Kellogg Community College

Course Cover Sheet

M-CAM Training Area:
☐CNC/Machining ☒Multi-Skilled/Mechatronics ☐Production Operation ☐Welding/Fabrications

Program(s): Industrial Technology

Course: INST 35050 Temperature Lab

Course Description: The student will become familiar with a temperature control unit. This unit is designed to simulate different heating and cooling cycles found in industrial environments. The student will also become familiar with different forms of energy, the definition of temperature, and the different scales used to measure it. Thermodynamics principles will also be discussed and their use in measuring temperature.

Date Created: July 2015

Faculty Developer(s)/Instructional Designers(s): Tim Krueger

Employer/Industry Partner: Employers on Advisory Committee

College Contact: Tom Longman

Phone: 269-965-4137

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Additional Information/Comments:

1. **READ: LAB-VOLT: Instrumentation and Process Control,** (Series 3531, ISBN 978-2-89640-453-7): *Familiarization with the Training System- Temperature*
    a. **Section 1:** Introduction to the Training System, p. 1
    b. **Section 2:** Process Workstation, pp. 3 – 20
    c. **Section 3:** Basic Setup, pp. 21 – 22
    d. **Section 4:** Instrumentation Workstation, pp. 23 – 26
    e. **Section 5:** Electrical Unit, pp. 27 – 33
    f. **Section 6:** Emergency Push-Button, pp. 35 – 37
    g. **Section 7:** Electrical Distribution Box, pp. 39 – 41
    h. **Section 8:** AC Drives and Pumps, pp. 43 – 54
    i. **Section 9:** Heating/Cooling Unit, pp. 55 – 62
    j. **Section 10:** Temperature Probes and Transmitter, pp. 63 – 76
    k. **Section 11:** Paperless Recorder, pp. 77 – 96
    l. **Section 12:** Brazed Plate Heat Exchanger, pp. 97 – 100
    m. **Section 13:** Pneumatic Unit, pp. 101 – 105
    n. **Section 14:** Three-Way Pneumatic Control Valve, pp. 107 – 120

o. **Section 15:** Accessories, pp. 121 – 126
p. **Appendix A – Appendix B:** pp. 127 – 161

2. **READ: LAB-VOLT: Instrumentation and Process Control,** (Series 3531, ISBN 978-2-89640-459-9), *Measurement - Temperature*
   a. **Unit 1:** Introduction to Measurement, pp. 1 – 6
   b. **Unit 2:** Measuring Instruments, pp. 7 -14
   c. **Unit 3:** Temperature Measurement, pp. 15 – 54
   d. **Unit 4:** Heat Exchanges, pp. 55 -78
   e. **Appendix A:** pp. 79 - 80
3. **CHECK:** knowledge of the material by completing the Programmed Exercises
4. **ARRANGE:** to complete this module by completing the **Assessment Activities**

All assessment activities are hands-on and listed on the syllabus.

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SYLLABUS

Module Name: INST 35 050 Temperature Lab
Credit Hours: 2.0
Contact Hours: 48
Instructor: Tim Krueger, kruegerti@kellogg.edu

GUIDELINES FOR SUCCESS

Read the module Course Description and complete the Learning Activities. When there is a good understanding of the material, proceed to the Assessment Activities. See the instructor at any time for assistance.

COURSE DESCRIPTION

The student will become familiar with a temperature control unit. This unit is designed to simulate different heating and cooling cycles found in industrial environments. The student will also become familiar with different forms of energy, the definition of temperature, and the different scales used to measure it. Thermodynamics principles will also be discussed and their use in measuring temperature.

