

SYLLABUS
IME 4580 - Manufacturing Systems Integration
Spring 2012

Current Catalog Data: Analysis of integrated manufacturing systems. Topics include modeling of manufacturing system and the role of computers in control and integration of manufacturing systems. (2-3), Credit: 3 hrs

Prerequisite Courses:

1. Understanding of capabilities of Graphical Computer Systems - IME 2460
2. Capability to define and follow an algorithmic approach to problem solving - CS 1040or CS 1110

Current Textbook:

1. Chang, T.C., Wysk, R.A., & Wang, H.P. (1998). Computer-Aided Manufacturing, Second Edition, Prentice-Hall. (recommended)
2. James A. Rehg, Henry W. Kraebber (2001), Computer-Integrated Manufacturing, Second Edition, Prentice-Hall. (recommended)
3. Pavel Ikonov, CAD 3D Data Exchange, 2nd Ed., (e-book - free) 2009

Course Coordinator: Dr. Pavel G. Ikonov / Office E221 / Phone:(269) 276-3284
E-mail Pavel.Ikonov@wmich.edu /

Office hours Monday /Wednesday 12:30-2:30 PM, Thursday 1:30-2:30 PM
(Additional office hours by appointment Monday - Friday (9:00 AM-9:00 PM))

Course Requirements:

- Attend all lectures, labs and demonstrations
- Participate in class discussions and all related activities
- Complete all assignments and meet all due dates
- Participate in group projects
- Use the library, Internet and, supplemental materials frequently

PERFORMANCE OBJECTIVES: Students who successfully complete this course will:

Course Objectives	Performance Criteria
1 Identify appropriate computer control in a manufacturing setting.	A1 Plan, design, analyze, implement, and improve cost-effective manufacturing methods ABET/ TAC-A
2 Perform experiments with CNC machines, DNC, part programming, Robots and factory automation	
3 Analyze typical automated systems commonly found in manufacturing enterprises	
4 Utilize data communications for the integration of manufacturing processes	
5 Function as a member of a team to undertake the analysis and integration of automated manufacturing processes	

Evaluation:

Homework assignments	10 points	93 -100% = A
Laboratory assignments	35	89-92%=BA
Pop Quiz's	5	83- 88%=B
Mid-Term examination	25	79-82%=CB
Final examination	25	73-78%=C
		69-72%=DC
		63-68%=D
		Below 63% = E
100 points		

Mid-term Exam: The mid-term exam will be given on the last week of February. It will be comprehensive, covering all material that was presented in the lecture and the laboratory to date.

Final Exam: The final exam will be held on Wednesday, April 25 from 8:00 am-10:00 am. The final exam will be comprehensive, covering all material that was presented in the lecture and the laboratory for the entire semester. The final exam will account for 25 % of the grade.

Homework: Various homework assignments will be made during the course of the semester. Homework will not be accepted late.

Pop quizzes/Class Participation: Pop quizzes will not be announced and can not be made up if missed. All students are expected to actively participate in the discussion of the topic of the day. The students will be evaluated on their individual degree of participation.

Lab Activities: Various means will be used to evaluate the students lab work including about not limited to) lab reports, lab quizzes, questioning about details of lab set-ups, etc.

Lab Housekeeping: The maintenance of a clean and safe work area is vital to the manufacturing enterprise. All students will be required to clean up after themselves. Furthermore, every student will be required to determine and accomplish a necessary item of common housekeeping at each lab session.

(Note: Due the arrangement of the labs work, missing more than one or two labs may lead to discharge from the course)

Topics and Schedule:

Week 1	Introduction to manufacturing processes and MSI, Analysis of Manufacturing Systems
Week 2	CAD/CAM –fundamentals of geometrical modeling and machining
Week 3	CAD/CAM –fundamentals, CAD/CAM data exchange-DXF, IGES, STEP
Week 4	CNC fundamentals-computational geometry for CNC machining
Week 5	CNC motion and precision control
Week 6	CNC motion control-AC. DC, and step motors, transducers and interpolators
Week 7	CAM simulation,
Week 7	Virtual Prototyping
Week 9	Inspection using Coordinate Measuring Machines (CMM) and computer vision,
Week 10	Rapid Prototyping (RP)
Week 11	Group Technology
Week 12	Computer Aided Process Planning (CAPP)
Week 13	DNC, FMS, & Computer Networks
Week 14	Robotics and Factory automation

Professional Component

Elected course that addresses the requirements for professional development with:

- Basic science: 10%
- Engineering topics: 90%
- General education: 10%

Relationship to Program Educational Outcomes

This course is advanced course that:

- (1) Developing skills for manufacturing system integration, design, prototyping, manufacturing and testing
- (2) Provides development and communications skills in the technical area of CAD/CAM production

- **Computer Usage:**

Extensive use of computer hardware and software is required throughout this course. Most lab sessions take place at the CAM Lab (F112) and CAES computer Lab (C228)

- **Laboratory Usage:**

Because of class size, most of the labs use simulation software in the CAE lab. However, the industrial grade equipment is used to prototype the product by all the students during the course of the semester

- **Oral and Written Communications:**

Written reports are required for all laboratory exercises. There are no formal oral presentations required for this course, however, active participation is expected during the course of lectures.

- **Calculus Usage:**

There is no specific calculus requirement for this course.

- **Library Usage:**

There is no specific library requirement for this course.

You are responsible for making yourself aware of and understanding the policies and procedures in the Undergraduate and Graduate Catalogs that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. [The policies can be found at <http://catalog.wmich.edu> under Academic Policies, Student Rights and Responsibilities.] If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with your instructor if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test.

Pavel Ikononov

Prepared by: Dr. Pavel G. Ikononov

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