

MESABI RANGE COMMUNITY & TECHNICAL COLLEGE

Course Outline

Course Title: Industrial Motor Control
Semester Course Prefix and Number: PAS 1266
Old Quarter Course Prefix and Number:

Submitted By: Scott Norcia
Approval Date:
Revision Date: 4/2/13

Number of Credits: 6
Semester(s) Offered: Spring
Class Size: 24
Negotiated by AASC on: (date)

Number of Lecture Credits: 2
Number of Lab Credits: 4
Number of Lab Hours: 8
Number of Studio/Demonstration/Internship Credits:

Course Purpose Code:

- 0 - Developmental Courses
1 - Non-transferable, General Education
X 2 - Technical course related to career programs
3 - College course which has the primary goal of applying certain concepts (e.g. vocal ensemble)
4 - Other college course not considered a part of general education (MNTC) (e.g. computer science, health, physical education)
5 - Course which is intended to fulfill the Minnesota Transfer Curriculum (MNTC) requirements or intended for transfer.
9 - Continuing Education/Customized Training specialized credit course (not occurring in 0-5)

Catalog Description:

This course covers the design, wiring, and operation of AC motor control circuits from the power distribution system, or source, to the final control circuit and motor. The student will receive instruction in the installation, troubleshooting, and maintenance of equipment associated with motors and motor controls. Topics include three phase power, transformers, control devices, motor starters and motors. Students should possess knowledge of basic electricity and electronic fundamentals.

Prerequisites and/or recommended entry skills/knowledge:

Course Prerequisite(s): EIAT/PAS 1253, EIAT/PAS 1243
Reading Prerequisite: None
Composition Prerequisite: None
Mathematics Prerequisite: None

Career Programs and Transfer Majors Accessing this Course:

Process Automation Systems Diploma
Process Automation Systems AAS
Wind Energy Technology AAS

Minnesota Transfer Curriculum Goal(s) partially met by this course if applicable:

(Notes: No more than two goals may be met by any one course. Curriculum Committee review and the Chief Academic Officer's approval are required.)

- 0. X None
1. Communications
2. Critical Thinking
3. Natural Sciences
4. Mathematical/Logical Reasoning
5. History and the Social and Behavioral Sciences
6. The Humanities and Fine Arts
7. Human Diversity
8. Global Perspectives
9. Ethical and Civic Responsibility
10. People and the Environment

Learning Outcomes: (including any relevant competencies listed in the Minnesota Transfer Curriculum)

Following the completion of this course the student will be able to demonstrate the ability to:

1. Identify electrical hazards.
2. Identify safe work rules and procedures.
3. Demonstrate the proper LOCK-OUT procedure.
4. Select and safely use test equipment to test circuits and equipment.
5. Describe the theory of AC power generation
6. Describe three phase power
7. Describe the relationship of voltage, current, and impedance
8. Describe the theory of AC motor operation.
9. Describe the operation of four types of single phase motors.
10. Terminate single phase motors for dual voltage and be able to reverse rotation of the motor.
11. Describe characteristics inherent to induction motor problems.
12. Make low/high voltage termination, reverse rotation and utilize methods for testing motors.
13. Describe the operating parts of motor starters.
14. Properly select, install and wire motor starters.
15. Select the proper motor overload heaters for a given motor using manufacturers data sheets.
16. Identify symbols for input devices, pilot devices, and output devices
17. Interpret common abbreviations used with electrical symbols
18. Use standard techniques for designating position and/or continuity of interlocking devices for a minimum of four functionally different items.
19. Describe the operation and application of motor control pilot devices.
20. Install, adjust and/or calibrate pilot devices.
21. Examine electrical schematics containing timing relays and decipher the sequence of control.
22. Draw simple and complex motor control diagrams providing proper symbols, lay-out, and labeling.
23. Properly wire specified motor control circuits following standard designs, applicable NEC codes and standards of workmanship.
24. Identify and describe seven methods of starting polyphase squirrel cage motors.
25. Draw and interpret diagrams for reduced voltage starting.
26. Wire control equipment to perform a part winding start on a three phase induction motor.
27. Describe the operation of a synchronous motor.
28. Describe the advantages synchronous motors provide to an electrical system.
29. Define terms associated with power distributions systems.
30. Draft a lay-out of the shop electrical system identifying types of equipment, equipment specifications, types of protection, and available voltages.
31. Describe the voltage to turns ratio, voltage to current relationship, and power ratings of transformers.
32. Draw connections for specific voltage and system connections.
33. Calculate the line current and voltage available for different designs of transformer connections.
34. Define terms associated with circuit protection.
35. Describe the criteria necessary for the selection of fuses.
36. Identify standard industrial wire types.
37. Calculate voltage drop for a given application.
38. Properly terminate wire.

Student Assessment Methods:

Lecture assignments and tests, Lab exercises tests

Use of Instructional Technology: (includes software, interactive video and other instructional technologies):

Power Point Software, videos, motor control lab facilities and equipment

Additional Special Information: (special fees, directives on hazardous materials, etc.)

Laptop Computer Lease

Transfer Information: (Please list colleges/majors that accept this course in transfer.)

None

Affiliated Mesabi Range College Courses and Programs:

Process Automation Systems Diploma
Process Automation Systems AAS
Wind Energy Technology AAS

Approvals:

Body	Representative Signatures	Date
Faculty Association		
Academic Affairs Standards Committee		
Chief Academic Officer		

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