Lansing Community College

Course Cover Sheet

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

Program(s): Intro to Mechatronics Block 1-3

Course: Basic Welding

Course Description:
This course covers safety, shielded metal arc welding, gas metal arc welding, oxyfuel welding and cutting. Various techniques are presented regarding equipment and filler metals.

Delivery method is hybrid, open entry/open exit.

Date Created: June, 2016. Revised January, 2017

Employer/Industry Partner: Magna/DexSys, Lansing, Michigan and various manufacturing companies in Mid-Michigan.

Faculty Developer(s)/Instructional Designers(s): Scott Poe/Ann Lapo

College Contact: Jill Doederlein

Phone: 517.483.9665

Email: doederj@lcc.edu

Additional Information/Comments: Due to the increased need to offer a flexible delivery format to meet the needs of students'/workers' busy schedules, LCC partnered with AMTEC (Automotive Manufacturing Technical Education Collaborative) led by Kentucky Community Technical College to offer open entry open exit modular courses in a hybrid format (lessons online and hands-on labs with an instructor on campus). LCC instructors added content based on the needs of local industry.

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DESCRIPTION:
This course covers safety, shielded metal arc welding, gas metal arc welding, oxyfuel welding and cutting. Various techniques are presented regarding equipment and filler metals.

TOTAL TIME REQUIREMENT for the course is approximately 110 hours.

PREREQUISITES: Reading Level 4. Writing Level 4. Math Level 5. Basic OSHA Safety.

OBJECTIVES: (for a complete list of objectives, see each module)
After completing this course, the student should be able to:

- Identify Personal Protective Equipment (PPE) required for welding and fabrication.
- Identify and explain hazards associated with welding.
- Identify and explain SMAW power sources.
- Identify and explain SMAW welding equipment.
- Identify and explain SMAW electrodes and filler metals.
- Explain SMAW welding principles.
- Explain GMAW welding principles.
- Identify and explain GMAW shielding gases.
- Identify and explain GMAW power sources.
- Identify and explain GMAW filler metals.
- Explain basic weld metallurgy.
- Demonstrate correct SMAW welding technique.
- Demonstrate SMAW welding in all positions.
- Explain hazards of GMAW welding.
- Operate GMAW welding equipment.
- Demonstrate correct GMAW welding technique.
- Demonstrate GMAW welding in all positions.
- Explain hazards of oxyfuel equipment.
- Identify and prepare oxyfuel equipment.
- Operate oxyfuel equipment correctly.
- Identify and explain oxyfuel gasses.
- Demonstrate correct oxyfuel welding technique.

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110 Welding and Fabrication consists of four modules:

1101—Introduction to Welding (9 lessons to read on your own, 8 total hours.)
This is an introductory course to arc welding. This course will introduce the power sources used in SMAW and GMAW welding, along with equipment and filler metals used to produce a welded joint. Welding principles will be introduced along with the metallurgy of steel and welding.

1102—SMAW/Stick Welding (5 lessons to read on your own, 16 labs to do at LCC with an instructor, 20 total hours)
This Shielded Metal Arc Welding (SMAW) module is designed to teach welders about arc welding safety and the Shielded Metal Arc Welding process, including flat, horizontal, vertical, and overhead welding techniques.

1103—GMAW/Gas Metal Arc Welding (5 lessons to read on your own, 9 labs to do at LCC with an instructor, 30 total hours)
Provides knowledge of theory, safety practices, equipment and techniques required for gas metal arc welding including different transfer methods and position welding.

1104—Oxy/Fuel and Joining (7 lessons to read on your own, 13 labs to do at LCC with an instructor, 24 total hours)
An introduction to oxy-fuel welding and cutting, including safety, setup and maintenance of oxy-fuel welding and cutting equipment. Techniques taught in this course include cutting, brazing, and welding.

MATERIALS:
Online portion of the class:
Software: Internet access, Web browser, word-processing software, Adobe Reader, up-to-date virus protection for the online portion of this course.

- Go to elearning.autoworkforce.org – modules 1101, 1102, 1103, 1104 to access the lessons, labs specifications and assessments for this course.

