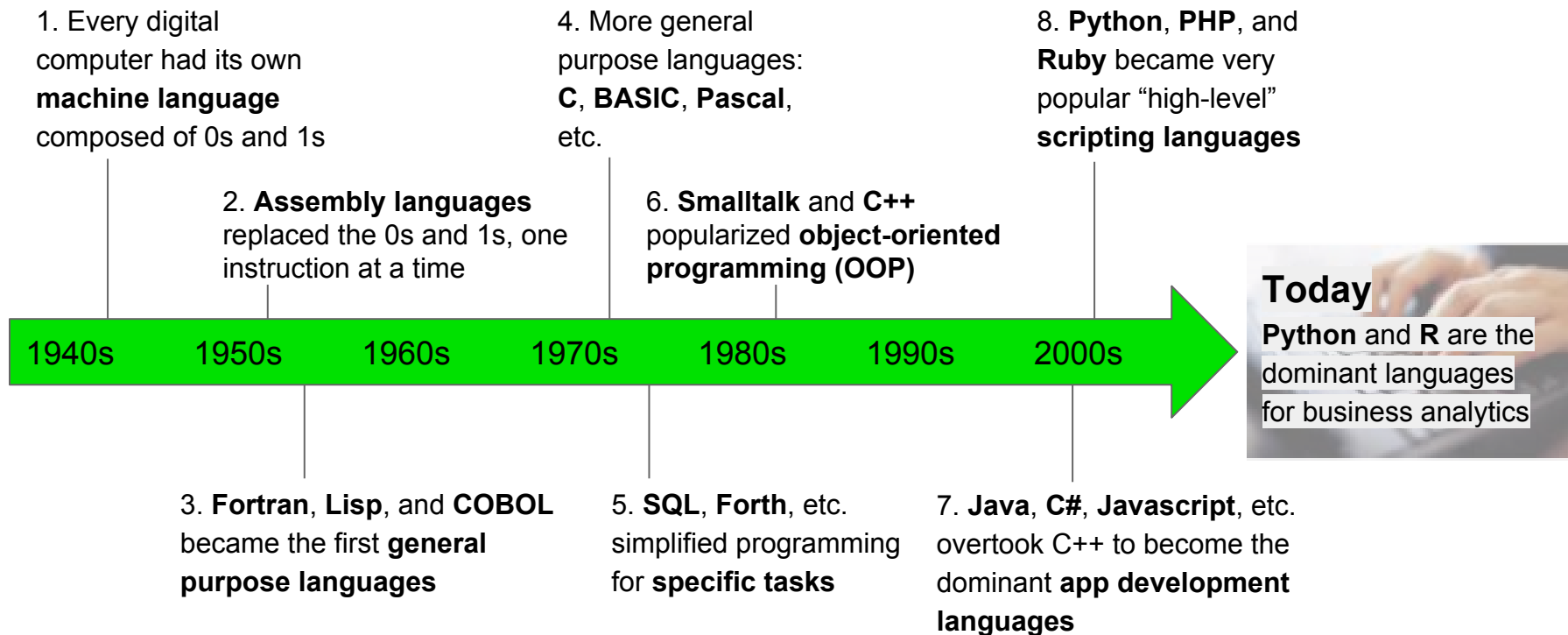
- Computers only do what we tell them to do
- Limited by our ability to communicate unambiguously
 - What we want the computer to do
 - How the computer is expected to do it
- Two implications for business analysts:
 - More likely to get what we want from computers if we ask the ***right questions in the right way***
 - ***Languages and tools continuously evolve*** as we ask for different things, so we should ***always be learning something new***

So Why Python?

- Easy to learn
 - Simple syntax, without a lot of clutter
 - [Most things have] “One obvious way to do it”
- Encourages logical thinking
 - Block structure, data structures, etc.
 - “Coding at the speed of thought”
- Amazing industry support
 - Lots and lots of free/open source tools and libraries
 - Easy to “glue together” whatever you need

A Brief History Lesson

Note: Until #8 all programmers were engineers or scientists



Key Observation

Until only a few years ago, professional-level data analytics required mastery of a whole stack of programming languages and systems.

Now, however, one can get do pretty much anything with just Python, which has the best tooling around for analytics!

