DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
INDUSTRIAL ENGINEERING PROGRAM, BSC.

Course Syllabus

1. **Course number and name**
   IE 413 (0803413) Introduction To Data Analytics And Machine Learning

2. **Credits and contact hours**
   (3+0) 3 credit hours, 3 contact hours

3. **Course type**
   Blended Learning Course (2+1)

4. **Instructor's or course coordinator's name**
   Dr. Fadwa Dababneh

5. **Textbook information**
   Introduction to Machine Learning with Python by Andreas C. Müller, Sarah Guido; Released October 2016; Publisher(s): O'Reilly Media, Inc.; ISBN: 9781449369415
   a. **Other supplemental materials**
      Instructor's notes

6. **Specific course information**
   a. **Catalog description**

Introduces concepts, data analysis techniques and tools for how to prepare data, deal with missing data and create custom data analysis solutions for different industries. What machine learning is and how it is related to statistics and data analysis. How machine learning uses computer algorithms to search for patterns in data. How to use data patterns to make decisions and predictions with real-world examples. The steps in the Data mining process.

   b. **Prerequisites or co-requisites**
      Prerequisite: ME 337 Discrete Math (0802337)

   c. **The course is:**
      Required in the Industrial Engineering program.

7. **Specific goals for the course**
   a. **Course outcomes:**
   After completion of the course, students are expected to be able to:
   1. Understand and execute the data science process starting from raw data to model validation.

2. Prepare and clean data, deal with missing data, and create custom data analysis solutions for different industries.
3. Understand what Machine learning is and how it is related to statistics and data analysis.
4. Build a model to fit data by applying various machine learning algorithms.
5. Use data patterns to make decisions and predictions with real-world examples

b. The following student outcomes are addressed by the course:

SO-(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

8. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Understand and execute the data science process starting from raw data to model validation.	-	Lectures (Example and Problems)	Assignment
CO-(2): Prepare and clean data, deal with missing data, and create custom data analysis solutions for different industries.	-	Lectures (Example and Problems)	Assignment
CO-(3): Understand what Machine learning is and how it is related to statistics and data analysis.	-	Lectures (Example and Problems)	Project
CO-(4): Build a model to fit data by applying various machine learning algorithms.		Online Video	Project
C)-(5): Use data patterns to make decisions and predictions with real-world examples		Online Video	Project
Student Outcomes			
SO-(1) An ability to identify, formulate, and solve complex engineering problems by applying		Lectures (Example and Problems)	Term Project

principles of engineering, science, and mathematics.			

9. Weekly Teaching Plan

Week	Lecture	Topic	Method of Delivery
1	Lec_1	Introduction to Data Analysis and Machine Learning	Lecture
1	Lec_2	Introduction to Data Analysis and Machine Learning	Lecture
1	Lec_3	Introduction to Data Analysis and Machine Learning	Online Lecture
2	Lec_4	Introduction to Data Analysis and Machine Learning	Lecture
2	Lec_5	Introduction to Data Analysis and Machine Learning	Lecture
2	Lec_6	Data Preparation (Data pre-processing)	Online Lecture
3	Lec_7	Data Preparation (Data pre-processing)	Lecture
3	Lec_8	Data Preparation (Data pre-processing)	Lecture
3	Lec_9	Data Preparation (Data pre-processing)	Online Lecture
4	Lec_10	Data Preparation (Data pre-processing)	Lecture
4	Lec_11	Data Preparation (Data pre-processing)	Lecture
4	Lec_12	Data Prep in Python	Online Lecture
5	Lec_13	Data Prep in Python	Lecture
5	Lec_14	Data Prep in Python	Lecture
5	Lec_15	Training and Testing sets	Online Lecture
6	Lec_16	Training and Testing sets in Python	Lecture
6	Lec_17	Training and Testing sets in Python	Lecture
6	Lec_18	Machine Learning Algorithms (Supervised-Regression)	Online Lecture
7	Lec_19	Machine Learning Algorithms (Supervised-Regression)	Lecture
7	Lec_20	Machine Learning Algorithms (Supervised-Regression)	Lecture
7	Lec_21	Machine Learning Algorithms (Supervised-Regression)	Online Lecture
8	Lec_22	Machine Learning Algorithms (Supervised-Classification)	Lecture
8	Lec_23	Machine Learning Algorithms (Supervised-Classification)	Lecture
8	Lec_24	Machine Learning Algorithms (Supervised-Classification)	Online Lecture
9	Lec_25	Machine Learning Algorithms (Supervised-Classification)	Lecture
9	Lec_26	Machine Learning Algorithms (Supervised-Classification)	Lecture
9	Lec_27	Machine Learning Algorithms (Supervised-Classification)	Online Lecture

10	Lec_28	Machine Learning Algorithms (Supervised-Classification and Regression Trees)	Lecture
10	Lec_29	Machine Learning Algorithms (Supervised-Classification and Regression Trees)	Lecture
10	Lec_30	Machine Learning Algorithms (Supervised-Classification and Regression Trees)	Online Lecture
11	Lec_31	Machine Learning Algorithms (Supervised-Classification and Regression Trees)	Lecture
11	Lec_32	Machine Learning Algorithms (Supervised-Classification and Regression Trees)	Lecture
11	Lec_33	Machine Learning Algorithms (Supervised-Classification and Regression Trees)	Online Lecture
12	Lec_34	Machine Learning Algorithms (Supervised-Random Forests)	Lecture
12	Lec_35	Machine Learning Algorithms (Supervised-Random Forests)	Lecture
12	Lec_36	Machine Learning Algorithms (Unsupervised)	Online Lecture
13	Lec_37	Machine Learning Algorithms (Unsupervised Clustering)	Lecture
13	Lec_38	Machine Learning Algorithms (Unsupervised Clustering)	Lecture
13	Lec_39	Machine Learning Algorithms (Unsupervised Clustering)	Online Lecture
14	Lec_40	Machine Learning Algorithms (Association Rules)	Lecture
14	Lec_41	Machine Learning Algorithms (Association Rules)	Lecture
14	Lec_42	Machine Learning Algorithms (Recommendation Systems)	Online Lecture
15	Lec_43	Neural Networks	Lecture
15	Lec_44	Neural Networks	Lecture
15	Lec_45	Neural Networks	Online Lecture

1. Grade Distribution:

Assessment	Grade	Week No.
- Midterm Exam	30%	7th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works ….)	20%	1-16th Week
- Final Examination	50%	16th Week

Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.