Hands-on labs portion of the class:
- Tools and equipment per module for each hands-on lab.

AMT 1101: Introduction to Arc Welding
No Labs

AMT 1102: SMAW/Stick Welding
Lab 1: Strike an Arc Using Scratch Method and Tap Method
Single/Multiple Process Constant Current Power Source
Mild Steel Plate 3/16" or thicker
E6010 electrode

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MATERIALS: *(continued)*

1102 (continued)

Lab 2: Run a Straight Bead on a Flat Plate and Fill the Crater
Single/Multiple Process Constant Current Power Source
Mild Steel Plate 3/16" or thicker
E6013 electrode
Lab 3: Run a Bead with a Whipping Technique
Single/Multiple Process Constant Current Power Source
Mild Steel Plate 3/16" or thicker
E6013 electrode
Lab 4: Building a Pad
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate 3/16" or thicker
1/8" (E6013)
Lab 5: Horizontal Welding Process/Lap Weld/Whip
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate 3/16" or thicker
1/8" (E6013)
Lab 6: Horizontal Process/Fillet Weld
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate 3/16" or thicker
1/8" (E6013)
Lab 7: Horizontal Process/Fillet Weld E7018 Electrode
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E7018) for DC
Lab 8: Three Pass Horizontal Process
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E7018) for DC
Lab 9: Vertical Down Process
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" E6013
Lab 10: Vertical Down Process with E6010
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" E6010

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MATERIALS: *(continued)*

1102 (continued)

Lab 11: Lap Joint Overhead Process
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E6010) for DC
Lab 12: Tee Joint in Overhead Position
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E6010) for DC
Lab 13: Single Pass Weld on a Tee Joint in Vertical Position
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 1/4"
1/8" (E6010)
Lab 14: Three Pass Vertical Up Process Tee
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E7018) for DC
Lab 15: Vertical Up Process Tee Triangular
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 1/4"
1/8" (E7018)
Lab 16: Three Pass Fillet Weld on a Tee Joint in the Vertical Position Welding Up with an E7018 Electrode
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 1/4"
1/8" (E7A1:A66

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MATERIALS: *(continued)*

AMT 1103: GMAW Welding
Lab 1: Run a Stringer Bead/Build a Pad
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 3/16"
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 2: Fillet Weld on a Lap Joint Vertical Position
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 3: Fillet Weld on Tee Joint Horizontal Position
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 4: Fillet Weld on a Lap Joint Using Short Arc Process Vertical Position Welding Down
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 5: Fillet Weld on a Lap Joint Using Short Arc Process Vertical Position Welding Down
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 6: Square Weld on a Butt Joint
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 7: Fillet Weld on a Tee Joint Using Short Arc Transfer in the Overhead Position
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas

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MATERIALS: *(continued)*

1103 (continued)

Lab 8: Three Pass Fillet Weld on a Tee Joint in the Horizontal Position
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 1/4"
0.035" (ER70S-6)
100% CO_2 or 75% Ar/ 25% CO_2 blend shielding gas
Lab 9: Horizontal Fillet Weld on a Tee Joint Using Axial Spray Transfer
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - ¼ "
0. 045" (ER70S-6)
90% Ar 10% CO_2 blend shielding gas

AMT 1104: Oxy/Fuel Cutting & Joining
Lab 1: Oxy/Fuel Part Identification
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & Acetylene Gases
Flint Lighter
Lab 2: Running a Bead
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene Gases
Flint Lighter
12" x 12" - 1/8" mild steel coupon
Welding Rod R60 or R45
Lab 3: Butt Joint Weld in the Flat Position
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart),
PPE
Oxygen & Acetylene Gases
Flint Lighter
2 - 6" x 6" - 1/8" mild steel coupon
1/8" Welding Rod R60 or R45
Vise
Hammer

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MATERIALS: *(continued)*

1104 (continued)

