



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

Course Syllabus

1. Course number and name

IE 573 Data Sci. Applications For Eng. And Business Intel.

2. Credits and contact hours

(3+0) 3 credit hours, 3 contact hours

3. Course type

Face to face Learning Course (3+0)

4. Instructor's or course coordinator's name

Dr. Hanan Saleet

5. Textbook information

- Barrenechea, Mark J .Jenkins, Tom Digital Manufacturing, First Published, Published in Canada 2018

a. Other supplemental materials

-Milan Gregor and Stefan Medvecky (2010 .)Digital Factory – Theory and Practice, Engineering the Future, Laszlo Dudas (Ed)., InTech, Available from :

<http://www.intechopen.com/books/engineering-the-future/digital-factory-theory-and-practice>

-Stephan Richter Dr .Steffen Wischmann, Additive manufacturing methods – state of development, market prospects for industrial use and ICT-specific challenges in research and development, Available from :[www .autonomik40.de](http://www.autonomik40.de)

-Zude Zhou, Shane (Shengquan)Xie, and Dejun Chen, Fundamentals of Digital Manufacturing Science, Springer London Dordrecht Heidelberg New York, 2012.

-Zongwei Luo, Robotics, Automation, and Control in Industrial and Service Settings, Published in the United States of America by Engineering Science Reference (an imprint of IGI Global), Available from :<http://www.igi-global.com>

-2016 Global Industry 4.0 Survey, Industry 4.0 :Building the digital enterprise, Available from :<https://www.pwc.com/gx/en/industries/industry-4.0.html>

6. Specific course information

a. Catalog description

This course aims to build student competence in digital transformation, digital factory modeling, and digital factory analysis.

b. Prerequisites or co-requisites

pre-requisites: introduction to data analytics and machine learning



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

- c. The course is:**
Elective in Industrial Engineering program.

7. Specific goals for the course

a. Course outcomes:

After completion of the course, students are expected to be able to:

- CO-(1): Generate Data flow model
CO-(2): Discuss the digital transformation
CO-(3): Discuss the Establishment of a digital twin

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

None

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): Generate Data flow model	-	Lectures (Example and Problems)	Exams
CO-(2): Discuss the digital transformation	-	Lectures (Example and Problems)	Assignment
CO-(3): Discuss the Establishment of a digital twin	-	Lectures (Example and Problems)	Project

9. Weekly Teaching Plan



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

Week	Lecture	Topic	Method of Delivery
1	Lec_1	Identify links between industrial engineering knowledge and methods, on one side, and the design, modeling and management activities related to Data sciences	Lecture
	Lec_2	Identify links between industrial engineering knowledge and methods, on one side, and the design, modeling and management activities related to Data sciences	Lecture
	Lec_3	Identify links between industrial engineering knowledge and methods, on one side, and the design, modeling and management activities related to Data sciences	Lecture
2	Lec_4	Identify links between industrial engineering knowledge and methods, on one side, and the design, modeling and management activities related to Data sciences	Lecture
	Lec_5	Understand the strategic differences between traditional factory and digital factory	Lecture
	Lec_6	Understand the strategic differences between traditional factory and digital factory	Lecture
3	Lec_7	Understand the strategic differences between traditional factory and digital factory	Lecture
	Lec_8	Understand the strategic differences between traditional factory and digital factory	Lecture
	Lec_9	Identify use cases of big data and real time data analytics supporting smart production, and advanced manufacturing process.	Lecture
4	Lec_10	Identify use cases of big data and real time data analytics supporting smart production, and advanced manufacturing process.	Lecture
	Lec_11	Identify use cases of big data and real time data analytics supporting smart production, and advanced manufacturing process.	Lecture
	Lec_12	Identify use cases of big data and real time data analytics supporting smart production, and advanced manufacturing process.	Lecture
5	Lec_13	Data flow model concept and construction	Lecture
	Lec_14	Data flow model concept and construction	Lecture
	Lec_15	Data flow model concept and construction	Lecture
6	Lec_16	Data flow model concept and construction	Lecture



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	Lec_17	Data flow model concept and construction	Lecture
	Lec_18	Formulate a data model representing data streamlining in a production line of an existing traditional factory	Lecture
7	Lec_19	Formulate a data model representing data streamlining in a production line of an existing traditional factory	Lecture
	Lec_20	Formulate a data model representing data streamlining in a production line of an existing traditional factory	Lecture
	Lec_21	Lean product lifecycle management towards digital factory with (machine learning)	Lecture
8	Lec_22	Lean product lifecycle management towards digital factory with (machine learning)	Lecture
	Lec_23	Lean product lifecycle management towards digital factory with (machine learning)	Lecture
	Lec_24	Lean product lifecycle management towards digital factory with (machine learning)	Lecture
9	Lec_25	Factory critical points identification and suggestions for improvement	Lecture
	Lec_26	Factory critical points identification and suggestions for improvement	Lecture
	Lec_27	Factory critical points identification and suggestions for improvement	Lecture
10	Lec_28	Factory critical points identification and suggestions for improvement	Lecture
	Lec_29	Technologies for digital transformation	Lecture
	Lec_30	Technologies for digital transformation	Lecture
11	Lec_31	Technologies for digital transformation	Lecture
	Lec_32	Technologies for digital transformation	Lecture
	Lec_33	Integration of technologies for digital factory	Lecture
12	Lec_34	Integration of technologies for digital factory	Lecture
	Lec_35	Integration of technologies for digital factory	Lecture
	Lec_36	Integration of technologies for digital factory	Lecture
13	Lec_37	Factory critical points identification and suggestions for improvement	Lecture
	Lec_38	Factory critical points identification and suggestions for improvement	Lecture
	Lec_39	Factory critical points identification and suggestions for improvement	Lecture
14	Lec_40	Factory critical points identification and suggestions for improvement	Lecture
	Lec_41	Establishment of a digital twin	Lecture



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

	Lec_42	Establishment of a digital twin	Lecture
15	Lec_43	Establishment of a digital twin	Lecture
	Lec_44	Establishment of a digital twin	Lecture
	Lec_45	Establishment of a digital twin	Lecture

10. Grade Distribution:

Assessment	Grade	Week No.
- First Exam	20%	
-Second Exam	15%	
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works)	15%	1-16 th Week
- Final Examination	50%	16 th Week

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