

# Lecture 2

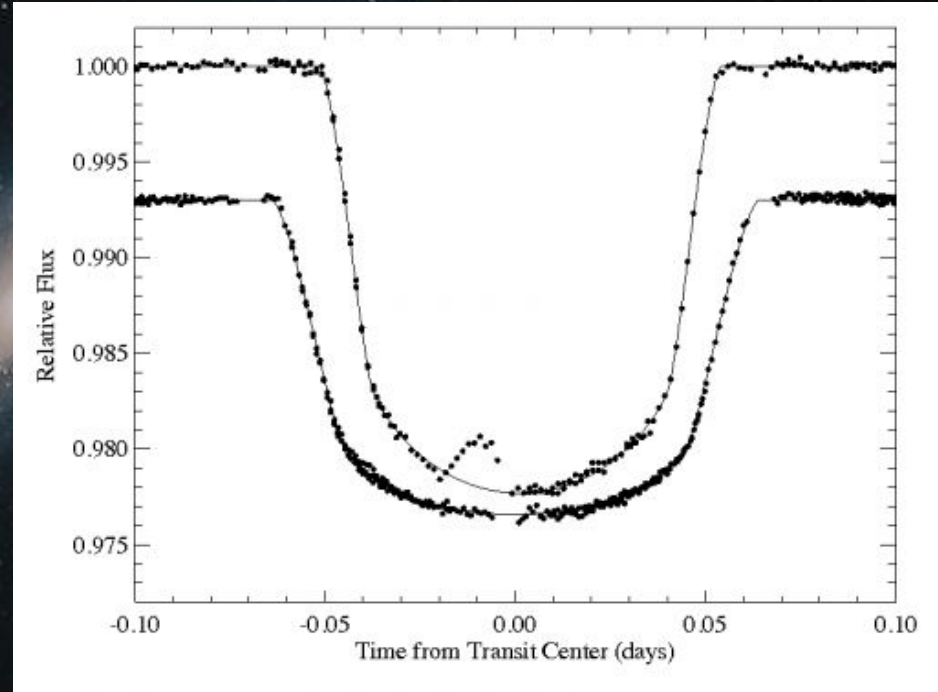
Introduction to Plotting and Matplotlib

# First Some Housekeeping

- BCourses
- Discussion Board
- Some things I should have said on Tuesday

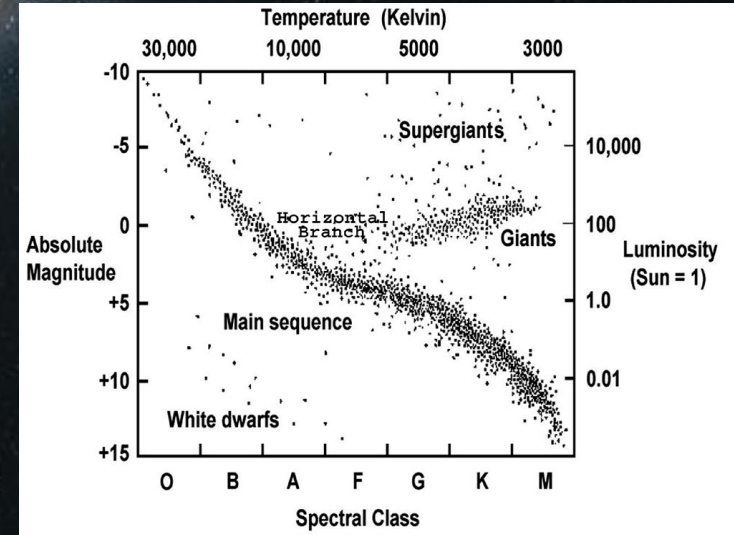
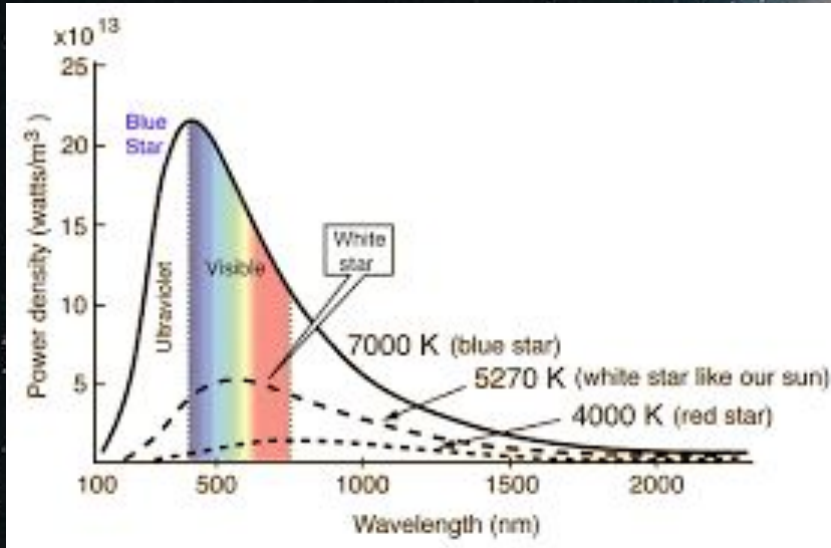
# The most critical aspect of research: Analyzing Data

- Once you're done analyzing your data, how are you going to show off your results?
- Not going to get much traction reporting results as a number without a visual
- Plotting is how you convince yourself and others of the strength of your conclusions



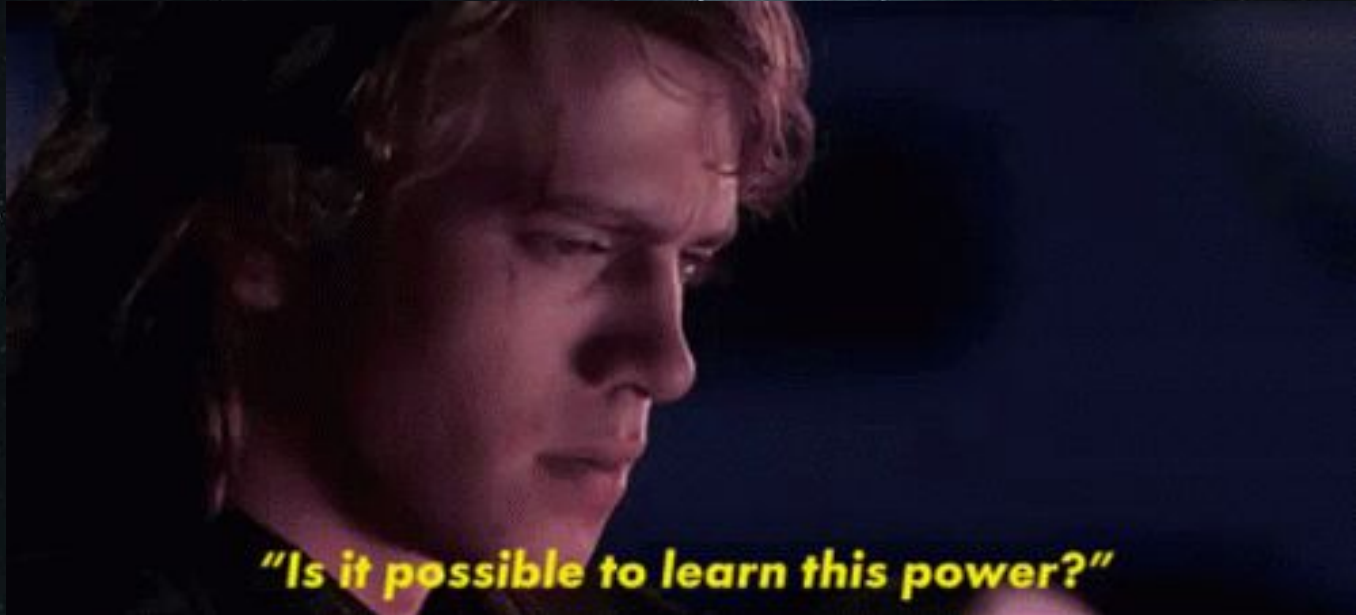
# In case you aren't convinced yet...

- Previous slide: Exoplanet transit lightcurve
- Right: HR diagram
- Left: Blackbody Radiation Curve
- Plotting is how scientists convey information clearly and concisely





**What do you need to start plotting in python?**



# What package to import?

```
import matplotlib.pyplot as plt
```

*matplotlib*

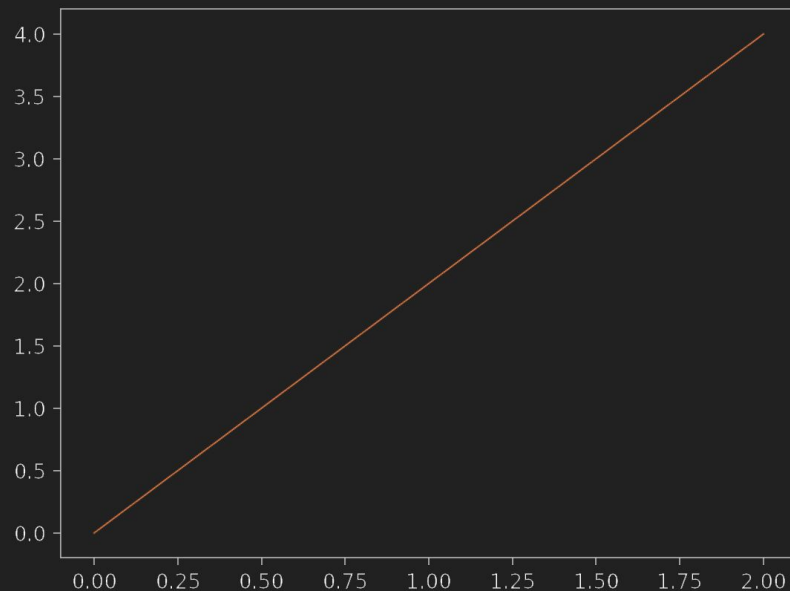
The logo for matplotlib, which is a circular gauge or radar chart with several colored segments (orange, yellow, green, blue) and a white background with a grid.

# Begin with the simplest...Plotting a line

```
>>> x = np.arange(3)
```

```
>>> y = 2*x
```

```
>>> plt.plot(x, y)
```

