ESI 4628: Decision Support Systems
for Industrial Engineers
Industrial Engineering and Management Systems Department
College of Engineering and Computer Science
University of Central Florida

COURSE SYLLABUS

Fall 2018

Instructor:	Dr. Ivan Garibay
Office:	Eng. 2, Room 424
E-Mail:	Ivan.Garibay@ucf.edu
Office Hours:	By appointment only
Teaching Assistant:	Mrs. Ramya Akula
TA E-Mail:	ramya.akula@Knights.ucf.edu
TA Office Hours:	Tuesdays 16:00pm-18:00pm, Eng.2, Room 311 (other days and times by appointment)
Website:	UCF Webcourses
Class Location:	ENG2 102
Credits:	3
Class Meeting Days:	Tuesdays and Thursdays
Class Meeting Hours:	10:30pm-11:45pm

Commented [IG1]: Ramya, please update here your office hours.

I. Goals and Objectives

The goal of this course is to make student familiar with fundamental methods for building data-driven decision support systems with the popular programming language Python (https://www.python.org/). In addition, basic decision support methodology will be presented along with modern data science techniques.

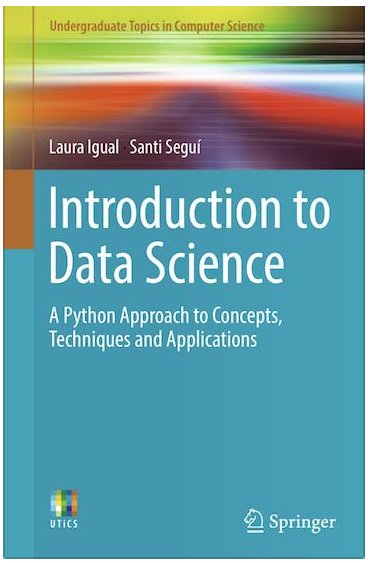
The objectives of this course are:

(1) To develop advanced programming skills using the Python programming language using the Jupyter Notebooks (http://jupyter.org) environment. By the end of the course the learner should be competent in using Python programming to manipulate data objects, ingest data, create data-driven models, and produce advanced data visualization.
(2) To use the previously learned skills to develop a complete data-driven decision support system for analyzing and modeling a real-world industrial engineering problem.

II. Course Prerequisites

- STA 3023 Probability and Statistics for Engineers
- COP 3223 High level Computer Programming

III. Required Text and Materials



Textbook:

Laura Igual and Santi Seguí, (2017). ***Introduction to Data Science: A Python Approach to Concepts, Techniques and Applications***, Undergraduate Topics in Computer Science, Springer International Publishing, Switzerland. ISBN: 978-3-319-50016-4.

Supplemental Resources: all IPython Notebooks contained on the book are available at: https://github.com/DataScienceUB/introduction-datascience-python-book

Required Software:

Anaconda (Python 3.6 version)
https://www.anaconda.com/what-is-anaconda/
This software is free and available at:
https://www.anaconda.com/download/

The Anaconda distribution is the most popular and easiest to use data science platform on the market. Anaconda includes Python, Jupyter Notebooks, and all the software and libraries that you will need for this course. Anaconda is free to download and use and it is available for Mac, Windows and Linux operating systems.

Laptop Usage:

- All students are expected to have access to a personal computer or laptop with internet. This computer is needed to access the UCF WebCourses platform and to do the required programing homework and final project. This computer needs to have the Anaconda (Python 3.6 version) software installed.
- All the lectures will be hands on. Students are strongly encouraged to bring in their laptops and perform the programming examples along with instructor in class.
- TA(s) will be present at all classes and dedicated to help and support students as they follow the lectures on their Laptops.

