Course Name: Introduction to Data Science Course Code: ITEC 313

General Information						
Course Code	**ITEC 313**	**Level/Year**	$5^{th}/3^{rd}$	**Required (R) / Selected Elective (SE)**		R
Credit Hours	**Theory**	2	**Lab**	1	**Total**	3
Prerequisites	MATH262	**Course Coordinator**		Dr. Nadim Rana		
Corequisites	NIL	**Track Leader**		Dr. John Martin		

Course Description

Data Science is the study of the generalizable extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, databases and other branches of computer science along with a good understanding of the craft of problem formulation to engineer effective solutions. This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset. Students will learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication. The focus in the treatment of these topics will be on breadth, rather than depth, and emphasis will be placed on integration and synthesis of concepts and their application to solving problems. To make the learning contextual, real datasets from a variety of disciplines will be used.

Course Objectives: On completion of the course, the student will be able to:

- Describe Data Science and the skill sets needed to be a data scientist.
- Understand the Data Science Process and how its components interact.
- Carry out basic statistical modeling and analysis.
- Explain the significance of exploratory data analysis (EDA) in data science.
- Apply basic tools (plots, graphs, summary statistics) to carry out EDA.
- Use APIs and other tools to scrap the Web and collect data

Course Contents

List of Topics	Weeks
CH 1: Introduction to Data Science	1,2,3
CH 2: Data	4, 5, 6
CH 3: Data Analysis	7, 8
CH 4: Data Analytics	9, 10
CH 5: Machine Learning	11, 12, 13
CH6: Data Collection, Experimentation and Evaluation Data Collection Methods	14, 15

Textbook

- Chirag Shah, "A Hands-On Introduction to Data Science", 1st Edition, © 2020 | ISBN-10:1108472443, ISBN-13:978-1108472449, Cambridge University Press

Reference Materials

- Foster Provost and Tom Fawcett, "Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking", 2013, ISBN 1449361323.
- Cathy O'Neil and Rachel Schutt, "Doing Data Science, Straight Talk from The Frontline", O'Reilly, 2014, ISBN: 978-1-449-35865-5.
- Trevor Hastie, Robert Tibshirani and Jerome Friedman, "Elements of Statistical Learning", Second Edition, 2009, ISBN 0387952845. (free online)

Course Learning Outcomes

CLO	Description	Mapped PI
CLO#01	**Define** the basic concepts and terminologies of the data science process	PI 1.1
CLO#02	**Identify** the critical methods and techniques for data preprocessing to solve a data problem	PI 1.3
CLO#03	**Illustrate** techniques for organizing, exploring, and analyzing data to perform descriptive and predictive analytics	PI 2.2
CLO#04	**Use** basic data analysis and statistical modeling tools to conduct Exploratory Data Analysis (EDA) and derive actionable insights	PI 2.3
CLO#05	**Discover** data-driven insights and **show** their analysis results effectively through written reports.	PI 3.1, PI 3.3

CLO-PI-SO Mapping

	SO-1	SO-2	SO-3	SO-4	SO-5	SO-6
CLO#01	PI 1.1	-	-	-	-	-
CLO#02	PI 1.3	-	-	-	-	-
CLO#03	-	PI 2.2	-	-	-	-
CLO#04	-	PI 2.3	-	-	-	-
CLO#05	-	-	PI 3.1, PI 3.3	-	-	-