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## Day 1 Intro to Python

### Learning Objective:

There are two main goals for this day.

1. To get the students thinking about “Digital” Transformation of their companies
2. To get them excited about Python

Twitter-Bot Detection Use Case. (The whole class participates)

Why did we choose Python?

Facebook Graph “Reverse Engineering”

### Session A: (MORNING) From 0900-1015

### Session B: (MORNING) From 1030-1200

### Session C: (Afternoon) From 1330 to 1545

File opening and reading a text file. Also covering how to read from a Webpage.

### Session D: (Afternoon) From 1600 to 1700

### Exercise for day 1

* Student is given a piece of text (as a file)
* Students Learn to manipulate the text using different python techniques that we covered in class today

# Day 2 More About Python

### Learning Objective:

### Session A: (MORNING) From 0900-1015

### Session B: (MORNING) From 1030-1200

* Build on lists, by learning about List Comprehensions, Filtered List Comprehensions

### Session C: (Afternoon) From 1330 to 1545

* Students think about what is “wrong” with each visualization that is presented to them…

### Session D: (Afternoon) From 1600 to 1700

Exercise for Day 2

* Visualization based exercises.
* The student learns to plot in many different ways.
* Manipulating the plot for aesthetics and to convey the insights

## Day 3 – Big Data

### Learning Objective:

* What is Time Series data?
* Why is it relevant in our Industry?
* Pandas – an important package for Time Series analysis

### Session A: (MORNING) From 0900-1015

### Session B: (MORNING) From 1030-1200

### Session C: (Afternoon) From 1330 to 1545

### Session D: (Afternoon) From 1600 to 1700

Exercise for Day 3:

Pandas based things for the students to try and learn.

A dataset is provided.

## Day 4 Big Data – Machine Learning Overview

### Learning Objective for Day 4:

* Motivating Machine Learning
* ML for Managers – just enough to know
* How does a computer “learn?”

### Session A: (MORNING) From 0900-1015

### Session B: (MORNING) From 1030-1200

### Session C: (Afternoon) From 1330 to 1545

### Session D: (Afternoon) From 1600 to 1700

Exercise for Day 4

* Hands on ML. Let’s build a Decision Tree

## Day 5: Intro to Cloud Computing

### Learning Objectives for the day:

* What is Cloud Computing?
* Why do we need it?
* What is O&G Digital Framework?
* What is Predix?

### Session A: (MORNING) From 0900-1015

### Session B: (MORNING) From 1030-1200

### Session C: (Afternoon) From 1330 to 1545

### Session D: (Afternoon) From 1600 to 1700

Exercise

## Day 6: Internet of Things

### Learning Objectives of the Day:

### Session A: (MORNING) From 0900-1015

### Session B: (MORNING) From 1030-1200

### Session C: (Afternoon) From 1330 to 1545

### Session D: (Afternoon) From 1600 to 1700

Exercise

## Day 7: Digital Twin & Simulation

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### Learning Objective:

* What do we mean by a “Digital Twin?”
* How is Simulation connected to Digital Twin?
* Motivating Simulation studies in the first place.
* The student is walked through two examples of Monte Carlo simulations, and they perform one as the 4pm exercise.

### Session A: (MORNING) From 0900-1015

* What do we mean by a “Digital Twin?”
* How is Simulation connected to Digital Twin?
* Why do we bother with simulation?
* Monte Carlo, DES, Simulation terms

### Session B: (MORNING) From 1030-1200

* Simple Simulation Exercises. (Coin toss, dice roll etc.)
* Live coding of different simple examples.
* Connect Coin Toss to Industry
  + A coin toss is a special case of a “Bernoulli” trial
  + We can model failures as B-trials.
  + Oil Rig safety systems. – 3 failing in the same hour. What are the chances?
* Share a Jupyter Notebook with class, during Break. (TBD)

### Session C: (Afternoon) From 1330 to 1545

* A live coding example of a simple retirement calculator. (See the PPT slides where this problem is described to the students.) Once they’ve understood the concept, the entire code is written in front of them – mistakes and all.
  + See the PPT slides where this problem is described to the students. (TBD)
  + Clean version of this code is available as a Jupyter notebook.
  + The students are encouraged to work alongside the instructor.
* Example #2: Set up a simple “stock market simulation.” (Take one stock, take its returns and simulate trading 1e5 times. Plot the results
  + Ref: <http://www.pythonforfinance.net/2016/11/28/monte-carlo-simulation-in-python/>
  + How to calculate DAILY INTEREST RATE from an annual number…
  + We run this example 10,000 times and plot the various results.
  + This gives us a good “range” of expectations about our possible investment.
  + The student should have really understood Monte Carlo Simulation by this session.
* Set up the Vendor Selection simulation problem before the break.
* During Break: Email the 2 Jupyter Notebooks to the students.

### Session D: (Afternoon) From 1600 to 1700

* Ask the students to code the Vendor Selection simulation problem before the break.
* Go around the room and help them. Get the peers to help others.
* The “solution” is available as a Jupyter Notebook here. (TBD)

Exercise : A full fledged Oil Pipeline Vendor simulation exercise.

## Day 8: Brilliant Factory

### Learning Objective:

### Session A: (MORNING) From 0900-1015

### Session B: (MORNING) From 1030-1200

### Session C: (Afternoon) From 1330 to 1545

### Session D: (Afternoon) From 1600 to 1700

Reading assignments:

1. <https://www.engadget.com/2017/07/18/google-glass-is-officially-back-with-a-clearer-vision>

Exercise

## Day 9: Case Studies & Industry Visit

### Learning Objective:

### Session A: (MORNING) From 0900-1015

### Session B: (MORNING) From 1030-1200

### Session: (Afternoon) From 1330 to 1700 – Factory Visit