SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: AUTOMATED CONTROL SYSTEMS

CODE NO.: CET684   **SEMESTER:** N/A

PROGRAM: ELECTRICAL MAINTENANCE TECHNICIAN
(COMPUTER LITERACY)

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DATE: AUGUST 1997   **PREVIOUS OUTLINE DATED:** JULY 1996

APPROVED: _____   _Sept. 2/97_
                DEAN   DATE

TOTAL CREDITS: 12

PREREQUISITE(S): N/A

LENGTH OF COURSE: 8 WEEKS @ 11 HOURS PER WEEK

TOTAL CREDIT HOURS: 88 HOURS

AUTOMATED SYSTEM INTEGRATION
WITH
INDUSTRIAL DATA COMMUNICATION
COURSE NAME

CET - 684

CODE NO.

COURSE DESCRIPTION:

The student will develop the understanding of Automated System Integration of PLC's, MMI's, AC & DC Drives. The student will use advanced PLC techniques & MMI software to program and troubleshoot Automated Systems. This will allow the student to interface PLC's with MMI's to control industrial processes.

The student will also identify the fundamentals of data communication which includes definitions, terminology and basic concepts. The four major layers of Data communication systems include components, context, types and computers will be overviewed with applications, lab demonstrations and practical exercises. Fiber optical links will be highlighted as one of the data communication network

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)   Identify the Hardware & Software components of a Automated Systems for the purpose of maintaining & troubleshooting integrated processes.

Potential Elements of the Performance:

- identify and state the purpose of industrial automation principles with defined terms and classifications
- distinguish and relate to the hardware & software components of an integrated automated system
- utilize industrial automated software programs and tools on different operating platforms such as Microsoft DOS and Windows
- produce drawings and document programs that can be used effectively in the maintaining and troubleshooting industrial automated systems
- identify with multi vendor PLC hardware & software for the purpose of program understanding and development
- utilize MMI software to integrate with PLC control of industrial processes

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2) Identify and relate to Data Communication principals for the purpose
    of understanding & maintaining in plant networks.

    Potential Elements of the Performance:

    - identify and state the purpose of the three basic parts of the component layer:
      1) nodes , 2) media, 3) protocol
    - describe the logical and physical connections which comprise network topologies
    - differentiate between the major network types:
      (ie. LAN vs. Wan. vs. Public networks)
    - list and describe a network application in terms of data communication fundamentals:
      (ie. Fast Ethernet @ 100 Mbps over cat.5 STP cable or optical fiber)

3) Perform basic installation and maintenance tasks associated with optical fiber links.

    Potential Elements of the Performance:

    - identify and state the purpose of the components of an optical fiber-link
    - differentiate between step index single-mode, step index multimode and graded index
      multimode optical fibers
    - describe how light propagates along the various types of optical fibers
    - state the causes of data rate limitations in an optical fiber link
    - state the safety hazards associated with handling optical fibers
    - describe how to prepare an optical fiber for mechanical splicing and termination
    - prepare a mechanical splice
    - list and describe the operation of various light sources and detectors used with optical
      fiber links
    - utilize the Canadian Electrical Code (C.S.A. Standard c22.1-94) Section 56 as it applies
      to the installation of optical fiber cables
    - describe various optical fiber cable and connector types
    - describe various optical fiber distribution networks and associated system components

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II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE (Continued)

III. TOPICS: Automated Integrated Systems

1) Introduction of terms and concepts related to the Automation Industry.

2) Overview of Automated Industrial Controls (ie. Hardwired vs. Softwired)

3) Introduction of Multi vendor PLC control (ie. AB vs. Modicon vs. GE)

4) Introduction to the advanced instruction set for the PLC 5 & SLC 500 family.

5) Introduction to the advanced instruction set for the Modicon 984 family.

6) Overview of MMI software such as Wonderware, Rsview 32 and Intellution.

7) Application of automation system integration with industrial processes.

III. TOPICS: Industrial Data Communications

1) Introduction of terms and concepts related to Data Communication Fundamentals.

2) Overview of the component layer with Media criteria.

3) Introduction to termination classification and different types of connections.

4) Overview of Low speed data communication vs. High speed data communications.

5) Understanding of the Open System Network Model which includes Data Topologies, Data Switching and Network types.

6) Overview of Network architecture & protocols.

7) Application of internetworking architectures utilized with industrial processes.

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IV.   REQUIRED RESOURCES/TEXTS/MATERIALS:

1 - Internet access for industrial searches such as http://www.rockwell.com

2 - Industrial manuals accessible in Lab

3 - Online help facilities in the software development packages.

4 - Resource material available from on the job training.

5 - Resource Textbooks available in the Library:

   1) Data Communication (Concepts And Applications)
      By: McGovern

   2) Data Communications, Computer Network And Open Systems
      By: Halsail

   3) Introduction To Digital And Data Communications
      By: Miller

   4) NetWare Professional Reference
      By: Siyan

6- Resources: Notes supplied by instructor (various texts are also available in the library)

V.   EVALUATION PROCESS/GRADING SYSTEM

The final grade for the course will be derived from the results of instructor assigned
Tests, and projects:

3	Tests	60%
4	Projects	40%
Total		100%

The grading system used will be as follows:

A+ = 90-100%,   A= 80-90%, B=70-79%, C=55-64%, R=Repeat

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VI.   SPECIAL NOTES:

- 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.

- Any Other Special Notes appropriate to your course.

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: