

# introduction\_jupyter

September 7, 2020

## 0.0.1 What is Jupyter Notebooks?

Jupyter is a web-based interactive development environment that supports multiple programming languages, however most commonly used with the Python programming language.

The interactive environment that Jupyter provides enables students, scientists, and researchers to create reproducible analysis and formulate a story within a single document.

Lets take a look at an example of a completed Jupyter Notebook: [Example Notebook](#)

## 0.0.2 Jupyter Notebook Features

- File Browser
- Markdown Cells & Syntax
- Kernels, Variables, & Environment
- Command vs. Edit Mode & Shortcuts

## 0.0.3 What is Markdown?

Markdown is a markup language that uses plain text formatting syntax. This means that we can modify the formatting our text with the use of various symbols on our keyboard as indicators.

Some examples include:

- Headers
- Text modifications such as italics and bold
- Ordered and Unordered lists
- Links
- Tables
- Images
- Etc.

Now I'll showcase some examples of how this formatting is done:

Headers:

# 1 H1

## 1.1 H2

### 1.1.1 H3

#### H4

H5 H6

Text modifications:

Emphasis, aka italics, with *asterisks* or *underscores*.

Strong emphasis, aka bold, with **asterisks** or **underscores**.

Combined emphasis with ***asterisks and underscores***.

Strikethrough uses two tildes. ~~Scratch this~~.

Lists:

1. First ordered list item
  2. Another item
- Unordered sub-list.
1. Actual numbers don't matter, just that it's a number
  2. Ordered sub-list
  3. And another item.
- Unordered list can use asterisks
  - Or minuses
  - Or pluses

Links:

<http://www.umich.edu>

<http://www.umich.edu>

[The University of Michigan's Homepage](#)

To look into more examples of Markdown syntax and features such as tables, images, etc. head to the following link: [Markdown Reference](#)

### 1.1.2 Kernels, Variables, and Environment

A notebook kernel is a “computational engine” that executes the code contained in a Notebook document. There are kernels for various programming languages, however we are solely using the python kernel which executes python code.

When a notebook is opened, the associated kernel is automatically launched for our convenience.

```
In [1]: ### This is python
        print("This is a python code cell")
```

This is a python code cell

A kernel is the back-end of our notebook which not only executes our python code, but stores our initialized variables.

```
In [2]: ### For example, lets initialize variable x

        x = 1738

        print("x has been set to " + str(x))
```

x has been set to 1738

```
In [3]: ### Print x
```

```
print(x)
```

1738

Issues arise when we restart our kernel and attempt to run code with variables that have not been reinitialized.

If the kernel is reset, make sure to rerun code where variables are initialized.

```
In [4]: ## We can also run code that accepts input
```

```
name = input("What is your name? ")
```

```
print("The name you entered is " + name)
```

What is your name? karthik

The name you entered is karthik

It is important to note that Jupyter Notebooks have in-line cell execution. This means that a prior executing cell must complete its operations prior to another cell being executed. A cell still being executing is indicated by the [\*] on the left-hand side of the cell.

```
In [9]: print("This won't print until all prior cells have finished executing.")
```

This won't print until all prior cells have finished executing.

## 1.2

### 1.2.1 Command vs. Edit Mode & Shortcuts

There is an edit and a command mode for jupyter notebooks. The mode is easily identifiable by the color of the left border of the cell.

Blue = Command Mode.

Green = Edit Mode.

Command Mode can be toggled by pressing **esc** on your keyboard.

Commands can be used to execute notebook functions. For example, changing the format of a markdown cell or adding line numbers.

Lets toggle line numbers while in command mode by pressing **L**.

**Additional Shortcuts** There are a lot of shortcuts that can be used to improve productivity while using Jupyter Notebooks.

Here is a list:

Command Mode (press Esc to enable)	Edit Mode (press Enter to enable)
Enter	enter edit mode
Shift-Enter	run cell, select below
Ctrl-Enter	run cell
Alt-Enter	run cell, insert below
Y	to code
M	to markdown
R	to raw
1	to heading 1
2,3,4,5,6	to heading 2,3,4,5,6
Up/K	select cell above
Down/J	select cell below
A/B	insert cell above/below
X	cut selected cell
C	copy selected cell
Shift-V	paste cell above
V	paste cell below
Z	undo last cell deletion
D,D	delete selected cell
Shift-M	merge cell below
Ctrl-S	Save and Checkpoint
L	toggle line numbers
O	toggle output
Shift-O	toggle output scrolling
Esc	close pager
H	show keyboard shortcut help dialog
I,I	interrupt kernel
0,0	restart kernel
Space	scroll down
Shift-Space	scroll up
Shift	ignore
	Tab
	code completion or indent
	Shift-Tab
	tooltip
	Ctrl-]
	indent
	Ctrl-[
	dedent
	Ctrl-A
	select all
	Ctrl-Z
	undo
	Ctrl-Shift-Z
	redo
	Ctrl-Y
	redo
	Ctrl-Home
	go to cell start
	Ctrl-Up
	go to cell start
	Ctrl-End
	go to cell end
	Ctrl-Down
	go to cell end
	Ctrl-Left
	go one word left
	Ctrl-Right
	go one word right
	Ctrl-Backspace
	delete word before
	Ctrl-Delete
	delete word after
	Esc
	command mode
	Ctrl-M
	command mode
	Shift-Enter
	run cell, select below
	Ctrl-Enter
	run cell
	Alt-Enter
	run cell, insert below
	Ctrl-Shift-Subtract
	split cell
	Ctrl-Shift--
	split cell
	Ctrl-S
	Save and Checkpoint
	Up
	move cursor up or previous cell
	Down
	move cursor down or next cell
	Ctrl-/
	toggle comment on current or selected lines

## Jupyter Notebook Shortcuts

Command Mode (press Esc to enable)		Edit Mode (press Enter to enable)	
Enter	enter edit mode	Tab	code completion or indent
Shift-Enter	run cell, select below	Shift-Tab	tooltip
Ctrl-Enter	run cell	Ctrl-]	indent
Alt-Enter	run cell, insert below	Ctrl-[	dedent
Y	to code	Ctrl-A	select all
M	to markdown	Ctrl-Z	undo
R	to raw	Ctrl-Shift-Z	redo
1	to heading 1	Ctrl-Y	redo
2,3,4,5,6	to heading 2,3,4,5,6	Ctrl-Home	go to cell start
Up/K	select cell above	Ctrl-Up	go to cell start
Down/J	select cell below	Ctrl-End	go to cell end
A/B	insert cell above/below	Ctrl-Down	go to cell end
X	cut selected cell	Ctrl-Left	go one word left
C	copy selected cell	Ctrl-Right	go one word right
Shift-V	paste cell above	Ctrl-Backspace	delete word before
V	paste cell below	Ctrl-Delete	delete word after
Z	undo last cell deletion	Esc	command mode
D,D	delete selected cell	Ctrl-M	command mode
Shift-M	merge cell below	Shift-Enter	run cell, select below
Ctrl-S	Save and Checkpoint	Ctrl-Enter	run cell
L	toggle line numbers	Alt-Enter	run cell, insert below
O	toggle output	Ctrl-Shift-Subtract	split cell
Shift-O	toggle output scrolling	Ctrl-Shift--	split cell
Esc	close pager	Ctrl-S	Save and Checkpoint
H	show keyboard shortcut help dialog	Up	move cursor up or previous cell
I,I	interrupt kernel	Down	move cursor down or next cell
0,0	restart kernel	Ctrl-/	toggle comment on current or selected lines
Space	scroll down		
Shift-Space	scroll up		
Shift	ignore		

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### 1.2.3 How do you install Jupyter Notebooks?

**Note:** Coursera provides embedded jupyter notebooks within the course, thus the download is not a requirement unless you wish to explore jupyter further on your own computer.

Official Installation Guide: <https://jupyter.readthedocs.io/en/latest/install.html>

Jupyter recommends utilizing Anaconda, which is a platform compatible with Windows, macOS, and Linux systems.

Anaconda Download: <https://www.anaconda.com/download/#macos>