NETECH

MECHANICAL ENGINEERING TECHNOLOGY

A. COURSE INFORMATION

Course Title Automation, MCT 235 Winter 2016
Credit Hours: 4 **Contact Hours** 3 Lecture Hours and 2 Laboratory Hours
Meeting Days, Times, and Rooms: Daily 0745 to 1214

Instructors: Dean Plowman, David Turner
Telephone/Extension: 401-739-5000
E-mail address: dplowman@neit.edu
Office location: S345
Office hours: By Appointment

Course description:
The course studies the utilization of robotics, CNC, DNC, and automated controls and assembly processes in the manufacturing environment. Levels of automation, as well as flexible and hard automation, open and closed loop control, adaptic control and material handling will be discussed.

Course prerequisite(s): none

Required/recommended textbook/resources (APA format) (and any other materials):
Rehg, James A.; *Introduction to Robotics in CIM Systems,* Fifth Edition; Prentice Hall; 2003

Course Learning Outcomes/Assessment measures:
The student will be able to:

1. identify the issues related to Computer-Integrated Manufacturing in order to optimize manufacturing facilities.
   Assessment: Homework, quizzes, and final exam.
2. identify the components and subsystems that make up a Computer-Integrated Manufacturing environment.
   Assessment: Homework, quizzes, and final exam.
3. analyze Computer-Integrated Manufacturing systems in manufacturing facilities.
   Assessment: Homework, quizzes, and final exam.
4. select the sensors needed in Computer-Integrated Manufacturing systems.
   Assessment: Homework, quizzes, and final exam
5. design a unique project using a robotic system.
   Assessment: Robotic project.
6. design and fabricate required fixtures and end of arm tooling for robotic systems.
   Assessment: Homework, end of arm tooling design calculations, quizzes, and final exam, and robotic project.
7. program and use a robot system.
   Assessment: Robotic project.

Homework Assignments	15%
Blog or Discussion Board	5%
End of Arm Tooling Design Calculations	10%

Quizzes	20%
Final Exam	20%
Robotic Project	30%

Instructional Strategies/Methodology

The course is designed to provide lecture on theory and provide examples of the theory. Students will be given in class examples to solve and in class lab assignments to reinforce the theory and problem solving skills. Homework is also assigned to be done outside of class to reinforce the theory and problem solving skills.

Evaluation and Grading Criteria:

Homework Assignments	15%
Blog or Discussion Board	5%
End of Arm Tooling Design Calculations	10%
Quizzes	20%
Final Exam	20%
Robotic Project	30%

Attendance Policy (Tardiness):

Make-up Policy:

B. COLLEGE POLICIES

Academic Honesty Policy:

Any project, paper, or examination is expected to be the student's own work, in the student's own words. Willful academic dishonesty (including but not limited to copying another student's work or allowing one's own work to be copied; using notes or books during an examination without the instructor's advance permission; presenting information or images copied from a book, journal, or online source as one's own) will not be tolerated.

Other Policies:

Each student is responsible for accessing the http://wcb.neit.edu/shandbook/syllabuspolicies.pdf web site and becoming familiar with all academic policies.

"The design of this course as outlined in the syllabus requires you to do work outside of class to be successful."

C. ADDITIONAL POLICIES

Only TI30 or equivalent calculators are permitted on exams.

Students are expected to attend all lecture and laboratory classes. Students are also expected to arrive for all classes prepared and on time. Students are responsible for obtaining any missed notes, handouts, or lecture material. All computational assignments will be submitted on Engineering Graph Paper.

Any student who misses an exam will be able to make up the exam within one week of the exam date. It is the student's responsibility to arrange for the makeup exam. If the student did not give prior notice before the exam, the grade on a make-up exam will be reduced by 20%.

D. ACADEMIC SUPPORT

Academic support services are available through the Academic Skills Center, Student Support Services, and the Library as well as in the department. See the tutoring schedule.

E. COURSE SCHEDULE

Day	Topic	In-class Activity/ Assignment	Out-of-class Activity/Assignment	Due Dates
One	Lecture Intro to Automation		Introduction Chapter 1: Questions 1, 2, 3, 7, 13, 22, 27 Problems 1, 2, 3, 7, & 13	
One/Two	Lecture • Robohand, Inc Dimension – www.robohand.com • Quiz 1 next week – Chapters 1 and 2 - from the textbook and my Power Point Presentation. • Automation project proposal		Robot Classification Chapter 2: Questions 1, 2, 3, 7, 13, 22, 27 Problems 1, 2, 8, 9, 15, & 21	
Three	Lecture Quiz 1 Lab – programming and designing Automation project		Automated Systems Chapter 3: Questions 1, 2, 3, & 4 Problems 1, 2, 3, & 4	
Four	Quiz 1 passed back Lecture Lab – programming and designing Automation project		End of Arm Tooling Chapter 4: Questions 1, 3, 8, 15, & 16 Problems 1, 3, 8, 15, & 16	

Day				
Five	Lecture Quiz 1 passed back Lab – programming designing and building Automation project Quiz 2 Next Week on Chapter 5 of Power Point Presentation		Sensors Chapter 5: Questions 4, 5, & 7: Problems 4, 5, & 7	
Five	Quiz 2 Lecture Lab – programming designing and building Automation project		Vision Systems Chapter 6: Questions 1, 4, & 10	
Six	Quiz 2 passed back Lab – programming designing and building Automation project		System Integration Chapter 7: Questions 6, 7, & 8	
Six	Final Exam Week 9 on Lecture material and Text Quiz 3 and Lab – programming designing and building Automation		Work Cell Programming Chapter 8: Questions 1, 5, & 12	

	project			
Day				
Seven	Final Lab – final programming and building of Automation project		Justification / Safety Chapter 9: Problems 1 & 2 Chapter 10: Problems 1, 4, 6, & 7	
Seven	Automation Project Presentation			

Caveat

NEIT reserves the right to change the above schedules and requirements without advance notice.

- Add as many as necessary…each assignment or activity should have its own separate sheet explaining the activity or assignment in greater detail.

Interim Products Robot Overview - Wolf PAC

1. Powering ON the System
    a. Breaker Boxes, Controller Location, Powerwave, and Cell Controller
    b. Review shut down procedure

2. System Specific Overview
    a. Safety Doors, Light Curtains, E-Stops, Limit Switches
    b. 2 – Cell Overview Tables
    c. Jogging the Robot and Moving it along the Track
    d. Wolf Cell Controller

3. Basic Robotic Functions
    a. Jogging Robot
    b. Acknowledging and resetting errors
    c. Set TCP
    d. Creating Modules, Routines, and Data sets
    e. Numbering convention

4. Teach Pendent Screens
    a. Production Manager
    b. Program Data
    c. Program Editor
    d. Wolfware Arc
    e. Weld guide view
    f. Jogging Window
    g. Shortcuts / Buttons
    h. Ect.

5. Service Routines
    a. Move to Home
    b. Check TCP
    c. Wire Cut
    d. Wire feeder
    e. Update TCP manual and automatic
    f. Ect.

6. Review of Point to Point (EB's tern is Non_Adaptive)
    a. Line of Code
    b. Air Moves
    c. Approach Points
    d. Depart Points

    e. Explanation of Each Data Set in Depth
    f. Part Fit – Up
    g. Torch Angles

10. Welding Exercises (*Heavy Weld?*)
    a. Butt Joint
    b. T Joint
    c. Tracking
    d. Searching
    e. Multi layered welding

11. Summary of the week
    a. Thoughts
    b. Likes and dislikes
    c. Q & A's

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