Lab 4: Fillet Weld the Lap Joint in a Horizontal Position
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart),
PPE
Oxygen & Acetylene Gases
Flint Lighter
2 - 6" x 6" - 1/8" mild steel coupon
1/8" Welding Rod R45
Vise
Hammer
Lab 5: Fillet Weld on a Tee Joint in the Horizontal Position
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene Gases
Flint Lighter
1 - 6" x 6" - 1/8" mild steel coupon
1 – 3" x 6" – 1/8" mild steel coupon
1/8" R45 welding rod
Vise
Hammer
Lab 6: Fillet Weld in the Vertical Position Welding Down
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene Gases
Flint lighter
2 - 6" x 6" - 1/8" mild steel coupon
1/8" R45 welding rod
Vertical Stand (to hold the work pieces in position)
Vise
Hammer

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MATERIALS: *(continued)*

1104 (continued)

Lab 7: Brazing
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene Gases
Flint lighter
12' x 12' - 1/8 mild steel coupon
Brazing Rod and Brazing Flux
1/8' Vertical Stand (to hold the work pieces in position)
Lab 8: Braze Weld a Butt Joint
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, brazing tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene gases
Flint lighter
Wire brush/emery cloth
2 - 6" x 6" - 1/8 mild steel coupon
1/8" brazing rod and brazing flux
Lab 9: Braze a Lap Joint in Horizontal Position
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, brazing tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene gases
Flint lighter
Wire brush/emery cloth
2 - 6" x 6" - 1/8 mild steel coupon
1/8" brazing rod
Brazing flux
Lab 10: Hand Held Cut
Standard Oxy-Fuel Cutting Set-up(regulators, handle, cutting attachment, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & acetylene gases
Flint lighter
PPE
2" x 12" - 1/2" thick mild steel

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MATERIALS: *(continued)*

1104 (continued)

Lab 11: Cut a Bevel Angle
Oxy-Fuel Cutting Set-up(regulators, handle, cutting attachment, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & acetylene gases
Flint lighter
PPE
12" long 2" x 2" angle iron
12" x 12" - 1/2" thick mild steel
Lab 12: Pierce a Hole
Oxy-Fuel Cutting Set-up (regulators, handle, cutting attachment, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & acetylene gases
Flint lighter
PPE
6" x 6" - 1/2" thick mild steel
Lab 13: Cut a Straight Line in Light Steel
Oxy-Fuel Cutting Set-up (regulators, handle, cutting attachment, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & acetylene gases
Flint lighter
PPE

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GRADING POLICY:

- Successful completion of all Labs (at least 80% recommended). Rubrics provided in AMTEC online specify how grading is determined.
- Successful completion of each module's post-assessment (at least 80% recommended).

College Grading Standards	Percent
4.0 Excellent	91-100%
3.5	86-90%
3.0 Good	81-85%
2.5	76-80%
2.0 Satisfactory	71-75%
1.5	66-70%
1.0	60-65%
0.0	0-59%

ACCEPTABLE USE POLICY:

Computer Resources

Use of College-owned computer resources is a privilege extended by the College to students, employees, and other authorized users as a tool to promote the mission of the College. All users agree to be bound by the terms and conditions of the LCC Acceptable Use Policy at the time they complete an account application form. Copies of the LCC Acceptable Use Policy are available at the Library Circulation Desk and may also be accessed on the World Wide Web. The URL is http://www.lcc.edu/policy/policies_1.aspx#ACCEPTABLE_USE_POLICY

Transfer Potential

For transferability information, please consult the Transfer Equivalency Information located at the LCC website at http://www.lcc.edu/transfer. For additional transferability information, contact the LCC Academic Advising Center, (517) 483-1904.

The MACRAO Transfer Agreement simplifies the transfer of students from one Michigan institution to another. The most current MACRAO Transfer Agreement information can be found at http://www.lcc.edu/transfer/macrao_agreement.aspx.

Student Code of Conduct and General Rules and Guidelines

LCC supports a positive educational environment that will benefit student success. In order to ensure this vision, the College has established the LCC Student Code of Conduct and the Student General Rules and Guidelines to ensure the protection of student rights and the health and safety of the College community, as well as to support the efficient operation of College programs. In addition, the College has established guidelines for the redress of grievances by individuals accused in such proceedings. A copy of the most current Code can be found on the College's website at http://www.lcc.edu/catalog/policies_procedures/studentrulesguidelines.aspx#code.