Excel is fine, but a Jupyter Notebook with live data is much better.

Course Expectations

What does success look like?

Why are you here again?

The goal of this course is not to turn you into a systems engineer, but **to provide fundamental programming skills needed to design and build data-driven analytical models.**



From the Course Catalog

“In this course, we **introduce** Python as a language and tool for **collecting, preprocessing, and visualizing** data for business analytics ... **[with an emphasis on ...]** business modeling, optimization, and statistical analysis.”

Course Objectives

Objectives for each assignment will always be cover both **theory** and **practice**

Theory: You should understand ...

- Fundamentals of logical reasoning as used in contemporary programming languages
- Basic and advanced data structures needed organize, store, and integrate data
- Syntax, control structures, data types, etc. in the Python language
- Importance of Python as a tool for data science

Course Objectives (Continued)

Practice: You should be able to ...

- Write Python scripts of moderate length and complexity
- Design and use data structures using built-in and third-party data types
- Integrate and use Python libraries like Numpy, Pandas, etc. to collect, process, and display data
- Master professional tools (Anaconda, Jupyter Notebooks, GitHub, etc.) used in the field

Course Plans and Policies

Assignments, Grading, etc.

Assignments

- Programming Tutorials (ungraded but required)
 - Cover specific theory and practice needed for the graded assignments. ***Progress is tracked online.***
- Quizzes (50% of course grade)
 - 5 Quizzes, with lowest grade dropped from Quiz Avg
- Team Project (40% of grade)
 - 2-3 students per team
 - Assigned in the fifth week of the course
- Professionalism (10% of grade)
 - Participation and timely completion of assigned work

Grading System: Curve *Everything*

Every graded assignment will be **scored** and then **normalized** using the following formula:

$$QP = 3.5 + (x - \mu) / \sigma,$$

← Note: that is the Z-score plus 3.5, which is an A-

where

- x is the student's raw score for the assignment
- μ and σ are the class average and standard deviation for the assignment

Letter grades are then 3.67+ → A, 3.34-3.66 → A-, ...

Academic Honesty

- Cheating will be dealt with swiftly in accordance with Fairfield University policy
 - Unless given **explicit permission** to collaborate, do not share your work with others
 - *Avoid even the appearance of cheating!*
- Each graded assignment will be accompanied by the following (signed) pledge:
 - *On my honor as a Fairfield University student, I have neither given nor received any unauthorized aid on this assignment/quiz/project.*

A Slight Digression about Values

Be sure you know why you are here.

Graduate School is a social contract, with a professional code of conduct that values ...

- Integrity over Grades
- Courage over Ego
- Community over Competition

If you can't abide by our values then please take another course.

Course Logistics

Website, Syllabus, Software

Class Docs / Website

All lectures, programming assignments, etc. are available here:

christopherhuntley.github.io/is505-docs

The class syllabus is linked from the home page:

christopherhuntley.github.io/is505-docs/Syllabus.html

Sign Up for DataCamp

- Data Camp is an online school for data analytics in Python, and R. We have a “class group” for IS505 where your progress can be tracked.
- Invitation emails will be sent to your `@student.fairfield.edu` address.
- If no email is found, then use the following link:
<https://www.datacamp.com/groups/34981c4aa00da0a97e58c045a60b936bd8a7f30a/invite>

GitHub / GitHub Classroom

All class documents, assignments, and projects will be managed online using GitHub.

