IE 461 Computer Integrated Manufacturing 3(2,1,2)

Catalog Data	Computer aided process planning (CAPP); Industrial robotics: design, programming, and applications; Automated material handling: storage and transportation technologies; Automated identification and data capture; Manufacturing system technologies: single stations, flow lines, assembly lines; Group technology and cellular manufacturing; Flexible manufacturing systems technology and implementation; Enterprise integration and ERP.			
Prerequisite	IE 360			
Co-requisites	IE 450			
Level	9			
Textbook	1. Automation, Production Systems, and Computer Integrated Manufacturing, Mikell Groover, Prentice Hall, 2000. 1. Computer-Integrated Design and Manufacturing, Nanua Singh, John Wiley & Sons, 1996.			
Reference	Computer Integrated Manufacturing, James Rehg and Henry Kraebber, Prentice Hall, 2001.			
Learning Objectives	Make students familiar with concepts, elements, and applications of CIM in manufacturing. The course exposes students to various components of CIM such as CAPP, Robotics, AS/RS, ATS, CMS, FMS, and ERP.			
Topics (classes)		**Topic**	**Week**	**Contact, hr**
	1.	Introduction	1 class	**3**
	2.	Computer Aided Process Planning (CAPP)	4 classes	**6**
	3.	Industrial Robots	6 classes	**18**
	4.	Automated storage and retrieval systems (AS/RS)	2 classes	**6**
	5.	Automated transportation systems (ATS)	2 classes	**6**
	6.	Automated identification and data capture	1 class	**3**
	7.	Cellular Manufacturing Systems (CMS)	4 classes	**6**
	8.	Flexible Manufacturing Systems (FMS)	6 classes	**18**
	9.	Enterprise Integration and ERP	2 classes	**6**
Laboratory Topics	**1**	Carrying out experiments on AS/RS and ATS in the CIM lab		
	2	Carrying out experiments on robot and milling station		
	3	Carrying out experiments on robot and turning station		
	4	Carrying out experiments on robot, assembly and inspection stations		
	5	Conducting case studies on CAPP and ERP systems		
Home work	A number of home works are assigned. These are addressed by teams of 2 students assigned by the instructor. Home works require written reports.			
Computer Usage	Several CIM software in addition to high level computer languages are required.			
Link to program outcomes	**a**	An ability to apply knowledge of mathematics, science, and engineering		
	c	An ability to design, develop, implement and improve a process, component, and/or integrated system that includes people, material, information, and energy to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.		
	k	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice		

Learning outcomes	Confer the student the ability to: 1. Identify the basic elements of manufacturing systems and their relationship to CIM components, and to determine the principles, advantages and limitations of CIM **[a]** 2. Understand and use CAPP systems **[k]** 3. Understand robot design and characteristics, calculate robot performance, analyze robot movement, and economics **[a, k]** 4. Understand robot applications, and to select robots for specific applications **[c]** 5. Understand and use AHS within a manufacturing system, specify AHS requirements, and select AHS for manufacturing systems **[a, c]** 6. Understand, design, specify, select and determine performance of cellular and flexible manufacturing systems technology and configuration **[a, c]** 7. Understand the enterprise integration and ERP systems (Identify the principle steps of CIM components selection procedures and integration of information between them for developing CIM organization) **[a]**
Estimated Category Content	Engineering Science:1 credit hours Engineering Design: 2 credit hour
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