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Subject Matter Expert (SME) Course Review Summary
College: Lansing Community College
M-CAM Training Area: ☐CNC/Machining ☒Multi-Skilled/Mechatronics ☐Production Operation ☐Welding/Fabrication
Degree Program Name:
Title of Course: Mechatronics Welding and Fabrication
Subject Matter Expert (SME) Reviewer Information **Name: Robert C. Hess** **Title: Senior Instructional Designer/Trainer** **Phone: 566-322-1033** **Email: bob.hess@mhtechnologies.net** **Organization/Affiliation: MH Technologies**
Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content):
Synopsis of Findings: 1. **All Labs hyperlinks not working in 1102.** 2. **1103 acceptable for training.** 3. **1104 Lab 7 Hyperlink not working.** 4. **1104 Lab 8 Hyperlink not working.**

Reviewers Signature Robert C. Hess Date: 3/8/17

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:			

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	

Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review

Comments or recommendations:			
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:			
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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Course Cover Sheet

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Program(s): Intro to Mechatronics Block 1-3

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Faculty Developer(s)/Instructional Designers(s): Scott Poe/Ann Lapo

College Contact: Jill Doederlein

Phone: 517.483.9665

Email: doederj@lcc.edu

Additional Information/Comments:

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OBJECTIVES: (for a complete list of objectives, see each module)
After completing this course, the student should be able to:

- Identify Personal Protective Equipment (PPE) required for welding and fabrication.
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- Identify and explain SMAW power sources.
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- Identify and explain SMAW electrodes and filler metals.
- Explain SMAW welding principles.
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- Identify and explain GMAW shielding gases.
- Identify and explain GMAW power sources.
- Identify and explain GMAW filler metals.
- Explain basic weld metallurgy.
- Demonstrate correct SMAW welding technique.
- Demonstrate SMAW welding in all positions.
- Explain hazards of GMAW welding.
- Operate GMAW welding equipment.
- Demonstrate correct GMAW welding technique.
- Demonstrate GMAW welding in all positions.
- Explain hazards of oxyfuel equipment.
- Identify and prepare oxyfuel equipment.
- Operate oxyfuel equipment correctly.
- Identify and explain oxyfuel gasses.
- Demonstrate correct oxyfuel welding technique.

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MATERIALS:
Online portion of the class:
Software: Internet access, Web browser, word-processing software, Adobe Reader, up-to-date virus protection for the online portion of this course.

- Go to elearning.autoworkforce.org – modules 1101, 1102, 1103, 1104 to access the lessons, labs specifications and assessments for this course.

Hands-on labs portion of the class:
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No Labs

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Single/Multiple Process Constant Current Power Source
Mild Steel Plate 3/16" or thicker
E6010 electrode

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MATERIALS: *(continued)*

1102 (continued)

Lab 2: Run a Straight Bead on a Flat Plate and Fill the Crater
Single/Multiple Process Constant Current Power Source
Mild Steel Plate 3/16" or thicker
E6013 electrode
Lab 3: Run a Bead with a Whipping Technique
Single/Multiple Process Constant Current Power Source
Mild Steel Plate 3/16" or thicker
E6013 electrode
Lab 4: Building a Pad
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate 3/16" or thicker
1/8" (E6013)
Lab 5: Horizontal Welding Process/Lap Weld/Whip
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate 3/16" or thicker
1/8" (E6013)
Lab 6: Horizontal Process/Fillet Weld
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate 3/16" or thicker
1/8" (E6013)
Lab 7: Horizontal Process/Fillet Weld E7018 Electrode
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E7018) for DC
Lab 8: Three Pass Horizontal Process
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E7018) for DC
Lab 9: Vertical Down Process
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" E6013
Lab 10: Vertical Down Process with E6010
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" E6010

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MATERIALS: *(continued)*

1102 (continued)