IV. Schedule

Unit	Class Date	Topics Covered	Readings (recommended before class)	Lecture J-Notebooks (covered during class)	Assignments
1	08/21/18	Data Science and Decision Support	https://docs.python.org/3/tutorial/	IDS-Week01-Jupyter&python.ipynb	Read Syllabus
	08/23/18	Introduction to Jupyter and Python			Term Project (selection due 9/4/18; update due 10/2/18; final due 11/13/18)
2	08/27/18	Data Structures (Tuples, Lists, Dicts, Sets, etc.)	https://www.coursera.org/learn/python-programming-introduction	IDS-Week02a-Data Structure in python.ipynb	
	08/30/18	(OUT) Functions in Python		IDS-Week02b-Functions in python.ipynb	
3	09/04/18	Basic Numpy	Python Data Science Handbook (Chapter 2) https://jakevdp.github.io/PythonDataScienceHandbook/02.00-introduction-to-numpy.html	IDS-Week03-Intro to Numpy.ipynb	Project and Team Selection Due Homework 1 Assigned (Due 09/18/18 10:00pm)
	09/06/18	(OUT Darpa60) Advanced NumPy - Matplotlib	Python for Data Analysis (Chapter 9) Python Data Science Handbook (Chapter 4) https://docs.scipy.org/doc/numpy/reference/routines.linalg.html	IDS-Week04a-More Advanced NumPy.ipynb IDS-Week04b-Advanced Numpy - Matplotlib.ipynb	
4	09/11/18	Intro to Pandas-Series, DataFrame	Python for Data Analysis (Chapter 5-page:123-165) https://www.tutorialspoint.com/python_pandas	IDS-Week05-Introduction to pandas.ipynb	
	09/13/18	Intro to Pandas-Series, DataFrame (cont.)			
5	09/18/18	Pivot Table	Python for Data Analysis (Chapter 8) Python Data Science Handbook (Chapter 3)	IDS-Week06a-pivottables.pynb	Homework 1 Due

	09/20/18	Data loading, Data Cleaning, and Preparation	Python for Data Analysis (Chapter 6- 7 page:1167-220) Python Data Science Handbook (page: 120-128)	IDS-Week06b-Data Loading, data cleaning, and data preparation.ipynb	
6	09/25/18	Graphing Data and Probabilities in MatPlotLib	Python for Data Analysis (Chapter 9) Python Data Science Handbook (Chapter 4)	IDS-Week07-Graphing Data and Probabilities in Matplotlib.ipynb	
	09/27/18	Graphing Data and Probabilities in MatPlotLib (cont.)			
7	10/02/18	(OUT SUS-DC) Linear Programming	https://docs.scipy.org/doc/scipy-0.18.1/reference/generated/scipy.optimize.linprog.html https://pythonhosted.org/PuLP/	IDS-Week08-Linear Programming.ipynb	Term Project Update Due Homework 2 Assigned (Due 10/16/18)
	10/04/18	Linear Programming (cont.)			
8	10/09/18	Reading Data and Performing Calculations on it	- Python Data Science Handbook (page: 158-170) -Python for Data Analysis (page: 153-165)	IDS-Week09-Statistical modeling-part1.ipynb	
	10/11/18	Reading Data and Performing Calculations on it (cont.)			
9	10/16/18	Processing data from multiple files	http://docs.h5py.org/en/latest/quick.html http://www.python-excel.org/ https://www.crummy.com/software/BeautifulSoup/	IDS-Week10a-Reading Files 1.ipynb IDS-Week10b-Reading Files 2.ipynb	Homework 2 Due
	10/18/16	Processing data from multiple files (cont.)			
10	10/23/16	Recommender Systems			
	10/25/16	(OUT CSSSA) Network Analysis			

11	10/30/18	Scikit-Learn: SVM and Random Forest	Intro to Data Science (Chapter 5) Python Data Science Handbook (pages: 262-266, 311-330, 331-381, 405-432) Python for Data Analysis (pages: 250-264, 373-378)	IDS-Week12-SupervisedLearning_ch05.ipynb	
	11/01/18	Scikit-Learn: SVM and Random Forest (cont.)			
12	11/06/18	Linear Regression	Intro to Data Science (Chapter 6) Python Data Science Handbook (pages: 262-266, 311-330, 331-381, 390-396) Python for Data Analysis (pages: 250-264, 373-378)	IDS-Week13-LinearRegression_ch06.ipynb	
	11/08/18	Linear Regression (cont.)			
13	11/13/18	Team Presentations			Term Project Due
	11/15/18	Team Presentations			
14	11/20/18	Team Presentations			
	11/22/18	--No class: Thanksgiving			
15	11/27/18	Team Presentations			
	11/29/18	Team Presentations			

Weekly units begin each Monday throughout the semester. Reading, discussion, and assignments are listed within each Module in WebCourses. Due dates for individual assignments vary across units, so it is the student's responsibility to stay up-to-date in dates and assignments in WebCourses. All work in this class takes place within the WebCourses environment unless specifically noted otherwise in an assignment.

