ETI260

Advanced Control and Maintenance

4 Credit Hours

Prepared by:
John McDaniel

Revised Date: October 24, 2014
August, 2007

Chris DeGeare, M.Ed., Division Chair, Business and Technical Education
Dena McCaffrey, Ed.D. Dean, Career & Technical Education
ETI260 Advanced Control and Maintenance

I. CATALOGUE DESCRIPTION

A. Pre-requisite: ETI236 Industrial Control and MTT147 Hydraulics and Pneumatics I  
   Co-requisites: ETI225 Introduction to Digital Circuits and ETI263 PLC’s for Automation

B. Credit hour award: 4

C. Description: Advanced Control and Maintenance will expand on the knowledge gained in the Industrial Control course as well as introduce students to maintenance principles found within the industrial workplace. In addition, those taking the class will be introduced to the fundamentals of robotic operations. Students will have more opportunities for hands-on activities. (S)

II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

| Demonstrate ability to design a working electrical line diagram and construct a working industrial control panel based off of the same line diagram. | Hands-on project  
Observation of lab performance, Homework |
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| Demonstrate ability to effectively troubleshoot common issues found in industrial control systems and control panels. | Hands-on project  
Observation of lab performance  
Group critique |
| Demonstrate the ability to utilize proper electrical components based off of the provided voltage and ampacity values for a circuit. | Hands-on project  
Observation of lab performance |
| Demonstrate how to properly wire and implement or replace various industrial control devices into a working electrical control system. | Hands-on project  
Observation of lab performance |
| Identify the various parts of an industrial control robot. | Written exams  
Quizzes  
Observation of lab performance |
| Demonstrate the ability to manipulate and control a Fanuc industrial robot in a manner that follows proper safety protocol in an industrial work environment. | Written exams  
Quizzes  
Observation of lab performance  
Hands-on project |
III. OUTLINE OF TOPICS

A. Maintenance Principles
   1. Preventive and predictive maintenance
   2. Maintenance scenarios
   3. Troubleshooting and repairing faulty maintenance situations
   4. Safety protocols used by industrial electricians in the work place

B. Electrical Panel Design and Construction
   1. Electrical circuit design and applications
   2. Industrial control panel build procedures
   3. Advanced industrial control devices and applications

C. Industrial Automation Systems
   1. Evaluating and understanding an automated control system
   2. Troubleshooting an automated control system

D. Principles of Industrial Robotics and Applications
   1. Evolution of industrial robotics
   2. Classifications of industrial robots
   3. Types of automation
   4. The role of robots in an industrial facility

E. Fundamentals of Robotics
   1. Identifying the parts of a robot
   2. Robot axis and joint identification and movements
   3. Robot configurations and uses

F. Programming the industrial robot
   1. Motion control applications
   2. Programming methods
   3. Characteristics of the different types of programming
   4. Peripheral applications, such as vision, and plc inputs and outputs
   5. Start-up and jog procedure using the Fanuc L200ic robot
   6. Creating a teach pendant program using the Fanuc L200ic robot
   7. Proper preventive and troubleshooting methods associated with an industrial robot
III. METHODS OF INSTRUCTION
   A. Lecture
   B. Research Activities
   C. Instructor Led Demonstrations
   D. Hands-On Activities

IV. REQUIRED TEXTBOOK
   None

V. REQUIRED MATERIALS
   A. Paper
   B. Pens
   C. Pencils
   D. Safety Glasses

VI. SUPPLEMENTAL REFERENCES
   A. Fanuc Robotics Training Manuals
   B. Acquired Research Documents
   C. Videos

VII. METHOD OF EVALUATION
   A. Homework 20%
   B. Hands on exercises 50%
C. Exams 20%

D. Attendance 10%

A = 90-100%
B = 80-90%
C = 70-80%
D = 60-70%
F = Below 60%

VIII. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Library; phone 636-797-3000, ext. 3169).

IX. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College Website http://www.jeffco.edu).

X. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

XI. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.