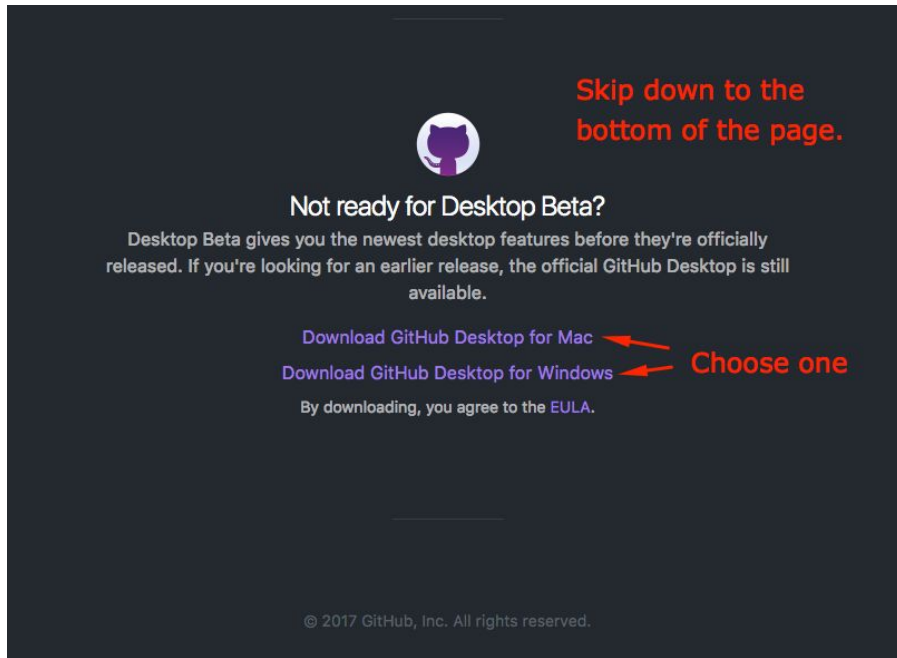
- Syllabus, lectures, etc. are in the is505-docs repo:
 - <https://github.com/christopherhuntley/is505-docs>
- GitHub Classroom will be used to post and grade programming assignments
 - Invitations for each assignment will be sent by email
- We will more about GitHub as we go along, starting with installation in class tonight

Sign Up for GitHub

- Go to GitHub.com
- Sign up for a new account using your @student.fairfield.edu account.
- Send an email from your student email to chuntley@fairfield.edu with your GitHub account username. The email subject is “GitHub account”.
- Keep an eye out for assignments from GitHub Classroom.

Install GitHub Desktop

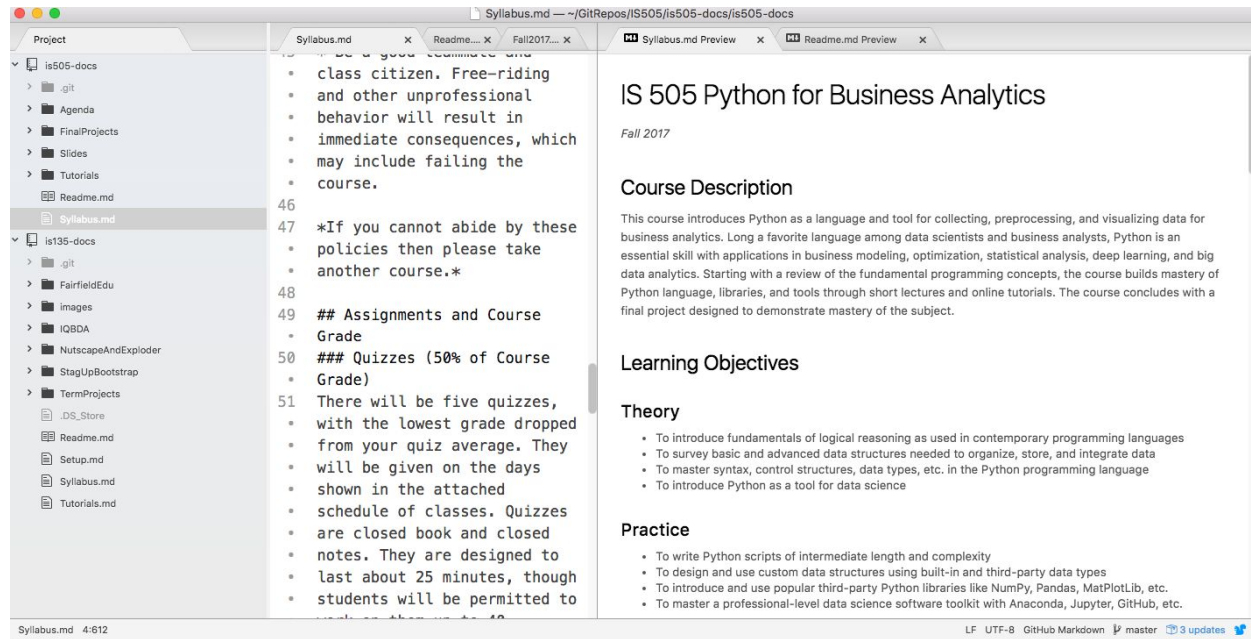
Download the **official version** (*not the beta*) from desktop.github.com. Then install as usual.



Install Atom (Recommended)

A code editor
that works
great with
GitHub.

Install from
atom.io



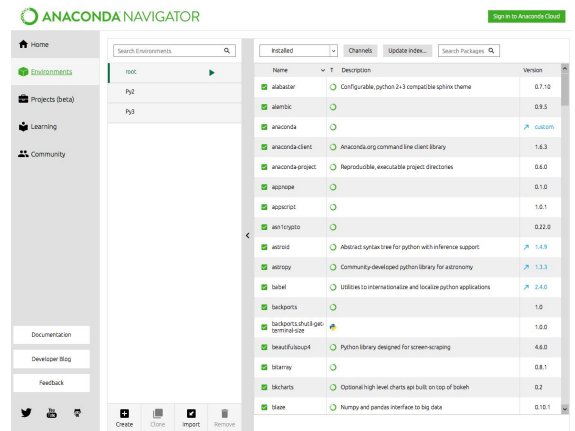
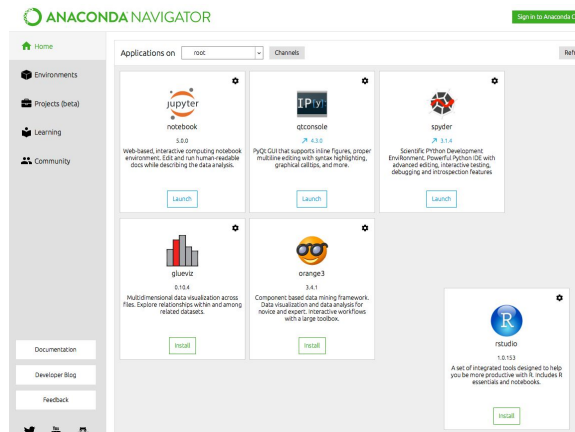
Create a Folder for your work

1. Create a new folder called `IS505` in your `documents` folder or desktop.
2. All your Git repositories and other work will be in this new `IS505` folder.
3. Take note of where you created the folder. You will need it later.

Anaconda

Anaconda is a desktop Python environment that bundles lots of tools and packages:

- Python (Installation)
- Apps: Jupyter Notebooks, Spyder IDE, etc.
- Libraries: NumPy, Matplotlib, etc.
- Conda: command line tools



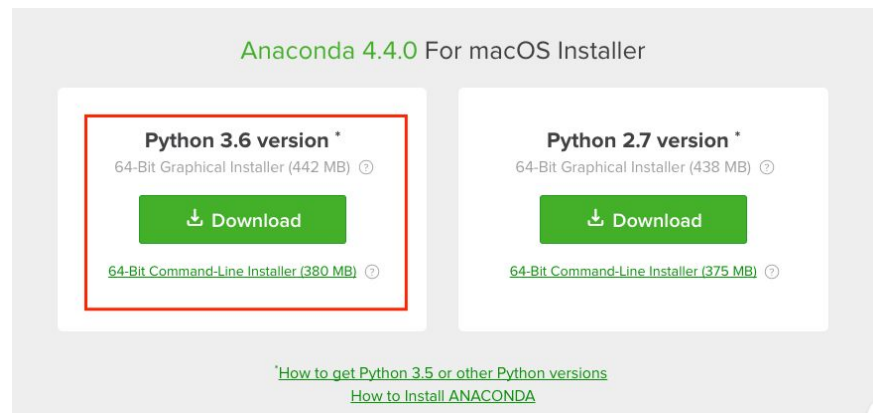
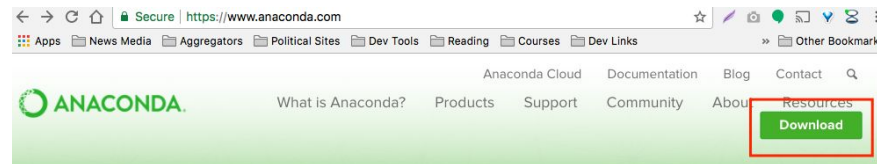
Install Anaconda

Go to anaconda.com and click the download button.

Choose the Python 3.* version for your OS.