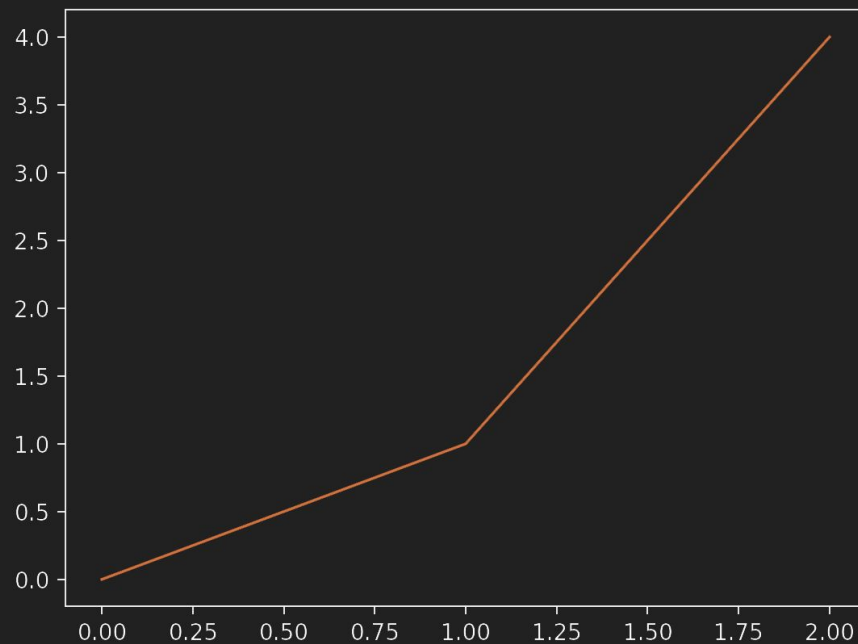


# What about a curve?

```
>>> x = np.arange(3)
```

```
>>> y = x**2
```

```
>>> plt.plot(x, y)
```



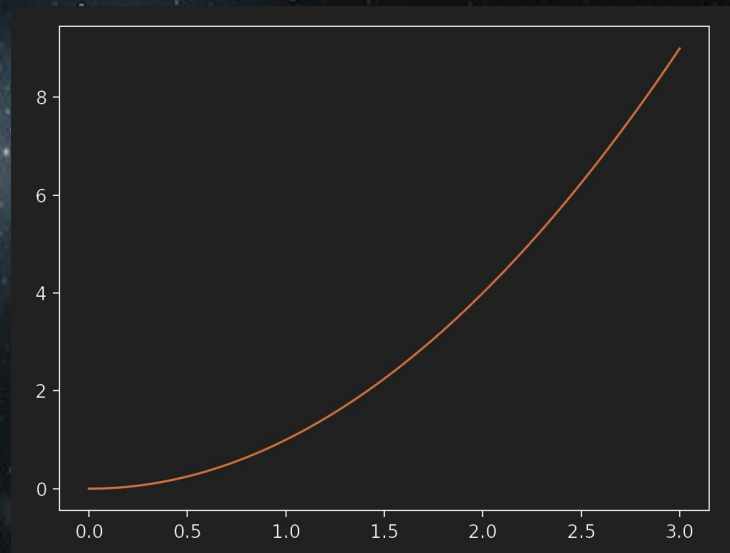


# Now, what about a curve?

```
>>> x = np.linspace(0,3,100)
```

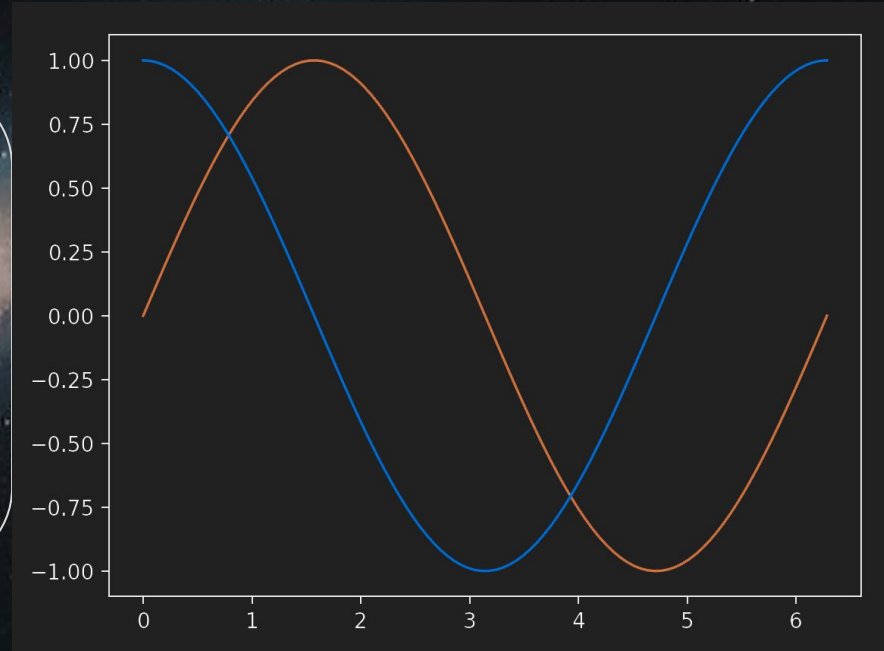
```
>>> y = x**2
```

```
>>> plt.plot(x, y)
```



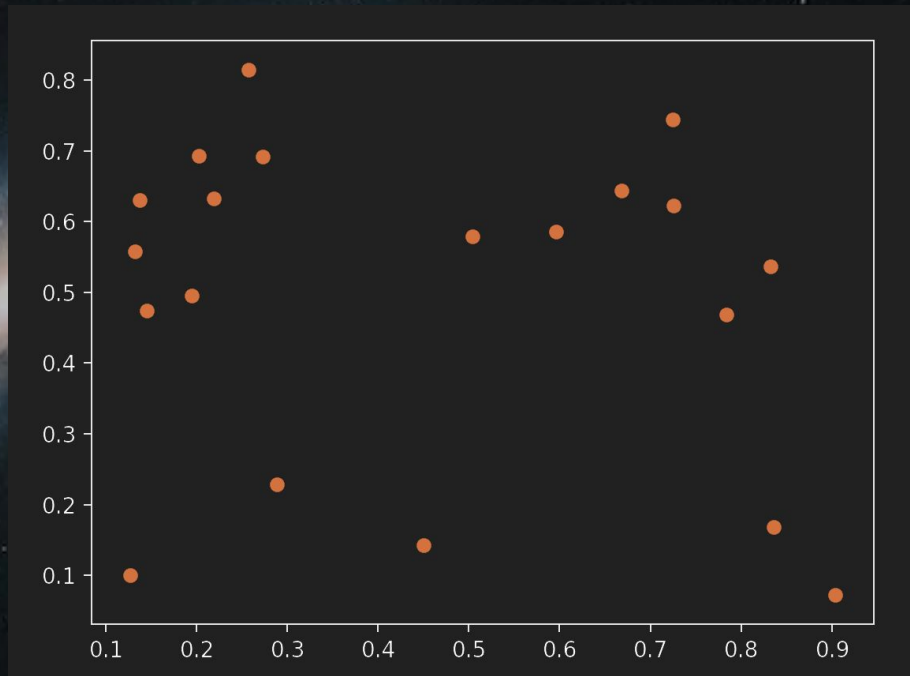
# Multiple curves????

```
x = np.linspace(0,2*np.pi,100)
plt.plot(x, np.sin(x))
plt.plot(x, np.cos(x))
plt.show()
```



