COMP/EECE 4731/6731-Data Analytics and Visualization
Fall 2021

Current Catalog Description:	This course will cover the terminology, methodology, and applications of data analytics and visualization. Methods for visualizing data from a variety of engineering and scientific fields including both static and time varying data and methods for generating both surface and volume visualizations, predictive analytics, modeling, and visualizing big and complex data to gain perspective. PREREQUISITE: COMP 2150 /EECE 2207 or permission of instructor.
Prerequisite:	COMP 2150 or EECE 2207, or permission of the instructor.
Credits/Contact Hours:	3 credits / 42 contact hours (3 lecture hours per week for 14 weeks)
Textbooks and/or Other Reqd Matl:	Python Machine Learning: Complete and Clear Introduction to the Basics of Machine Learning with Python. Comprehensive Guide to Data Science and Analytics. June 30, 2020. by Alex Campbell.
This course is	Elective for both the B.S.C.P and B.S.E.E. degree programs.

Course Learning Outcomes/ Assessment Tools:

Course Learning Outcomes	SOs[*]	PIs[+]	Assessment Tools		
- data analytics and visualization	1a	P1	Homework #1		
-Introduction to data analysis visualizations -Learn the basics of Pandas to extract data from databases	2a	P1	Software assignments on python for visualization		
-Learn basic python and Matplotlib to analyze and visualize data	7b	P1	Software assignment On plots/visuals		
- statistical concepts for practical data analytics	6a	P2	Analytical Assignment #1		
- Conduct linear and non-linear regression analysis	1c	P3	Assignment #2 on regression		
-Learn to use data to answer practical questions in order to find data-driven solutions	2a	P5	Semester long project on Cohesive Data Storytelling		
-Introduce the idea of model thinking to solve practical problems	7b	P1	Assignment to investigate real-world case		
-Data Communication, Ethics, Regulations and Compliance	4a	P1	Assignment on data Ethics		

	* SO: Student Outcome; + PI: Performance Indicator
Competencies:	1. Demonstrate how to extract, process and analyze data from databases and perform practical data analysis using tools such as Panda, SQL, and Python. **2.** Communicate key findings with stakeholders through storytelling.
Topics Covered: **(42 classes)**	**Week 1-2**: **Introduction to Data Analytics and Visualization** Discuss key milestones in the learning path, and grading process. **Weeks 3 - 6**: **Foundational Concepts in Data Analysis & Visualization** • Introduction to concepts of data analysis visualizations • Basics of Pandas to extract and process data. • SQL and Relational Databases to enable comprehensive analyses • Python and Matplotlib to analyze and visualize data. • Statistical techniques using python and R for advanced analytics. **Weeks 7 - 10**: **Predictive Analytics** • Statistical concepts for practical data analytics (i.e., ANOVA) • Liner & Non-linear regression analysis and Model thinking • Use data to answer questions to find data-driven solutions. **Weeks 10 – 12**: **Automating Data Analysis &Communicating Results** • Automating Data Analysis Tasks Using python • Communicate your results to key stakeholders and **Weeks 12-14: Ethics and Story Telling** • Cohesive Data Storytelling, Ethics, Regulations and Compliance
Curriculum:	This course contributes 3 credit hours to the required partial fulfillment of 1½ years of engineering topics, consisting of Methods for visualizing data from a variety of engineering and scientific fields including both static and time varying data, methods for generating both surface and volume visualizations, predictive analytics, modeling, and visualizing big data to gain perspective.

Student Outcomes (Scale: 1-3):

#1	#2	#3	#4	#5	#6	#7
3	3		1		2	2

3 – Strongly supported; 2 – Supported; 1 – Minimally supported

Prepared by:	Mohammed Yeasin, Ph.D. August 2021