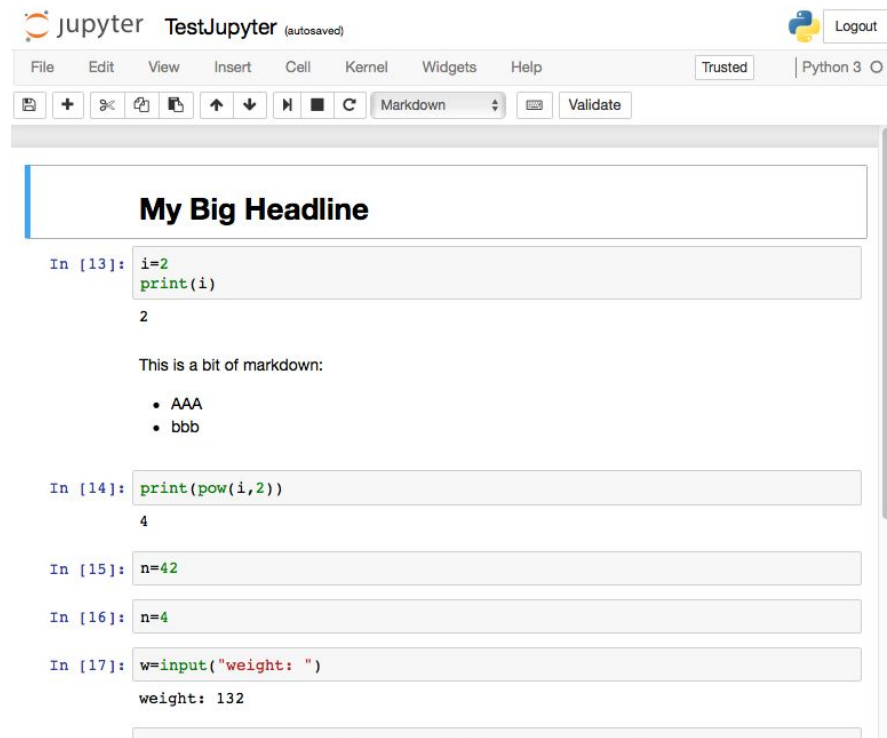
The download may take a while. Be patient.

Install as usual.



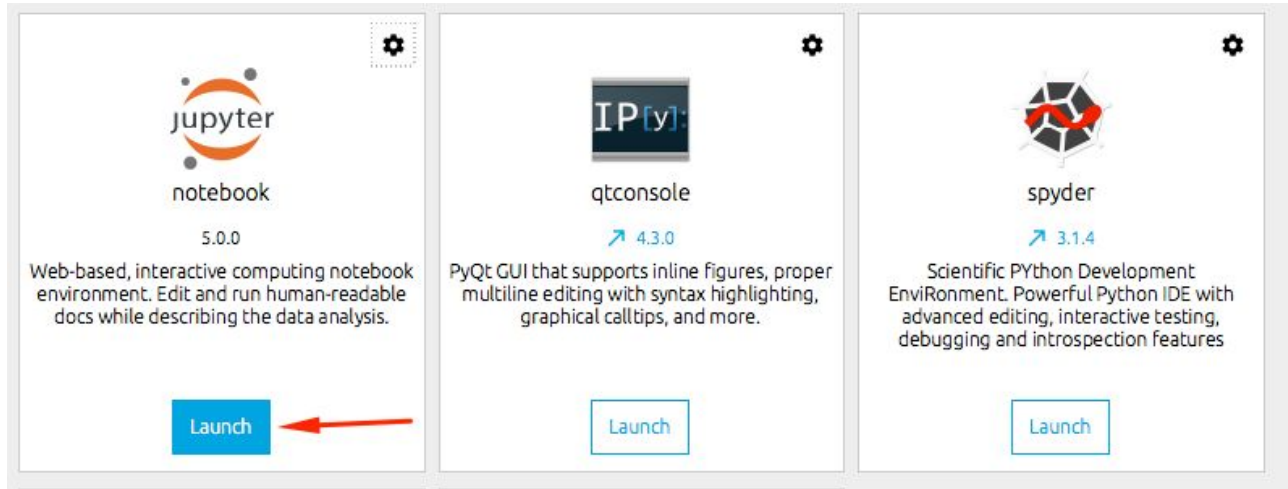
Jupyter Notebooks

- Mix formatted text and Python code to create interactive reports that can run in your web browser.
- GitHub can *render* your notebook pages automatically without any extra software.



