| **IE 461 Computer Integrated Manufacturing 3(2,1,2)** |
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| Catalog Data | This course is an introduction to automation technologies in manufacturing systems. It describes automation components and gives numerical analysis about sizing a manufacturing system.  |
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| Pre-requisite | IE 360 |
| Co-requisites | IE 450 |
| Level | 9 |
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| Textbook | 1. Automation, Production Systems, and Computer Integrated Manufacturing, Mikell Groover, Prentice Hall, 2000.
2. Computer-Integrated Design and Manufacturing, Nanua Singh, John Wiley & Sons, 1996.
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| Reference | Computer Integrated Manufacturing, James Rehg and Henry Kraebber, Prentice Hall, 2001. |
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| Learning Objective | 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.  |
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|  | Topic | Contact hours (Lecture + Tutorial) |
| Topics (classes) | 1. | Introduction  | 2 |
| 2. | Manufacturing systems | 6 |
| 3. | Industrial Robots | 6 |
| 4. | Automated transportation systems (ATS) | 4 |
| 5. | Automated storage and retrieval systems (AS/RS) | 4 |
| 6. | Automated identification and data capture | 4 |
| 7. | Industrial networks | 4 |
| 8. | Industrial information systems | 4 |
| 9. | Computer Aided Process Planning (CAPP) | 3 |
| 10. | Cellular Manufacturing Systems (CMS) | 4 |
| 11. | Flexible Manufacturing Systems (FMS) | 4 |
|  |  | Total | 45 contact hours |
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| 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 |
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| Homework | During the semester, the students are expected to submit their homework in time **and** in a neat format. The homework might include reading or problem solving assignments. These are addressed individually or by teams of 2 students assigned by the instructor. |
| Computer Usage | Several CIM software, in addition to high level computer languages will be addressed. |
| Plagiarism | With respect to the university policy, plagiarism is completely prohibited; and will be punished according to the university rules. |
| Assessment Method | * Mid term 1 (15%)
* Mid term 2 (15%)
* Lab (15%)
* Homework and quizzes (15%)
* Final (40%)
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| 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 |
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| 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]**
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| Estimated Category Content  | Engineering Science:1 credit hoursEngineering Design: 2 credit hour |
| Prepared by | Dr. Saber DARMOUL & Dr. Adham Ragab |
| Preparation Date | January 2014 |