

**MESABI RANGE COMMUNITY & TECHNICAL COLLEGE – VIRGINIA/EVELETH  
COURSE OUTLINE**

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**Course Title:** Industrial Motor Control  
**Quarter Course Prefix and Number:**  
**Semester Course Prefix and Number:** EIAT1266

**Approval Date:**  
**Revision Date:**

**Number of Credits:** 6      **Number of Lecture Credits:** 1      **Number of Lab Credits:** 5  
**Semester(s) Offered:**      **Number of Studio/Discussion Credits:**

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**Course Purpose Code:**

- 0 – Developmental Courses
- 1 – Non-Transferable General Studies
- 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 Minnesota Transfer Curriculum (MNTC) requirements.
- 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 circuits from the power distribution system or source to the final control circuit and motor. Students will be prepared to install, troubleshoot, and maintain equipment associated with motors and motor control. Elements include three phase power, transformers, control devises, motor starters and motors. Students should posses a knowledge of basic electricity and electronic fundamentals.

**Prerequisites and/or recommended entry skills/knowledge:**

Course Prerequisite(s): EIAT 1253, EIAT 1233, EIAT 1243, EIAT 1295, & EIAT 1244

Reading Prerequisite:

Composition Prerequisite:

Mathematics Prerequisite:

**Career Programs and Transfer Majors Accessing this Course:**

Electrical & Industrial Automation Technology

**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 Vice President of Academic Affairs approval are required).

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| 0. <input checked="" type="checkbox"/> None                                | 6. <input type="checkbox"/> The Humanities and Fine Arts     |
| 1. <input type="checkbox"/> Communications                                 | 7. <input type="checkbox"/> Human Diversity                  |
| 2. <input type="checkbox"/> Critical Thinking                              | 8. <input type="checkbox"/> Global Perspectives              |
| 3. <input type="checkbox"/> Natural Sciences                               | 9. <input type="checkbox"/> Ethical and Civic Responsibility |
| 4. <input type="checkbox"/> Mathematical/Logical Reasoning                 | 10. <input type="checkbox"/> People and the Environment      |
| 5. <input type="checkbox"/> History and the Social and Behavioral Sciences |  |

**Learning outcomes, including any relevant competencies listed in the Minnesota Transfer Curriculum:**

The following list of course goals will be addressed in the course:

1. identify electrical hazards.
2. identify safe work rules and procedures.
3. perform 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 terminations, 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 a neat and workmanship like fashion.
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 synchronous motors.
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-in 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.
- 39.

**Possible 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

**A one-paragraph summary or outline of the major course content:**

This course covers the design, wiring, and operation of AC motor circuits from the power distribution system or source to the final control circuit and motor. You will be prepared to install, troubleshoot, and maintain equipment associated with motors and motor control. Elements include three phase power, transformers, control devices, motor starters, motor speed control and motors. Students should possess knowledge of basic electricity and electronic fundamentals.

**Additional special information (special fees, directives on hazardous materials, etc.)**

Lab Fee

**APPROVALS:**

| Body                               | Representative Signatures | Date |
|------------------------------------|---------------------------|------|
| Curriculum Committee               |                           |      |
| Faculty Association                |                           |      |
| Meet and Confer                    |                           |      |
| Vice President of Academic Affairs |                           |      |

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