Create Your First Notebook (1)

Open Anaconda and launch Jupyter Notebook from the home screen.



Create Your First Notebook (2)

Navigate to and then open the IS505 folder.



A screenshot of the Jupyter dashboard interface. At the top left is the Jupyter logo and the word "jupyter" in a large font, with "dashboard" in a smaller font below it. At the top right is a "Logout" button. Below the header is a list of folders, each with a checkbox, a folder icon, a name, and a timestamp. A red arrow points to the "IS505" folder.

Folder Name	Timestamp
is-dsb.fairfield.edu	2 years ago
IS505	7 minutes ago
laravel	6 months ago
Movies	3 years ago
Music	2 years ago
Pictures	8 months ago
Public	3 years ago
Sites	3 years ago

Create Your First Notebook (3)

Create a blank Python 3 Notebook.



Logout

Files

Running

Clusters

Formgrader

Assignments

Select items to perform actions on them.

Upload

New



Notebook:

Python 3

Other:

Text File

Folder

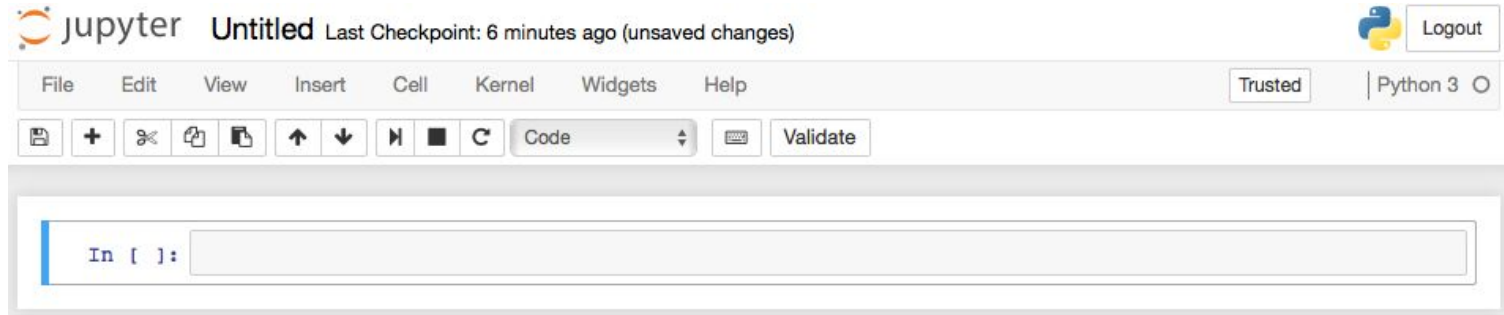
Terminal

Click here

Then here

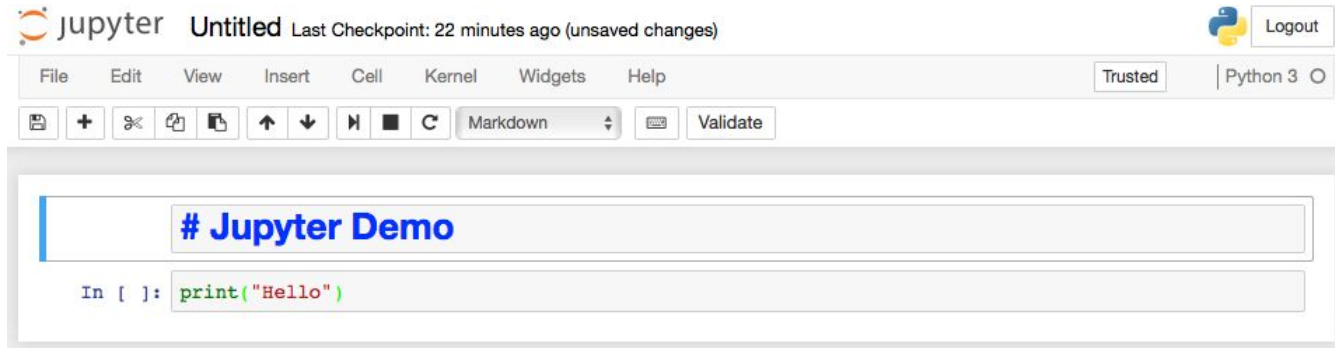
Notebook list empty.

Create Your First Notebook (4)



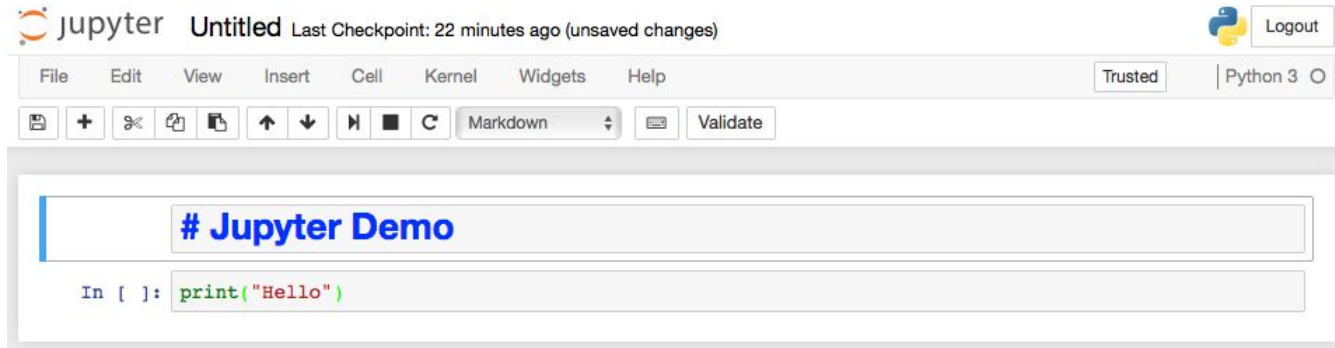
- You will see a blank page with a box for entering text:
- Each *line* of the notebook is a snippet of formatted text or Python code.
 - A toolbar provides commands to add, move, format, etc. lines in the notebook.

Create Your First Notebook (5)



1. Enter `print("Hello")` into the first line.
2. Press the `+` button to add a new line.
3. Select `Markdown` from the line type selector.
4. Enter `# Jupyter Demo` in the second line.
5. Use the `↑` button to move the line upwards.

Create Your First Notebook (6)

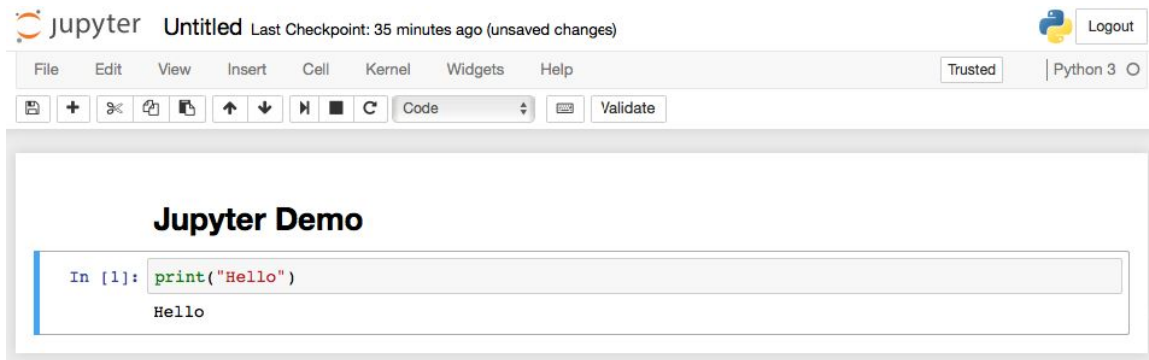
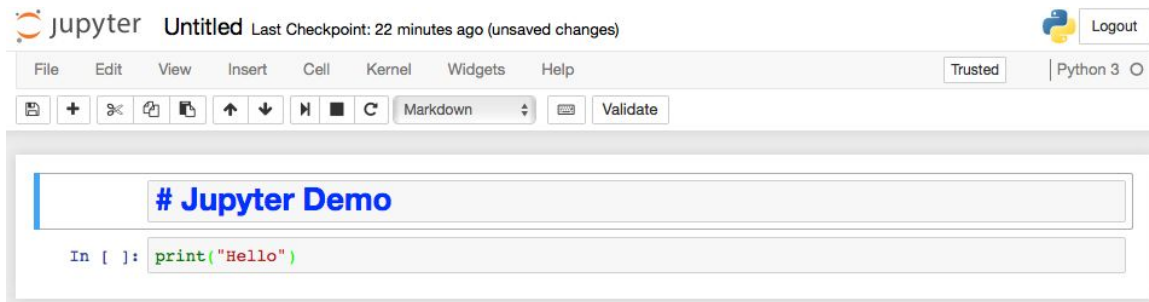


- The `# Jupyter Demo` snippet is written in a formatting language called [Markdown](#), which is commonly used for wikis, blogs, and manuals.
- The `print("Hello")` snippet is Python 3 code that we want to run inside our notebook.

Create Your First Notebook (7)

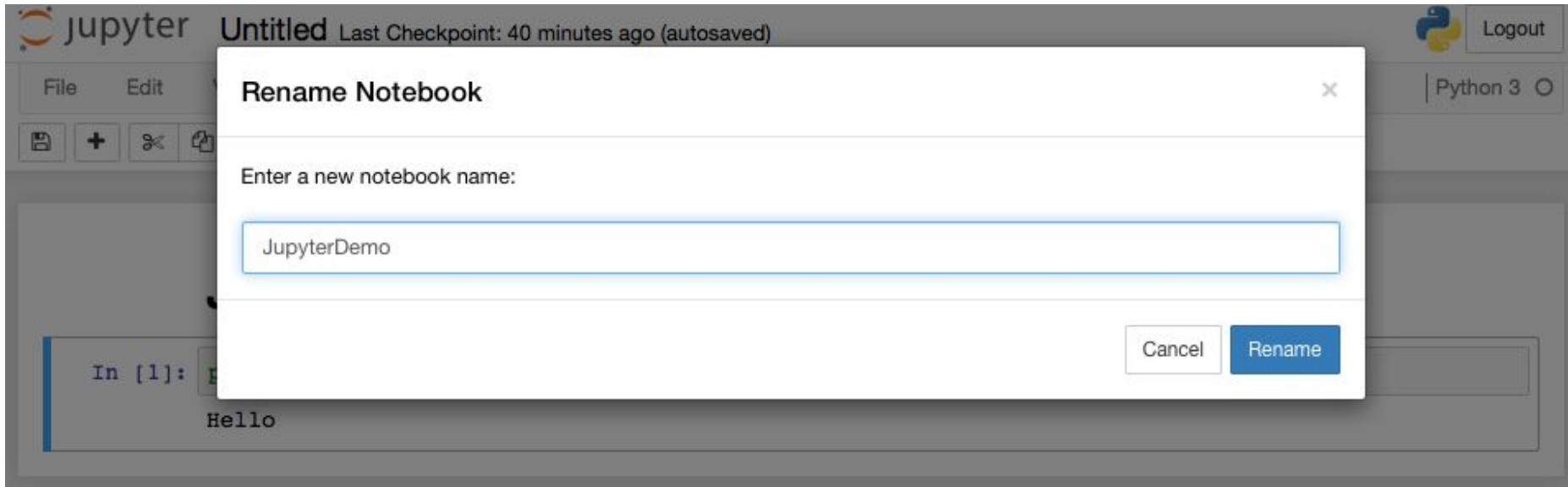
From the `Cell` menu, choose `Run all` to execute the notebook.

The notebook will render with formatted text and code output.



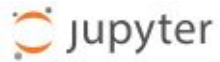
Create Your First Notebook (8)

Click `Untitled` in the notebook header to change the name of the file to `JupyterDemo` (with no spaces).



Create Your First Notebook (9)

From the Jupyter Files menu choose `Close` and `Halt`. Your file is shown with the `.ipynb` extension.



Logout

Files

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Clusters

Formgrader

Assignments

Select items to perform actions on them.

Upload

New ▾



📁 / IS505

Name ↑

Last Modified ↑



..

seconds ago



JupyterDemo.ipynb

8 minutes ago

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Syllabus, Software, Tutorials, etc.