

# Spring 2022: CSEE5590/490 – Special Topics

## Python and Deep Learning - ICP-4

### Lesson Overview:

In this lesson, we will review python scientific libraries. NumPy, Pandas, and Matplotlib.

### Programming elements:

Numpy matrix and nd-arrays.

Pandas and data processing.

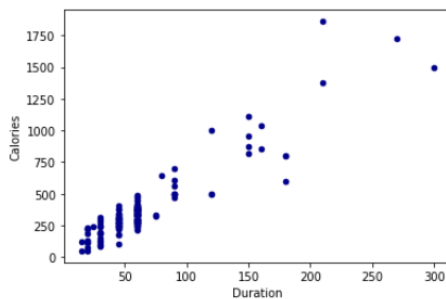
### 1. Numpy:

Using NumPy create random vector of size 15 having only Integers in the range 1-20.

1. Reshape the array to 3 by 5
2. Print array shape.
3. Replace the max in each row by 0  
(You can NOT implement it via for loop. You need to use **np.where, reshape**)
4. Extract a diagonal from the array and save it in *.npy* file format.

### 2. Pandas

1. Read the provided CSV file 'data.csv'.
2. Show the basic statistical description about the data.
3. Check if the data has null values.
  - a. Replace the null values with the mean
4. Select at least two columns and aggregate the data using: min, max, count, mean.
5. Filter the dataframe to select the rows with calories values between 500 and 1000.
6. Filter the dataframe to select the rows with calories values > 500 and pulse < 100.
7. Create a new "df\_modified" dataframe that contains all the columns from df except for "Maxpulse".
8. Delete the "Maxpulse" column from the main df dataframe
9. Convert the datatype of Calories column to int datatype.
10. Using pandas create a scatter plot for the two columns (Duration and Calories).
  - a. Example:



### 3. Matplotlib

1. Using Matplotlib read the provided image "image.jpg".
2. Show the image.
3. Print the image shape
4. Using NumPy crop the border of the image (background) to keep the word UMKC.
  - a. See similar image below.
5. Write the cropped image as a new file "cropped\_image.jpg"
6. Using Numpy where method change the background of the image to black (0 pixels) and keep the word UMKC unchanged.

7. Write the new image as a new file “np\_where\_image.jpg”.

**#Example output images:**

**1- Cropped image:**



**2- np.where\_image:**



\*\* Follow the IPC rubric guidelines.

\*\* You can leave the class after completing at least 20% of the ICP.

**Submission Guidelines:**

1. Once finished document your code and make sure all parts if the assignments are completed.
2. Push your code to your GitHub repo and update the ReadMe file, add your info, and partner info.
3. Submit the assignment ICP-2 on Canvas.
4. Present your work to TA during class time to proof the execution and complete submission.

**After class submission:**

1. Once finished document your code and make sure all parts if the assignments are completed.
2. Push your code to your GitHub repo and update the ReadMe file, add your info, and partner info.
3. Submit the assignment ICP-2 on Canvas before the deadline.
4. Record a short video (1~3) minute, proof of execution and complete assignment.
5. Add video link to ReadMe file.

**Note:** *Cheating, plagiarism, disruptive behavior and other forms of unacceptable conduct are subject to strong sanctions in accordance with university policy. See detailed description of university policy at the following URL:*  
<https://catalog.umkc.edu/special-notice/academic-honesty/>