

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: General PM and Predictive Maintenance

Course Description: This course covers how to check for wear and tear, placing components to avoid breakdown, lubricating, cleaning, and testing to keep equipment optimized for efficiency and accuracy.

Delivery method is hybrid, open entry/open exit.

Date Created: February, 2017

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

Faculty Developer(s)/Instructional Designers(s): Sidney Mosley/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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AMT 102: General Preventive Maintenance (PM) and Predictive Maintenance (Lansing Community College)
Syllabus

DESCRIPTION:

This course covers how to check for wear and tear, placing components to avoid breakdown, lubricating, cleaning, and testing to keep equipment optimized for efficiency and accuracy.

TOTAL TIME REQUIREMENT for the course is approximately 30 hours.

PREREQUISITES: Reading Level 4. Writing Level 4. Math Level 5. Basic OSHA Safety. Capstone 1. Capstone 2.

OBJECTIVES: (for a complete list of objectives, see each module)

After completing this course, the student should be able to:

- Demonstrate appropriate predictive and preventive maintenance safety.
- Perform general housekeeping.
- Monitor floor management development system.
- Perform equipment checks.
- Change filters.
- Maintain oil and grease levels.
- Collect oil samples for analysis.
- Interpret oil analysis data and take action.
 - Read and interpret oil analysis data.
 - Determine root cause of contamination.
 - Initiate work orders as required.
 - Locate and eliminate source of contamination.
 - Schedule a repair if contaminated.
- Troubleshoot series type, automatic lube system.
- Demonstrate correct use of vibration analysis to diagnose condition of equipment.
- Demonstrate correct techniques for laser shaft alignment.
- Demonstrate correct techniques for balancing equipment.
- Demonstrate correct techniques for online and offline motor current analysis of equipment.
- Demonstrate correct techniques for performing infrared thermograph of equipment.
- Demonstrate correct techniques for performing ultrasonic maintenance of equipment.
- Interpret data available in a maintenance database.
- Demonstrate correct procedures for predictive maintenance troubleshooting.

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102 General Preventive Maintenance and Predictive Maintenance consists of two modules:

1021 – Basic PM (9 lessons to read on your own, 3 labs to do at LCC with an instructor, 10 total hours)
Basic PM covers how routine work is done to keep equipment in good working order and to optimize its efficiency and accuracy. Activities in this module include regular routine cleaning, lubricating, testing, checking for wear and tear and eventually replacing components to avoid breakdown.

1022 – Advanced Technologies in Predictive Maintenance (9 lessons, 6 labs, 20 total hours).
Maintenance departments in modern automotive production facilities have been significantly influenced by quality-improvement philosophies. Gradual, continuous improvement in all aspects of plant operation is the goal of production operation, these same principles all apply to facility maintenance as well. Maintenance personnel can apply these concepts to their maintenance, troubleshooting, and repair tasks in order to continuously improve plant operations and efficiency. This module will introduce the learner to the various types and styles of predictive and preventive maintenance components used in industrial applications.

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 1021 and 1022 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 1021: Basic PM
Lab 1: Safety, Housekeeping, & 5S Practices
AMTEC Integrated Manufacturing System (or equivalent)
Oil filter for Parker DPAK Hydraulic Power Unit or equivalent
Oil and Grease for AMTEC Integrated Manufacturing System or equivalent
Floor Management Development System (FMDS) or screen shots and resources from FMDS
Lab 2: Collect Oil Samples for Analysis
AMTEC Integrated Manufacturing System (or equivalent)
Parker DPAK Hydraulic Power Unit or equivalent
Oil collection kit
Pump for extracting oil
Container for oil sample
Lab 3: Troubleshooting Automatic Lubrication System
AMTEC Integrated Manufacturing System (or equivalent)
Series type automatic lubrication system

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MATERIALS: *(continued)*

AMT 1022: Advanced Technologies in Predictive Maintenance
Lab 1: Vibration Analysis
Trainer with moving components where vibration may be detected
Vibration Analyzer
Computerized Maintenance Management System (CMMS)
Lab 2: Balancing
Trainer with moving components where balance/unbalance may be detected & capable of lockout
Balancing machine
Trial weights
Trim weights
Grinder (optional)
Welding equipment (optional)
Lab 3: Online and Offline Motor Current Analysis
Trainer with electrical motor whose current can be analyzed
Motor Current Analyzer
Lab 4: Infrared Thermography
AMTEC Manufacturing System Simulator (or equivalent)
Infrared Thermography Equipment
Infrared Camera
Computerized Maintenance Management System (CMMS)
Lab 5: Ultrasonic Analysis
AMTEC Manufacturing System Simulator (or equivalent)
Ultrasonic Analysis Equipment
Computerized Maintenance Management System (CMMS)
Lab 6: Predictive Troubleshooting
AMTEC Manufacturing System Simulator (or equivalent)
Vibration Analyzer
Infrared Thermography Equipment
Infrared Camera
Ultrasonic Analysis Equipment
Computerized Maintenance Management System (CMMS)

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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 General PM and Predictive Maintenance

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 good for training.

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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Robert C. Hess

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Shelby Twp., MI 48317
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Qualifications

Dedicated, articulate, and enthusiastic with strong analytical and organizational abilities. Effective communication and interpersonal skills. Ability to work independently or as an integral part of a team to accomplish goals. Experience prioritizing and completing numerous concurrent responsibilities while meeting time and organizational goals. Sound professional attitude, strong work ethic and pride in personal performance.

Experience

- | | | |
|--|-------------------------------------|--|
| 2015 – Present | M H Technologies LLC | Warren, MI |
| Senior Instructional Designer/Trainer | | |
| <ul style="list-style-type: none">• Perform Needs Analysis and quote training programs• Develop on-line training programs, system manuals, student workbooks, and job aids• Deliver on-site training programs | | |
| 2002 – 2015 | R.C. Technologies | Shelby Twp. MI |
| Business Owner – R.C. Technologies | | |
| <ul style="list-style-type: none">• Research and quote training programs• Development of training programs for Ford Motors, DaimlerChrysler, General Motors, Kuka Robotics, Fame Conveyor, Lamb Technicon, Delphi, Magna, and SPX• Design training programs, system manuals, student workbooks, PowerPoint presentations, and job aids• Deliver on-site training programs• Professional Industrial photography | | |
| 1995 – 2002 | DCT Inc. | Sterling Heights, MI |
| Training Designer | | |
| <ul style="list-style-type: none">• Research and quote training programs• Design training programs, system manuals, student workbooks, and job aids• Deliver on-site training programs | | |
| 1990 – 1995 | Bond Robotics | Sterling Heights, MI |
| Training Manager / Field Service Engineer | | |
| <ul style="list-style-type: none">• Managed Training Department• Research and quote training programs• Design operation and maintenance manuals plus training guides• Deliver all training programs• Perform on-site electrical and mechanical customer support for installation, start-up, and debugging of pressroom automation | | |
| 1986 – 1990 | Robotic Vision Systems, Inc. | Sterling Heights |
| Field Service Engineer / Trainer | | |
| <ul style="list-style-type: none">• Research, installation, programming and training of 3D vision guided robotic welding and sealant systems for military, aerospace, and automotive industry | | |
| Education | 1977 – 1981 | Ferris State University |
| | | Big Rapids, MI |
| | | <ul style="list-style-type: none">• BSEE |