

MESABI RANGE COMMUNITY & TECHNICAL COLLEGE

Course Outline

Course Title: Temperature, Strain, and Analytical Instruments

Submitted By: Scott Norcia

Semester Course Prefix and Number: PAS 2266

Approval Date:

Old Quarter Course Prefix and Number:

Revision Date: 11/23/11

Number of Credits: 3

Number of Lecture Credits: 1

Semester(s) Offered: Fall

Number of Lab Credits: 2 Number of Lab Hours: 4

Class Size: 24

Number of Studio/Demonstration/Internship Credits:

Negotiated by AASC on: (date)

Course Purpose Code:

- 0 – Developmental Courses
- 1 – Non-transferable, General Education
- 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 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/PAS 1253, EIAT/PAS 1233, EIAT/PAS 1243, EIAT/PAS 1295, & EIAT/PAS 1244
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

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. 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. 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 a 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

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

Outline or Statement of 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.)

Laptop Computer Lease

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

None

Approvals:

| Body | Representative Signatures | Date |
|--------------------------------------|--|----------|
| Curriculum Committee |  | 11-29-11 |
| Faculty Association |  | 12-5-11 |
| Academic Affairs Standards Committee |  | 11-29-11 |
| Chief Academic Officer | | |

Distribution: Original – Administrative Office

Copies: Curriculum Committee Chair, AASC Chair, Transfer Specialist, Originating Faculty Member, Scheduler, Records, Student Services, Learning Center, Library

Revised: October 2006