Lab 11: Lap Joint Overhead Process
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E6010) for DC
Lab 12: Tee Joint in Overhead Position
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E6010) for DC
Lab 13: Single Pass Weld on a Tee Joint in Vertical Position
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 1/4"
1/8" (E6010)
Lab 14: Three Pass Vertical Up Process Tee
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 10 gauge
1/8" (E7018) for DC
Lab 15: Vertical Up Process Tee Triangular
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 1/4"
1/8" (E7018)
Lab 16: Three Pass Fillet Weld on a Tee Joint in the Vertical Position Welding Up with an E7018 Electrode
Single/Multiple Process - Constant Current Power Source
Mild Steel Plate - 1/4"
1/8" (E7A1:A66

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MATERIALS: *(continued)*

AMT 1103: GMAW Welding
Lab 1: Run a Stringer Bead/Build a Pad
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 3/16"
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 2: Fillet Weld on a Lap Joint Vertical Position
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 3: Fillet Weld on Tee Joint Horizontal Position
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 4: Fillet Weld on a Lap Joint Using Short Arc Process Vertical Position Welding Down
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 5: Fillet Weld on a Lap Joint Using Short Arc Process Vertical Position Welding Down
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 6: Square Weld on a Butt Joint
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas
Lab 7: Fillet Weld on a Tee Joint Using Short Arc Transfer in the Overhead Position
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 10 gauge
0.035" (ER70S-6)
100% CO2 or 75% Ar/ 25% CO2 blend shielding gas

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MATERIALS: *(continued)*

1103 (continued)

Lab 8: Three Pass Fillet Weld on a Tee Joint in the Horizontal Position
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - 1/4"
0.035" (ER70S-6)
100% CO_2 or 75% Ar/ 25% CO_2 blend shielding gas
Lab 9: Horizontal Fillet Weld on a Tee Joint Using Axial Spray Transfer
Single (or Multi-process) Process - Constant Voltage Power Source & Wire Feeder
Mild Steel Plate - ¼ "
0. 045" (ER70S-6)
90% Ar 10% CO_2 blend shielding gas

AMT 1104: Oxy/Fuel Cutting & Joining
Lab 1: Oxy/Fuel Part Identification
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & Acetylene Gases
Flint Lighter
Lab 2: Running a Bead
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene Gases
Flint Lighter
12" x 12" - 1/8" mild steel coupon
Welding Rod R60 or R45
Lab 3: Butt Joint Weld in the Flat Position
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart),
PPE
Oxygen & Acetylene Gases
Flint Lighter
2 - 6" x 6" - 1/8" mild steel coupon
1/8" Welding Rod R60 or R45
Vise
Hammer

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MATERIALS: *(continued)*

1104 (continued)

Lab 4: Fillet Weld the Lap Joint in a Horizontal Position
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart),
PPE
Oxygen & Acetylene Gases
Flint Lighter
2 - 6" x 6" - 1/8" mild steel coupon
1/8" Welding Rod R45
Vise
Hammer
Lab 5: Fillet Weld on a Tee Joint in the Horizontal Position
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene Gases
Flint Lighter
1 - 6" x 6" - 1/8" mild steel coupon
1 – 3" x 6" – 1/8" mild steel coupon
1/8" R45 welding rod
Vise
Hammer
Lab 6: Fillet Weld in the Vertical Position Welding Down
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene Gases
Flint lighter
2 - 6" x 6" - 1/8" mild steel coupon
1/8" R45 welding rod
Vertical Stand (to hold the work pieces in position)
Vise
Hammer

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MATERIALS: *(continued)*

1104 (continued)

Lab 7: Brazing
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene Gases
Flint lighter
12' x 12' - 1/8 mild steel coupon
Brazing Rod and Brazing Flux
1/8' Vertical Stand (to hold the work pieces in position)
Lab 8: Braze Weld a Butt Joint
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, brazing tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene gases
Flint lighter
Wire brush/emery cloth
2 - 6" x 6" - 1/8 mild steel coupon
1/8" brazing rod and brazing flux
Lab 9: Braze a Lap Joint in Horizontal Position
Standard Oxy-Fuel Welding Set-up (regulators, handle, mixer, brazing tip, hose, check valves, flashback arrestors & cylinder cart)
PPE
Oxygen & Acetylene gases
Flint lighter
Wire brush/emery cloth
2 - 6" x 6" - 1/8 mild steel coupon
1/8" brazing rod
Brazing flux
Lab 10: Hand Held Cut
Standard Oxy-Fuel Cutting Set-up(regulators, handle, cutting attachment, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & acetylene gases
Flint lighter
PPE
2" x 12" - 1/2" thick mild steel

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MATERIALS: *(continued)*

1104 (continued)

Lab 11: Cut a Bevel Angle
Oxy-Fuel Cutting Set-up(regulators, handle, cutting attachment, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & acetylene gases
Flint lighter
PPE
12" long 2" x 2" angle iron
12" x 12" - 1/2" thick mild steel
Lab 12: Pierce a Hole
Oxy-Fuel Cutting Set-up (regulators, handle, cutting attachment, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & acetylene gases
Flint lighter
PPE
6" x 6" - 1/2" thick mild steel
Lab 13: Cut a Straight Line in Light Steel
Oxy-Fuel Cutting Set-up (regulators, handle, cutting attachment, tip, hose, check valves, flashback arrestors & cylinder cart)
Oxygen & acetylene gases
Flint lighter
PPE

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GRADING POLICY:

- Successful completion of all Labs (at least 80% recommended). Rubrics provided in AMTEC online specify how grading is determined.
- Successful completion of each module's post-assessment (at least 80% recommended).

College Grading Standards	Percent
4.0 Excellent	91-100%
3.5	86-90%
3.0 Good	81-85%
2.5	76-80%
2.0 Satisfactory	71-75%
1.5	66-70%
1.0	60-65%
0.0	0-59%

ACCEPTABLE USE POLICY:

Computer Resources

Use of College-owned computer resources is a privilege extended by the College to students, employees, and other authorized users as a tool to promote the mission of the College. All users agree to be bound by the terms and conditions of the LCC Acceptable Use Policy at the time they complete an account application form. Copies of the LCC Acceptable Use Policy are available at the Library Circulation Desk and may also be accessed on the World Wide Web. The URL is http://www.lcc.edu/policy/policies_1.aspx#ACCEPTABLE_USE_POLICY

Transfer Potential

For transferability information, please consult the Transfer Equivalency Information located at the LCC website at http://www.lcc.edu/transfer. For additional transferability information, contact the LCC Academic Advising Center, (517) 483-1904.

The MACRAO Transfer Agreement simplifies the transfer of students from one Michigan institution to another. The most current MACRAO Transfer Agreement information can be found at http://www.lcc.edu/transfer/macrao_agreement.aspx.

Student Code of Conduct and General Rules and Guidelines

LCC supports a positive educational environment that will benefit student success. In order to ensure this vision, the College has established the LCC Student Code of Conduct and the Student General Rules and Guidelines to ensure the protection of student rights and the health and safety of the College community, as well as to support the efficient operation of College programs. In addition, the College has established guidelines for the redress of grievances by individuals accused in such proceedings. A copy of the most current Code can be found on the College's website at http://www.lcc.edu/catalog/policies_procedures/studentrulesguidelines.aspx#code.

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Subject Matter Expert (SME) Course Review Summary
College: Lansing Community College
M-CAM Training Area: ☐CNC/Machining ☒Multi-Skilled/Mechatronics ☐Production Operation ☐Welding/Fabrication
Degree Program Name:
Title of Course: Mechatronics Welding and Fabrication
Subject Matter Expert (SME) Reviewer Information **Name: Robert C. Hess** **Title: Senior Instructional Designer/Trainer** **Phone: 566-322-1033** **Email: bob.hess@mhtechnologies.net** **Organization/Affiliation: MH Technologies**
Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content):
Synopsis of Findings: 1. **All Labs hyperlinks not working in 1102.** 2. **1103 acceptable for training.** 3. **1104 Lab 7 Hyperlink not working.** 4. **1104 Lab 8 Hyperlink not working.**

Reviewers Signature Robert C. Hess Date: 3/8/17

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:			

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	

Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review

Comments or recommendations:			
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:			
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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