	JORDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY **INDUSTRIAL ENGINEERING DEPARTMENT**	

Course Number and Name	PDDE 428 Application of AI in Product Design
Course Description	This course covers the fundamentals of AI applications in product design where students will be introduced to design ontology to formulate representations of design and apply practical aspects of data science through group projects. The course will teach students how to use AI tools such as machine learning and neural networks to collect data needed to develop and design a product as to understand factors that can crucially affect the acceptance and rejection of the product in the market
Credits and contact hours	3 Credit hours; 3 hours of lectures
Pre- or Co-requisites	PDDE 370: Product Feasibility Study
Required/ Elective	Required

Instructor	Dr. Nader Al Theeb
Office Location	Engineering building, C5L2
Office Phone	720-1000 Ext: 22883
Email	naaltheeb@just.edu.jo
Office Hours	See the student service system

Text Book(s)	Different resources will be used
Software tools	Python, Autodesk tools: Project Dreamcatcher

Course Objectives	Upon completion of this course, the students will • Understand the application of AI in Product design • Utilize some AI tools to create innovative product design
Measured Outcomes (ABET)	3c, 3d and 3g
Measured Outcomes (NQF)	L7K1, L7S3, and L7C3

Topics	Chapters in Text
Introduction: History of AI in Product Design Topics, Terminologies of AI.	
Review of product design: concepts, phases, examples ……	
Review of AI tools: review of machine learning, neural network, …..	
Integration between AI and product design: Methods for integration, case studies …… **Project 1:** Utilize AI tools to help in finding some basic data in product design process.	
AI tools in Product design: introduction to Project Dreamcatcher: Generative Design Solutions in CAD, how to utilize Project Dreamcatcher efficiently. **Project 2:** Utilize Project Dreamcatcher to create different design options for an idea.	
Machine Learning (ML) Tools in Product design: How ML is utilized in product deign process **Project 3:** Use ML to enhance the output designs in Project 2	
AI in Additive Manufacturing and 3D Printing: How AI is utilized in additive manufacturing. **Project 4:** Create a small product by utilizing the additive manufacturing techniques with collaboration of AI tools	
Evaluating AI-Driven Design Solutions: Methods and parameters to evaluate designs developed by AI tools	

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Evaluation		
Assessment Tool	**Expected Due Date**	**Weight**
Assignments and participation	TBA	15 %
Term Project Progress	TBA	45 %
Term Project Final	Presentation and report	20 %
	Design	20 %

Course Outcomes (CLOs)	**JNQF Descriptor**
1. Understand the fundamental concepts of micro- and nanotechnologies in product development.	**7K1**
2. Gain knowledge about the design, fabrication, and application of MEMS and transducers.	**7S1**
3. Learn about the co-integration of MEMS with integrated circuits.	**7S2**
4. Develop skills in multiphysics simulation and characterization of micro- and nanodevices.	**7S1**
5. Explore industrial and scale-up technologies relevant to micro- and nanotechnology-based product development.	**7C4**
6. Address reliability and interconnect issues in micro- and nanoscale product.	**7C1**

Policy	
Attendance	Attendance will be checked at the end of each class. University regulations will be strictly followed for students exceeding the maximum number of absences. No make-up test will be given without an official university-approved excuse.
Homework	Homework problems are designed to give the students the opportunity to practice solving problems related to the course materials presented each week. Homework problems will be assigned but not graded.
Student Conduct	It is the responsibility of each student to adhere to the principles of academic integrity. Academic integrity means that a student is honest with him/herself, fellow students, instructors, and the University in matters concerning his or her educational endeavors. Cheating will not be tolerated in this course. University regulations will be pursued and enforced on any cheating incident.