

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE OUTLINE: AUTOMATED CONTROL SYSTEMS
CODE NO.: ELR 315-6
PROGRAM: ELECTRICAL TECHNOLOGY
SEMESTER: SIX
DATE: JANUARY 1992
PREVIOUS
OUTLINE DATED: JANUARY 1991
AUTHOR: ENO LUDAVICIUS

NEW: _____ REV.: X

APPROVED:

W. Filipowich
COORDINATOR

Jan 7/93
DATE

L.P. Craggett
DEAN

93-01-07
DATE

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TOTAL CREDIT HOURS: 80

PREREQUISITE(S): ELR 320 - 6

PHILOSOPHY/GOALS:

IN THIS COURSE THE STUDENT WILL DEVELOP THE UNDERSTANDING OF AUTOMATED FEEDBACK CONTROL SYSTEMS AND THE AUTOMATED TOOLS FOR FACTORY AUTOMATION. THE LABWORK WILL INCLUDE PROGRAMMING PLC'S WITH PC'S, INTERFACING ROBOTS TO THEIR WORKCELLS, NETWORKING PC'S WITH FIBER OPTIC LINKS AND CONTROLLING POWER ELECTRONIC DRIVES FROM PLC CONTROL.

STUDENT PERFORMANCE OBJECTIVES:

UPON SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENT WILL BE ABLE TO:

1. PROGRAM AND TROUBLESHOOT THE MODICON 984 PLC FAMILY.
2. CONNECT SIMPLE NETWORKS WITH FIBER OPTICS.
3. DESIGN AND IMPLEMENT ROBOTIC WORKCELLS.
4. CONTROL A PROCESS WITH A PID LOOP CONTROLLER.

TOPICS TO BE COVERED:

1. OVERVIEW OF FEEDBACK CONTROL SYSTEMS.
2. COMPUTER-CONTROLLED INDUSTRIAL MACHINES, PROCESSES AND ROBOTS.
3. INTRODUCTION TO COMPUTER-INTEGRATED MANUFACTURING.
4. ROBOTIC IN CIM SYSTEMS.
5. PLC'S IN CIM SYSTEMS.

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LEARNING ACTIVITIES	REQUIRED RESOURCES
1. OVERVIEW OF FEEDBACK CONTROL SYSTEMS	TEXT: FEEDBACK CONTROL SYSTEMS BY: C. PHILLIPS, R. HARBOR
- THE CONTROL PROBLEM - THE LAPLACE TRANSFORM - THEOREMS OF THE LAPLACE TRANSFORM - DIFFERENTIAL EQUATIONS AND TRANSFER FUNCTIONS - LINEARIZATION	CHAPTER ONE
- SYSTEM MODELLING - ELECTRICAL CIRCUITS - BLOCK DIAGRAMS AND SIGNAL FLOW GRAPHS - ELECTROMECHANICAL SYSTEMS - ANALOGOUS SYSTEMS - A ROBOTIC CONTROL SYSTEM	CHAPTER TWO
- SYSTEM RESPONSES - TIME RESPONSE OF SYSTEMS - FREQUENCY RESPONSE OF SYSTEMS - REDUCED ORDER MODELS	CHAPTER FOUR
- CONTROL SYSTEM CHARACTERISTICS - CLOSED LOOP CONTROL SYSTEM STABILITY - SENSITIVITY - DISTURBANCE REJECTION - STEADY-STATE ACCURACY - TRANSIENT RESPONSE - CLOSED LOOP FREQUENCY RESPONSE	CHAPTER FIVE
- FREQUENCY RESPONSE DESIGN - CONTROL SYSTEM SPECIFICATION - PID CONTROLLER DESIGN AND IMPLEMENTATION	CHAPTER NINE
- DIGITAL CONTROL SYSTEM - A DISCRETE TIME SYSTEM - TRANSFORM METHODS - SIMULATION DIAGRAMS AND FLOW GRAPHS	CHAPTER TEN
- ANALYSIS AND DESIGN OF DIGITAL	CHAPTER TWELVE

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LEARNING ACTIVITIES

REQUIRED RESOURCES

5.

METHOD(S) OF EVALUATION

TESTS - THREE WRITTEN TESTS TOTALLING 50%.
(MINIMUM AVERAGE OF 55% MUST BE MAINTAINED
FOR A PASSING GRADE IN ALL THREE TESTS.)

PROJECTS - FIVE PROJECTS TOTALLING 50%.
(MINIMUM AVERAGE OF 55% MUST BE MAINTAINED
FOR A PASSING GRADE IN ALL FIVE PROJECTS.)

TOTAL 100%

THE GRADING SYSTEM USED WILL BE AS FOLLOWS:

A+ = 90 - 100% A = 80 - 89% B = 70 - 79% C = 55 - 69%

R REPEAT

REQUIRED STUDENT RESOURCES:

TEXT BOOKS: 1. FEEDBACK CONTROL SYSTEMS
 C. L. PHILLIPS, R. D. HARBOR
 PRENTICE HALL

**ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE
LIBRARY BOOK SECTION:**

SPECIAL NOTES: