

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

Course Title: Temperature, Strain, and Analytical Instruments **Approval Date:**
Quarter Course Prefix and Number: **Revision Date:**
Semester Course Prefix and Number: EIAT 2266

Number of Credits: 3 **Number of Lecture Credits:** 1 **Number of Lab Credits:** 2
Semester(s) Offered: **Number of Studio/Discussion Credits:**

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 is designed to encompass three independent areas of instrumentation that utilize measurement methods that are similar in design and theory. The course covers the terminology, methods, and application of temperature, strain, and analytical measurement. The course provides the knowledge and skills required for operational understanding, proper installation and accurate calibration of the primary elements and transducers used in these measurement areas.

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 student will:

1. define the range of temperature measuring instruments
2. differentiate temperature scales
3. identify bimetallic temperature elements
4. define operating principle of filled thermometer systems
5. identify the classes of filled systems
6. define the operational theory of thermocouples
7. determine emf output for hot and cold junction temperature of thermocouples
8. identify the use of extension and compensation wires
9. calibrate a thermocouple transmitter
10. identify thermistor
11. define the operational theory of RTDs
12. calculate standard RTD resistance for various temperatures
13. identify RTD bridge circuits
14. identify 3 and 4 wire RTD lead compensation
15. install and calibrate a RTD and transmitter
16. define the theoretical basis for radiation thermometers
17. identify static forces and stress
18. analyze strain gages
19. identify strain gage measurement systems
20. identify load cells
21. install and calibrate a multiple loads cell weighing system
22. identify analytical instruments
23. define the theoretical basis of conductivity measurement
24. identify methods of measuring pH and ORP
25. calibrate pH and ORP meters
26. identify optical analytical instruments
27. analyze combustion product analytical instruments

Possible student assessment methods:

Lab assignments, worksheets, papers, and tests.

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

Power Point Software, videos, instrumentation lab facilities and equipment

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

This course focuses on the practical application and operation of primary elements used in industrial instrumentation for temperature measure, strain/stress measurement, and analytical based measurements. The course provides hands-on experience in the installation and calibration of measurement elements and their transducers.

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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