# Plotting points? Scatter plots!!!

```
x = np.random.rand(20)  
y = np.random.rand(20)  
plt.scatter(x,y)  
plt.show()
```



# Different types of plot in one?

```
XX = np.linspace(0,2*np.pi,100)
```

```
YY = np.sin(XX)
```

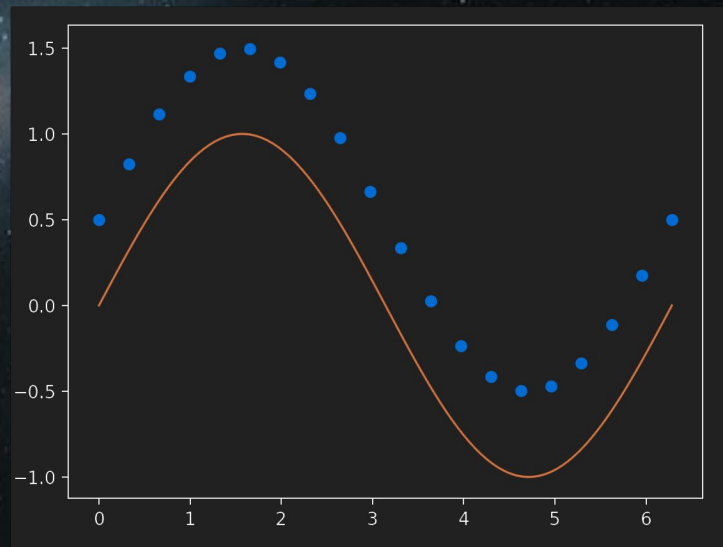
```
x = np.linspace(0,2*np.pi,20)
```

```
y = np.sin(x) + 0.5
```

```
plt.plot(XX, YY)
```

```
plt.scatter(x,y)
```

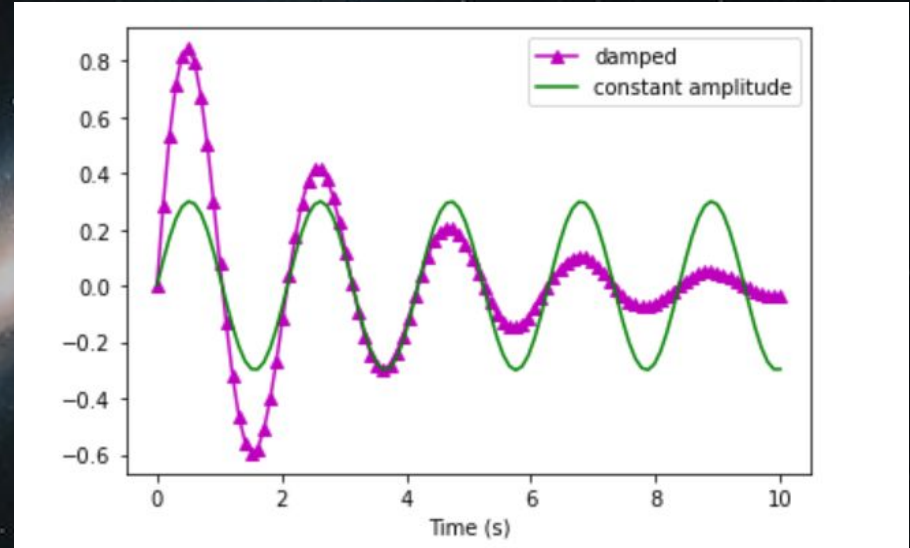
```
plt.show()
```





# Cardinal Rules of Plotting

- Always label your axes
- Always add units to your labels
- Make sure anyone who looks at your plot can tell exactly what everything means
  - Add a legend if necessary
  - Be sure to differentiate between lines on the same plot (by color, or line style, etc.)



# Plotting Demo

The background of the slide is a deep space image. It features a dark, black sky filled with numerous small, white stars of varying brightness. A prominent, elongated nebula or galaxy structure is visible, stretching diagonally from the upper left towards the lower right. This structure has a bright, orange-yellow core that fades into a diffuse, blueish-white glow. In the lower right quadrant, there is a smaller, distinct, yellowish-white elliptical object, possibly another galaxy or a distant star cluster.