V. Assignments

Assignments will be submitted individually. Assignments will consist of few exercises from the textbook selected by the instructor. All assignments will be submitted via WebCourses. A solution to the homework assignment will be posted after the submission deadline. If you have question regarding your grade, please proceed in the following order:

1) Check the posted solution and compare it with yours
2) If you still have questions about grading, please email the TA.
3) If your questions are not resolved, please email me with your concern.

VI. Course Project

The Term Project will be submitted in groups of 5. Each group will select one project following guidelines to be provided in class. Projects will need to address a recent, relevant, real-world issue in industrial engineering or science in general. The project shall include a problem and relevance statement, a background section citing at least two publications, a data section describing the data used, a methods section describing what method of data analysis was used, a results section providing data visualizations of the results of the study, a conclusions section, an Appendix A section indicating the roles and contributions of each of the team members, and an Appendix B section listing all the code developed for the project.

Each team will work on its project throughout the semester. The project deliverables include:

- Term Project update report (doc)
- Term Project final report (doc)
- Term Project final program files (Jupyter notebook, data, others)
- Term Project presentation and presentation document (ppt)

Each file submitted to any of the assignments must be named to include the identity of both the group and the assignment (e.g., "Group X Homework 1.docx", "Group Y Term Project Program.ipynb"). Please do not use ZIP files or any form of compressed files for submissions.

VII. Grading

Your grade will be based on assignments, and a term project. Course grades are determined by a weighted aggregation of scores earned on each distinct components of the course, as follows:

Homework 1	20%
Homework 2	20%
Project	60%

Letter grades will be assigned based on the following conversion scheme.

Letter Grade	Numeric Grade
A	90-100
A-	87-89
B+	84-86
B	80-83
B-	77-79
C+	70-73
C	69-65
C-	65 and below

VIII. Policies

1. There is no attendance taken.
2. Students are responsible for announcements and material covered in class.
3. No cell phone use in class, including voice, text, or data.
4. Laptops may be used for Anaconda, note-taking and course related activities only. E-mail, web, and chat are prohibited in class.
5. Loud music and noisy or disruptive behaviors are not allowed.
6. No seating in any of the seats along the back wall of the classroom.
7. Absences or late assignments do not need to be communicated to the instructor. Informing instructor of a planned late submission does not constitute approval for the late submission.
8. WebCourses discussions and e-mails are the required mechanisms for class communications

9. E-mails to the instructor should only be used where personal privacy is required. Discussion posts are preferred (via the Ask Dr. Garibay thread in Canvas) to avoid having to answer large number of emails with the same or related questions.
10. UCF policies on academic integrity will be **strictly enforced** in all discussions and assignments
11. Any form of plagiarism or cheating shall result in a Failing grade in this class. **Zero tolerance**. This course utilizes *turnitin.com* plagiarism checker and that includes the programming code to be developed for the homework assignments and final project.

Disability

The University of Central Florida is committed to providing reasonable accommodations for all persons with disabilities. Students with disabilities who need accommodations in this course must contact the professor at the beginning of the semester to discuss needed accommodations. No accommodations will be provided until the student has met with the professor to request accommodations. Students who need accommodations must be registered with Student Disability Services, Ferrell Commons Room 132, phone (407) 823-2371, TTY/TDD only phone (407) 823-2116, before requesting accommodations from the professor.

Financial Aid Disbursements

All faculty are required to document student's academic activity at the beginning of each course. In order to document that you began this course, you must participate on-time in all scheduled assignments in Unit 1. Failure to do so will delay financial aid disbursement to which you would otherwise be entitled.

The instructor reserves the right to modify the syllabus