SU DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE SYLLABUS
COSC 311 – *Introduction to Data Visualization and Interpretation*

Description: Provides a foundation in the area of data science based on data curation and statistical analysis. Learn data analysis concepts and techniques that facilitate making decisions from a rich data set. Investigate data concepts, metadata creation and interpretation, machine learning, and basics of information visualization. Learn fundamentals about data standards and methods for organizing, curating, preserving data for reuse, drawing conclusions and making decisions from data. Understand how to use data analysis tools for data manipulation, analysis and visualization. Includes discussions on diverse issues around data, including technologies, behaviors, organizations, policies and society. Four hours per week.

Prerequisites: Grade of "C" or better in: COSC 120, MATH 216, MATH 306

Required Text:
- Data Science from Scratch: First Principles with Python, By Joel Grus. ISBN: 978-1492041139.
- The Visual Display of Quantitative Information, 2nd edition, by Edward R. Tufte. ISBN: 978-0961392147.

References:
- Computational and Inferential Thinking: The Foundations of Data Science, online edition, by Ani Adhikari and John DeNero. https://www.inferentialthinking.com

	Weeks
Python Programming Language Basics	***2.0***
Jupyter, Variables, expressions, functions, classes, library usage, I/O	
Data Processing and Organization	***1.0***
Numerical tools, file processing, Pandas, Numpy	
Tools for plotting and visualization	***2.5***
Matplotlib, Scikit, categorical and numerical data, graph types and stylistic choices	
Randomness and Sampling	***1.5***
Simulating simple stochastic processes, synthetic data generation	
Inferential Statistics	***3.0***
Hypothesis testing, empirical distributions, estimators, non-parametric tools	
Machine Learning Overview and Algorithms	***3.0***
Linear methods, decision trees, clustering, sample complexity, supervised and unsupervised methods, Bayesian tools	
Exams	***1.0***

EVALUATION

Homework, labs, class participation: 20-30%
Projects and presentations: 40-60%
Exams and quizzes: 20-40%

NOTE: ONCE A STUDENT HAS RECEIVED CREDIT, INCLUDING TRANSFER CREDIT, FOR A COURSE, CREDIT MAY NOT BE RECEIVED FOR ANY COURSE WITH MATERIAL THAT IS EQUIVALENT TO IT OR IS A PREREQUISITE FOR IT.