Course Title: Temperature, Strain, and Analytical Instruments

Submitted By: Robert Stevens
Approval Date: 
Revision Date: 9/6/16

Number of Credits: 3
Number of Lecture Credits: 1
Number of Lab Credits: 2
Number of Lab Hours: 4
Number of Studio/Demonstration/Internship Credits: 

Semester(s) Offered: Fall
Class Size: 24

Catalog Description:
The course is a "Hybrid" or "Blended" course with the majority of the learning environment traditional in-class lectures and hands-on lab work which also includes Web-based learning activities to complement face-to-face work. 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): ECM 1253, ECM 1233, ECM 1243, ECM 1295, ECM 1244
Reading Prerequisite: None
Composition Prerequisite: None
Mathematics Prerequisite: None

Career Programs and Transfer Majors Accessing this Course:
Electrical Controls and Maintenance Diploma
Electrical Controls and Maintenance 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. AASC 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)

Upon completion of this course, the student will be able to:

- Identify the thermodynamic principles and measurement scales of heat and temperature.
- Define function of temperature measurement devices
- Identify strain and weight measurement principles
- Define function strain and weight measurement devices.
- Identify the theoretical basis of analytical measurement
- Properly wire, adjust/calibrate and troubleshoot temperature, strain and analytical instruments and circuits.

Student Assessment Methods:
Assessment made of lab assignments, worksheets, and papers using rubrics and check lists. Tests and quizzes of technical knowledge to be given at regular intervals during semester.

Use of Instructional Technology: (includes software, interactive video and other instructional technologies):
ECM Laptop Computer Lease with Industrial Software

Additional Special Information: (special fees, directives on hazardous materials, etc.)
Laptop Computer Lease and Required Tool List

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

Affiliated Mesabi Range College Courses and Programs:

Approvals:

<table>
<thead>
<tr>
<th>Body</th>
<th>Representative Signatures</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty Association</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Affairs Standards Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chief Academic Officer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Distribution: Original – Instructional Services
Copies: Transfer Specialist, Originating Faculty Member, Records
Revised: December 2012