SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE MARIE, ON

COURSE OUTLINE

Course Title: AUTOMATIC CONTROL SYSTEMS

Code No.: ELR 315-6   Semester: SIX

Program: ELECTRICAL TECHNOLOGY

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Date: 01/1998   Previous Outline Date: 01/1997

Approved: _____   _____
                        Dean   Date

Total Credits: Prerequisite(s):
Length of Course: Total Credit Hours:

COURSE NAME
AUTOMATIC CONTROL SYSTEMS

COURSE NUMBER
ELR 315-6

I.   COURSE DESCRIPTION:

The student will develop an understanding of control system integration of PLCs, MMIs, AC & DC drives and instrumentation Advanced PLC techniques and MMI software will be used to design, document and commission automated control systems. The student will interface PLC control with MMIs to control industrial drives and process control loops. Classical control theory will be introduced to assist with project implementation.

II.   LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:
(Generic Skills Learning Outcomes placement on the course outline will be determined and communicated at a later date.)

Upon successful completion of this course the student will demonstrate the ability to:

1.   Assist in the design of a variety of control systems.

Potential Elements of the Performance:

- utilize block diagrams and transfer functions to model basic control systems

- derive the Laplace transform of a time domain function

- use tables to find inverse Laplace transforms

- simplify block diagrams

- discuss criteria for system stability using Bode diagrams and s-plane analysis

Upon successful completion of lab portion of this course the student will demonstrate the ability to:

2)   Develop and demonstrate animated graphics for MMI displays and advance programming of MMI screens

Potential Elements of the Performance:

- the ability to program animated graphic screens for MMI,

- the ability to program MMI to display various variables in both digital and animated forms

- the ability to set-up animated control functions on MMI graphic screens

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3)   Develop advance PLC programs to control various electrical

Potential Elements of the Performance:

- the ability to program PLCs to control Motor Drives, AC Variable Frequency Drives and Soft-starts

- the ability to program a PLCs to retrieve and display motor control functions and data.

- the ability to connect PLCs in Scanner mode (master) or adapter mode (slave) to transfer information from PLCs or other smart equipment through Peer to Peer or Remote I/O communications.

4)   Assemble and connect a variety of automated equipment to perform process control and to develop process control PLC programs and MMI graphic screens.

Potential Elements of the Performance:

- the ability to configure PLC Analog input and output interfacing modules

- the ability to program and configure PLC, PID software advance instructions

- the ability to program PLC to control a single loop process

- the ability to program a PLC to control two and three loop processes (cascading).

- the ability to program a MMI to control one ,two and three loop processes

5)   Assemble and connect a variety of electrical automated equipment to perform as an integrated system utilizing task and control through MMI software and PLC hardware

Potential Elements of the Performance:

- the ability to program PLCs, MMI, to perform selected tasks over different networks from local and remote locations.

- the ability to program a PLC, MMI connect a basic open- loop control systems and run the system through Ethernet and DH+ Protocols from a remote location

- the ability to program a PLC, MMI connect a basic close- loop control systems and run the system through Ethernet and DH+ Protocols from a remote location

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- the ability to connect and implement basic safety circuits and requirements for basic open and closed, control systems.

- Select and connect several different types of electrical equipment such as Motor Drives, PLCs, Process Control equipment, MMIs along with sensing devices and output power devices into a structured unified controlled system to perform simulated tasks..

III. TOPICS:

1) Overview of control terminology and principles.

2) Overview of industrial controls and automation hardware/software.

3) Overview of MMI software.

4) Overview of PLC/PC networking.

5) Advanced PLC programming.

6) Motor drive control with PLCs.

7) Introduction to process control.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Required resources will be supplied by the instructor.

V. EVALUATION PROCESS/GRADING SYSTEM
The final grade for the course will be determined as follows:

THEORY   40%

PROJECTS   60%

The grading system used will be as follows:

A+   90 to 100%

A   80 to 89%

B   70 to 79%

C   55 to 69%

R   < 55%   in theory and/or project component (repeat course)

- In order to maintain a passing grade the student must obtain a minimum 55% average in both the theory and project portions of the course
- If a student misses a test he/she must have a valid reason (ie. medical or family emergency). In addition, the school must be notified before the scheduled test sitting. The student should contact the instructor involved. If the instructor cannot be reached leave a message with the Dean's office or the College switchboard. If this procedure is not followed the student will receive a mark of zero on the test with no rewrite option.

- Special Needs
  If you are a student with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717, 491 so that support services can be arranged for you.
- Retention of Course Outlines
  It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.

- Disclaimer for Meeting the Needs of the Learners

- Substitute Course Information is available at the Registrar's Office.

VII. PRIOR LEARNING ASSESSMENT

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the following: