SIE 483/583
Computer Integrated Manufacturing (CIM) Systems
Fall 2016

Class hours: TTh 12:30 a.m. – 1:45 p.m., 105 Chavez (ENGR162A for lab sessions)

Course URL: http://www.d2l.arizona.edu (where you need to login with Arizona account)

Instructor: Dr. Young Jun Son
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Office hours: MW 1 – 2:30 p.m., or by appointment

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TA Office hours: TTh 10:30 – 12:00 p.m., or by appointment

Purpose: This course is intended to expose students to modern manufacturing and automation principles with a specific focus on CIM and engineering integration issues (both concepts as well as hands-on practice). The course will present in-depth materials on automated shop floor control, including manufacturing equipment control, process plan representation models, control architecture (hierarchical vs. distributed), and functional architecture (decision-making, monitoring, and execution). The course will also present materials on CAPP, PLC, robotics and integration issues in manufacturing. Students via class projects will develop an automated shop floor control system for the manufacturing cell at The University of Arizona CIM lab.

Prerequisites: SIE 383. Also, each student should be familiar with a CAD system, a scientific programming language, and a database system. Homework will provide hands-on practice, which is the basis for understanding the topics conceptually covered in class.

Textbook: No textbook is required for this course.

Course Handouts: lecture notes, papers, book chapters, manuals. Handouts (and lecture notes) will be uploaded in the morning of the class date. Therefore, students are required to visit the course web site and print out new handouts before they come to the class.

Topics to be covered:
1. Introduction to manufacturing
2. Engineering product specification
3. Geometric tolerancing
4. Numerical control (NC), NC programming, robot programming, and PLC
5. Process plan representation models (for automation)
6. Computer control of manufacturing equipment (serial and parallel communications)
7. Shop floor control architecture (hierarchical vs. distributed)
8. Functional architecture (decision-making, monitoring, and execution)
9. Development of actual shop floor control system (involving LAN, communication server)
10. Interface of shop floor controller with business systems (ERP or order system)
11. Auxiliary devices supporting manufacturing automation/inspection (vision system, RFID, CMM)

Class Projects: At the beginning of the semester, the class will be partitioned into groups. The same grouping will be maintained throughout the whole semester. Further information on the project will be provided in a separate handout in the middle of the semester.

Grading:
1. Homework: 25 %
2. Midterm Exam: 20 %
3. Quizzes: 5 %
4. Final Exam: 25 %, 1:00~3:00 p.m. at the classroom on December 9, 2016
5. Project: 25 %

Computer Usage:
1. Microsoft Access database
2. Programming language (e.g. Microsoft Visual Studio or Java)
3. Network programming (TCP/IP)
4. Device control programming (serial port or parallel port)

Course Rules:
1. Homeworks need to be done individually unless otherwise mentioned.
2. Students are expected to attend lectures and lab. Students not attending a lab session or arranging to make it up will receive a 0 for that assignment. The instructor reserves the right to give a pop quiz at any time. You should expect such a quiz on any day where less that 50% of the registered students are not in class at the designated start time.
3. You can miss one quiz without affecting your grade. However, no make-up quizzes or assignments will be given under any circumstances (except the situation mentioned in item 4).
4. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion; Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.
5. Students are not allowed to use pagers and cell phones during the class.
6. Plagiarism is not allowed to any extent for the assignments, exams, and final projects.
7. Threatening behavior by students is prohibited (refer to the University policy at http://policy.web.arizona.edu/~policy/threaten.shtml).
8. Students with Disabilities: If you anticipate the need for reasonable accommodations to meet the requirements of this course, you must register with the Disability Resource Center and request that the DRC send me official notification of your accommodation needs as soon as possible. Please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.
9. The information contained in the syllabus (except the grade and absence policies) may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.

Inclusive Excellence:
Inclusive Excellence is a fundamental part of the University of Arizona's strategic plan and culture. As part of this initiative, the institution embraces and practices diversity and inclusiveness. These values are expected, respected and welcomed in this course.

This course supports elective gender pronoun use and self-identification; rosters indicating such choices will be updated throughout the semester, upon student request. As the course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect.