PURDUE UNIVERSITY FORT WAYNE Civil and Med Engineering

Department of Civil and Mechanical

Course	ME 54700: Mechatronics, Robotics and Automation	
Type of Course	Graduate course for MSE-ME concentration Elective (Group 1) for ME program	
Catalog Description	Modern products are mostly mechatronic products, where mechanical components are integrated with electrical, electronic, and control components to fulfill high-level system functionalities. Especially, robots are critical components in modern manufacturing and their roles to our societies are becoming increasingly of importance. The design, manufacture, assembly, and operation of mechatronic products require engineers to understand a wide scope of engineering knowledge and to be able to design and integrate mechanical, electric, and control subsystems. This course is designed for graduate students to (1) understand the concept of mechatronics, (2) learn design principles to integrate multidisciplinary components as a system to meet requirements of products, (3) gain the fundamental knowledge about robots and automation, (4) have hand-on skills in developing basic mechatronic products	
Credits	3	
Contact Hours	3	
Prerequisite Courses	Graduate Standing or ME 36100 with a grade of C or better	
Corequisite Courses	None	
Textbook (Optional)	 John Craig, "Introduction to Robotics Mechatronics and Control", Fourth Edition, Pearson, ISBN 9780133489798. William Bolton, Mechatronics-Electronic Control Systems in Mechanical and Electrical Engineering", Sixth Edition, Pearson, ISBN: 978-1-292-07668-3. 	

Course Objectives (1). Consult the student handbook for information pertaining to academic

- honesty, the grade appeal process, or grievance policies.(2). You are expected to use your IPFW account to send and receive email
- related to this course. Please send email only from your IPFW email account.
- (3). During computer labs, computers are to be used only for material related to this class. No internet surfing unless the instructor requests, no game playing, absolutely no chatting!
- (4). Eating and drinking are not allowed in classroom or lab. If you do carry a drink, it should have a lid and please be careful.
- (5). As a courtesy to the instructor and other students, do not be late for class and turn off your cell phone.
- (6). No late homework or in-class exercise submission.
- (7). Students with a disability should contact the SSD office at Walb 113 (481-6657) for a description of services available.

Course Outcomes

A student who successfully fulfills the course requirements will have demonstrated:

- (1). An ability to identify, select, and integrate mechatronic components to meet product requirements (1,2)
- (2). An ability to develop kinematic, dynamic and control models for robots (1,2,6)
- (3). An ability to use commercial software tools for modeling and simulation of mechatronic systems (1,2,6)
- (4). An ability to design, analyze, and optimize mechatronic products (1,2,6)
- (5). An ability to write technical reports and present engineering design solutions efficiently (4,6,7)

Lecture Topics

- (1). Introduction of Mechatronics
- (2). Mechanical Components and Motion Systems
- (3). Power and Driving Systems
- (4). Sensing, Numerical Control, and Programming
- (5). Modeling and Simulation
- (6). System Integration
- (7). Introduction of Robotics
- (8). Fundamental of Kinematics and Dynamics
- (9). Robotic Programming and Control
- (10). Robots in Production Systems
- (11). Human and Robot Interaction
- (12). Independent study on mechatronic design

Computer Usage	High
Laboratory Experience	Medium
Design Experiences	Medium
Coordinator	Zhuming Bi, Ph.D.
Date	17 October 2022