IE 414 - Spring 2012 - COMPUTER INTEGRATED MANUFACTURING

Instructor : Ümit Bilge (ext.7071)  bilge@boun.edu.tr
Course Schedule : W 3-4 M2200, F 3-4 M2200

Course Description : This course is designed for introducing third and fourth grade IE students to the state-of-the-art issues in the area of computer integrated manufacturing (CIM) through hands on experience in BUFAIM- Flexible Automation and Intelligent Manufacturing Laboratory. The course will cover topics such as fundamentals of CIM and automation; CAD/CAM, numerical control manufacturing, Robotics, Flexible Manufacturing Systems (FMS) and data integration in CIM applications. The students will work on Lab assignments and a term project using the available software in BUFAIM in teams of two or three people. Lab assignments will include robot programming and shop floor control applications. The term project will focus on FMS design and management through simulation.

Prerequisites: IE 306 or equivalent

Material: Class notes, assignment information handouts, assignments, and other material will be available as softcopy at the beginning of the term. The following will be reserved at BUFAIM Lab for reference:

Course outline:

I. Introduction
   1.1 Manufacturing systems
   1.2 Automation
   1.3 Computer Integrated Manufacturing

II. Numerical Control Production Systems
   2.1 Numerical Control: NC and CNC
   2.2 Computer Assisted Part Programming
   2.3 DNC

III. Industrial Robotics
   3.1 Robot Applications
   3.2 Robotics Technology
   3.3 Robot Programming

LAB ASSIGNMENT I: ACL programming for SCORBOT ER IX

IV. Real-time Shop Floor Control

LAB ASSIGNMENT II: Real-time control of BUFAIM Model Factory

V. Flexible Manufacturing Systems
   5.1 Definition and Basic Issues
   5.2 Automated Guided Vehicle Systems
   5.3 Simulation software developed in BUFAIM: FMS.NET
   5.4 FMS short-range planning problems

TERM PROJECT: FMS Design using simulation

VI. Network Communication and Enterprise Integration
   6.1 Communication Networks
   6.2 Data Integration and Transportability
   6.3 Enterprise-wide Integration
Assignments, Project and Grading:

- You are asked to **form your groups (2-3 students)** within the first week of classes and inform the instructor.
- Attendance is required during LAB hours, time assigned for groupwork and project meetings (group as a whole) as well as lectures.
- You are required to follow general LAB rules. Improper behavior (bringing food, smoking, shouting, playing games, bringing in people other than who take the course, mis-use of equipment) and any kind of action which can disturb others will be evaluated negatively.
- Do not forget to register for groupwork in the LAB ahead of time so that assistants will keep the LAB open for you. Apart from this, assistants will be available during their office hours to help and guide you; please respect their work, and consult them only during their posted office hours.

**Assistant in charge:** Umut Beşikçi, Gökalp Erbeyoğlu

**Term Project** (in groups) due on final date 40%
1. 15 min. Presentation + 5 min for questions
2. Final Report

**Assignments** (in groups same as the Term Project group)
1. Robotics 20%
   Assignment demo and report due: Mar.30th, Fri.

2. Real Time shop Floor Control 10%
   Assignment demo due: Apr.20th, Fri.

**Two announced quizzes** 30%

**Attendance required for passing**

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**Tentative Schedule**

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<th>Date</th>
<th>Topic and Lectures</th>
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<tr>
<td>22 Feb / 2 Mar</td>
<td>Introduction / NC Systems</td>
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<td>7 / 9 March</td>
<td>Robotics / Robotics Lab</td>
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<td>14 / 16 March</td>
<td>Robotics Lab / Groupwork in Lab</td>
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<td>21 / 23 March</td>
<td>Groupwork in Lab / <strong>Quiz I</strong> &amp; Groupwork in Lab</td>
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<td>28 / 30 March</td>
<td>Groupwork in Lab / <strong>Assignment I Demo</strong></td>
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<td>4 / 6 April</td>
<td>FMS / Real-time Shop Control &amp; Demo</td>
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<td>11 / 13 April</td>
<td>FMS.NET &amp; Project Case / Groupwork in Lab</td>
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<td>18 / 20 April</td>
<td>Editor &amp; Sim Demo &amp; Groupwork in Lab / <strong>Assignment II Demo</strong></td>
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<td>25 / 27 April</td>
<td><strong>SPRING BREAK</strong></td>
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<td>2 / 4 May</td>
<td>FMS set-up problems / Project meeting</td>
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<td>9 / 11 May</td>
<td>Project meeting / Networks &amp; Ent. Integration</td>
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<td><strong>16 / 18 May</strong></td>
<td><strong>Quiz II</strong> &amp; Groupwork in Lab / Project meeting</td>
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<td>23 / 25 May</td>
<td>Project meeting / Project meeting</td>
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