

Fall 2011:IE 4230 - Systems Integration (3 cr.)

Lecture: 1:00 - 1:50 pm, MWF, LSBE 265

Lab: See IE 4222

Instructor: Dr. Ryan G. Rosandich, Associate Professor

Office: VKH 107

Office Hours: 3:00-3:50 pm, MWF, or by appointment

E-mail: rrosandi@d.umn.edu

Phone: 726-7226 (my office); 726-6161 (M.I.E. Office); 726-8596 (M.I.E. Fax)

Textbook: Stenerson, Jon, *Industrial Automation and Process Control*, Prentice Hall, New Jersey (2003).

Web page: http://www.d.umn.edu/~rrosandi/Courses/IE_4230/index.htm

Prerequisites: IE 4020 or ME 3140 and ECE 2006 and CS requirement

Course Objectives

When you finish this course, it is hoped that you will:

- 1) Understand the key concepts of manufacturing systems integration, including:
 - Information flow in a manufacturing enterprise (b, c, d, e, g, k, l)
 - Organization of integrated manufacturing systems (c, d, k, l)
 - Popular network topologies and protocols (a, c, e, j, k, l)
 - Fixed and programmable automation techniques (a, c, e, k, l)
 - Flexible material handling (c, e, j, k, l)
 - Flexible manufacturing methods (c, e, j, k, l)
 - Techniques for part tracking and identification (c, e, j, k, l)
 - Techniques for automated visual inspection (a, b, c, e, j, k, l)
- 2) Acquire some of the skills required for effective design and operation of modern manufacturing systems, including:
 - Interconnecting various intelligent devices in a manufacturing system (c, e, k, l)
 - Utilizing fixed automation, jigs, and fixtures (a, c, e, k, l)
 - Programming PLCs using ladder diagram, function block, and sequential methods (c, e, j, k, l)
 - Programming a CNC router (c, e, k, l)
 - Programming a GMF-S10 robot using KAREL (c, e, k, l)
 - Using manufacturing execution system (MES) software (c, e, k, l)

Program Outcomes (ABET)

This course contributes toward developing the following:

- An ability to apply knowledge of mathematics, science and engineering appropriate to an industrial engineer (a)
- An ability to design, develop, implement and improve integrated systems that include people, materials, information, equipment, and energy (c)
- An ability to identify, formulate and solve industrial engineering problems (e)
- An ability to use the techniques, skills, and modern engineering tools necessary for industrial engineering practice (k)
- A working knowledge of manufacturing processes and systems (l)

Grading:

Minimum grades will be determined by the standard grading system (93, 90, 87...), but I may adjust (curve) grades based on the relative distribution of scores.

- **Homework (15%):** Homework will consist of various exercises assigned throughout the course. Late homework without a valid reason will receive no credit.
- **Midterm Exams (2 @ 25%):** In-class exams with closed book and no notes.
- **Final Exam (35%):** In-class exam with closed book and no notes.

Policies:

- **Disabilities:** It is the policy and practice of the University of Minnesota Duluth to create inclusive learning environments for all students, including students with disabilities. If there are aspects of this course that result in barriers to your inclusion or your ability to meet course requirements – such as time limited exams, inaccessible web content, or the use of non-captioned videos – please notify the instructor as soon as possible. You are also encouraged to contact the Office of Disability Resources to discuss and arrange reasonable accommodations. Please call 218-726-6130 or visit the DR website at www.d.umn.edu/access for more information.
- **Equal Opportunity:** The University of Minnesota is committed to the practice that all of its students shall have equal educational opportunities. The University expressly forbids discrimination on the basis of race, color, gender, sexual orientation, disability, veteran's status, ethnicity, religion, creed, national origin, or marital status.
- **Academic Integrity:** Academic dishonesty tarnishes UMD's reputation and discredits the accomplishments of students. Academic dishonesty is regarded as a serious offense by all members of the academic community. UMD's Student Academic Integrity Policy can be found at: <http://www.d.umn.edu/conduct/integrity/>
- **Student Conduct:** Appropriate classroom conduct promotes an environment of academic achievement and integrity. Disruptive classroom behavior that substantially or repeatedly interrupts either the instructor's ability to teach, or student learning, is prohibited. Student are expected adhere to Board of Regents Policy: *Student Conduct Code*: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.pdf
- **Absence from Class:** Please let me know ahead of time (phone, fax, e-mail, voice mail) if you must be absent for legitimate reasons. These are subpoenas, jury duty, military duty, religious observances, illness, bereavement for immediate family, and NCAA varsity intercollegiate athletics. Excess unexcused absences will result in failure of the course.
- **Grade Reconsideration:** If you feel that you have been graded unfairly on any assignment or exam, you must contact me within 7 days of receiving the grade. Grades will not be reconsidered at any other time.
- **Work Ethic:** I expect each student to read all suggested material, make a good effort at all assigned work, and be prepared for class. A guideline is to expect to spend about 2 hours outside of class for each hour in class, but quality is more important to me than quantity.

Schedule:

See the course web page for the latest schedule.