COURSE DESCRIPTION FORM

INSTITUTION Fast University of Computer and Emerging Sciences

PROGRAM (S) TO BE EVALUATED Computer Science

A. Course Description

(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

Course Code	CS481
Course Title	Data Science
Credit Hours	3
Prerequisites by Course(s) and Topics	Data Structures
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	Assignments, Project, MidTerm1, MidTerm2 (Programming based), Final
Course Coordinator	Dr Muhammad Atif Tahir
URL (if any)	
Current Catalog Description	Data Science is a dynamic and fast-growing field at the interface of Statistics and Computer Science. It is an interdisciplinary field about processes and systems to extract knowledge or insights from data in various forms (Wikipedia). This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools including data collection and integration, data cleaning, data analysis using machine learning, visualization and effective communication. The main focus of these topics with be on understanding and integration of concepts and their application to solving problems.
Textbook (or **Laboratory Manual** for Laboratory Courses)	Lecture Notes Davy Cielen, Arno D. B. Meysman, and Mohamed Ali, Introducing Data Science, Big data, machine learning, and more, using Python tools, May 2016

Reference Material	Journals: Machine Learning, Pattern Recognition Conferences: ICPR, ICDM www.datacamp.com (Students are given free access on many tutorials)
Course Goals	*Outcomes of Instruction* 1. Student should able to describe what Data Science is and the skill sets needed to be a data scientist. 2. Students should able to get inside knowledge about data such as using data to get information about an unknown quantity of interest. 3. Students should able to understand supervised and unsupervised modelling, over fitting and its avoidance, visualization 4. Students should able to apply most important data science methods, using open-source tools 5. Students should able to work as a team while integrating important components in data science *Student Outcomes Addressed by the Course (From ABET)* (a) An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline (b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution (f) An ability to communicate effectively with a range of audiences (j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices [CS] (k) An ability to apply design and development principles in the construction of software systems of varying complexity [CS]
Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction and one-hour lectures)	**1. Topics to be covered:**

List of Topics	No. of Weeks	Contact Hours	CLO
Basics of Data Science, Motivating Examples, Introduction to Python	**1**	**3**	**1, 4**
Data Overview, Compute Simple Statistics, Data Cleaning, Simple Visualization, Case Studies, Practical Examples	**2**	**6**	**1,2, 4**

	Supervised Classification (kNN, Naïve Bayes, SVM, Decision Tree, Random Forest Trees)	**2**	**6**	**3,4**
	Unsupervised Classification & Feature Extraction (kmeans, PCA, LDA)	**1.5**	**4.5**	**3,4**
	Regression	**1**	**3**	**2,3,4**
	Ensemble Classifiers	**1**	**3**	**2,3,4**
	NLP	**1.5**	**4.5**	
	Introduction to Graph Analytics + Graph Visualizations	**1.5**	**4.5**	**3,4**
	Deep Learning Models	**1.5**	**4.5**	**1,3,4**
	Group Project Presentations	**1**	**3**	**5**
	Total	**14+2**	**45**	

Laboratory Projects/Experiments Done in the Course	Yes. Project and Regular Lab Classes once a week			
Programming Assignments Done in the Course	Yes. Infact, midterm 2 was conducted on Lab totally based on programming			
Class Time Spent on (in credit hours)	**Theory**	**Problem Analysis**	**Solution Design**	**Social and Ethical Issues**
	30	15	0	0
Oral and Written Communications	Every student is required to submit at least __1___ written reports of typically _4____ pages and to make __1___ oral presentations of typically __10___ minute's duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.			

Instructor Name ____Dr Muhammad Nouman Durrani_____

Instructor Signature _____

Date _____01/02/2021_____