MODULE COMPETENCIES

1. Understand how the temperature control unit functions
2. Understand the fundamentals of heating and cooling fluids
3. Understand the function of the Trend Recorder
4. Understand the function of three way valves
5. Understand the function of AC Drives
6. Understand the function of Resistance Temperature Detectors (RTDs)
7. Understand the function of thermocouples
8. Understand the function of Heat Exchanges

LEARNING ACTIVITIES

1. **READ: LAB-VOLT: Instrumentation and Process Control,** (Series 3531, ISBN 978-2-89640-453-7): *Familiarization with the Training System- Temperature*
    a. **Section 1:** Introduction to the Training System, p. 1
    b. **Section 2:** Process Workstation, pp. 3 – 20
    c. **Section 3:** Basic Setup, pp. 21 – 22
    d. **Section 4:** Instrumentation Workstation, pp. 23 – 26
    e. **Section 5:** Electrical Unit, pp. 27 – 33
    f. **Section 6:** Emergency Push-Button, pp. 35 – 37
    g. **Section 7:** Electrical Distribution Box, pp. 39 – 41
    h. **Section 8:** AC Drives and Pumps, pp. 43 – 54
    i. **Section 9:** Heating/Cooling Unit, pp. 55 – 62
    j. **Section 10:** Temperature Probes and Transmitter, pp. 63 – 76
    k. **Section 11:** Paperless Recorder, pp. 77 – 96
    l. **Section 12:** Brazed Plate Heat Exchanger, pp. 97 – 100

   m. **Section 13:** Pneumatic Unit, pp. 101 – 105
   n. **Section 14:** Three-Way Pneumatic Control Valve, pp. 107 – 120
   o. **Section 15:** Accessories, pp. 121 – 126
   p. **Appendix A – Appendix B:** pp. 127 – 161
2. **READ:** **LAB-VOLT: Instrumentation and Process Control,** (Series 3531, ISBN 978-2-89640-459-9): *Measurement - Temperature*
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   c. **Unit 3:** Temperature Measurement, pp. 15 – 54
   d. **Unit 4:** Heat Exchanges, pp. 55 -78
   e. **Appendix A:** pp. 79 - 80
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4. **ARRANGE:** to complete this module by completing the **Assessment Activities**

ASSESSMENT ACTIVITIES

1. Be able to properly wire the e-stop circuit on the temperature control trainer
2. Use the trend recorder to monitor temperature fluctuations
3. Program the AC Drive to maintain constant flow rates
4. Be able to use the three way valves in missing functions
5. Measure temperature using a RTD
6. Measure temperature using thermocouples
7. Be able to use a heat exchanger in order to maintain a consistent temperature in a fluid

GRADING INFORMATION

All modules at the RMTC are considered pass/fail. The student must achieve 90% or higher on all written Assessment Activities, and 100% or higher on all lab Assessment Activities in order to pass this module.

ACADEMIC INTEGRITY

The Kellogg Community College policy on Academic Integrity is spelled out in the student handbook. If it is suspected that the student is cheating, fabricating, facilitating academic dishonesty, or plagiarizing, there may be serious consequences. The incident will be documented and may be reported to the academic chair and/or program director for possible disciplinary actions up to and including course, program, or college expulsion.

AMERICANS WITH DISABILITIES ACT AND SECTION 504

Kellogg Community College does not discriminate in the admission or treatment of students on the basis of disability. KCC is committed to compliance with the American Disabilities Act and Section 504 of the Rehabilitation Act. See Student Handbook for information about student services.

INSTRUCTOR RIGHTS STATEMENT

Information contained in this syllabus was to the best knowledge of the instructor considered correct and complete when distributed for use at the beginning of the semester. However, this syllabus should not be considered a contract with Kellogg Community College and any student, nor between the instructor and any student. The instructor reserves the right, acting within the policies and procedures of Kellogg Community College, to make changes in the course content or instructional techniques without notice or obligation.

Subject Matter Expert (SME) Course Review Summary
College: Kellogg Community College
M-CAM Training Area: ☐CNC/Machining ☒Multi-Skilled/Mechatronics ☐Production Operation ☐Welding/Fabrication
Degree Program Name: Industrial Technology
Title of Course: INST 35050 Temperature Lab
Subject Matter Expert (SME) Reviewer Information **Name: Robert C Hess** **Title: Senior Instructional Designer/Trainer** **Phone: 586-322-1033** **Email: bob.hess@mhtechnologies.net** **Organization/Affiliation:**
Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content):
Synopsis of Findings: **Generally, the presentation is well written and contains all the necessary information to train the student in the subject. I would advise to have the graphics with the callouts present on the same page as the descriptions when introducing a new component to the learner, it is less confusing that way not having to flip a page to see what the component is. Also, the step-by-step procedures could use a graphic showing the button/knob/switch/screenshot the learner is using to perform the step, and the result of the step after it is performed. (Indicator light, changed status, etc.)** **Objectives should be plainly stated before each new learning objective. I know the student has been given a syllabus, but I believe it benefits the learner to have specific stated objectives before they start the task.** **Wherever there are graphics, and space is available, enlarge the photo/graphic. There are in there for a reason, use as much space as allowed!** **Do not see any prerequisites for this class. What should the student know before taking this course? What skills/knowledge/experience should they have before hand?**

Reviewers Signature Robert C Hess Date: 1-31-17

Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review

1. Course Overview and Objectives	Exceptional	Satisfactory	Ineffective
The goals and purpose of the course is clearly stated.		X	
Prerequisites and/or any required competencies are clearly stated.		X	
Learning objectives are specific and well-defined.		X	
Learning objectives describe outcomes that are measurable.		X	
Outcomes align to occupational focus (industry skills and standards).		X	
Comments or recommendations:			

2. Material and Resources	Exceptional	Satisfactory	Ineffective
The instructional materials contribute to the achievement of the course learning objectives.		X	
The materials and resources meet/reflect current industry practices and standards.	X		
The instructional materials provide options for a variety of learning styles.		X	
Resources and materials are cited appropriately. If applicable, license information is provided.	X		
Comments or recommendations: **Need to get final electronic copies collated from main manual, repaginate/image#'s/etc., and rebrand where**			

3. Learning Activities	Exceptional	Satisfactory	Ineffective
Provide opportunities for interaction and active learning.	X		
Help understand fundamental concepts, and build skills useful outside of the learning object.	X		
Activities are linked to current industry practices and standards.	X		
Comments or recommendations:			

Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review

4. Assessment Tools/Criteria for Evaluation	Exceptional	Satisfactory	Ineffective
The course evaluation criteria/course grading policy is stated clearly on syllabus.		**X**	
Measure stated learning objectives and link to industry standards.		X	
Align with course activities and resources.		X	
Include specific criteria for evaluation of student work and participation.		X	
Comments and recommendations: **Need to be able to qualify the learners hands-on demonstrations for the instructor. Some sort of baseline to start from.**			

5. Equipment/Technology	Exceptional	Satisfactory	Ineffective
Meets industry standards and needs.	**X**		
Supports the course learning objectives.	X		
Provides students with easy access to the technologies required in the course/module.	X		
Comments and recommendations:			

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Robert Hess

Technical Instructor, Curriculum Developer and Technical Writer

Robert Hess is a proven trainer, and technical writer with more than 22 years of expertise analyzing needs, developing training programs, and creating procedures and documentation that reduce costs and maximize productivity.

- Project manage all phases of training lifecycle, using in-depth knowledge of process analysis.
- Expertise developing and implementing training programs that meet strategic business objectives.
- Skilled in training and documentation design strategies that drive productivity and reduce operating costs.
- Lead training teams and departments, including recruiting, hiring, train-the-trainer, and developing staff.
- Ability to prioritize and complete concurrent projects while meeting time and organizational goals.
- Excellent skills in all Microsoft Office Suite products.

Robert has developed training programs and provided customer price quotes. Led needs analysis meetings. Designed training courses, system manuals, student workbooks, PowerPoint presentations, safety training, software training, standard operating procedures, and training aids. Delivered on-site training programs. Tracked training results and provided evaluations / solutions.

Robert Hess has extensive experience in Press Room Technology. Installed and programmed, debugged, and provided customer support for destacking systems with Bond Robotics and DCT, Inc. Developed, designed, and delivered training agendas and class delivery for Destacking systems, press-to-press automation, and end-of-line delivery/racking systems. Pressroom experience includes standard (lift cage) blank removal, robotic blank removal, shuttle blank removal, electromagnetic and standard fanning systems, galvanized, stainless steel and aluminum blank delivery automation, blank washing systems, double blank detection units, centering stations, and press handling automation.

Robert’s education and experience includes electrical design and engineering, mechanical design, advanced adult training procedures, cross-cultural training, industrial magnetic and stamping technology. Robert has 22 plus years in the automotive, military, and aerospace industry.