

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: Print Reading

Course Description:

This course introduces how to read, manipulate, and understand a mechanical part print. Participants will learn to recognize, identify, describe, and relate the components used in schematics and symbols.

Delivery method is hybrid, open entry/open exit.

Date Created: September, 2015.

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

Faculty Developer(s)/Instructional Designers(s): Nathan Webb/Ann Lapo

College Contact: Jill Doederlein

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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 introduces how to read, manipulate, and understand a mechanical part print. Participants will learn to recognize, identify, describe, and relate the components used in schematics and symbols.

TOTAL TIME REQUIREMENT for the course is approximately 30 hours.

PREREQUISITES: Reading Level 4. Writing Level 4.

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

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

- Identify the different parts of a print.
- Describe the uses of prints.
- List and explain the six (6) steps in reading a print.
- Identify the different types of lines that are typically found on prints.
- Explain the difference between a scale and a rule.
- Explain the use of scales.
- Explain the three (3) principal planes of projection as they relate to the development of views.
- Demonstrate how multiviews are read.
- Explain the importance of proportional sketching.
- Explain how auxiliary views are developed and used on a print.
- Identify two types of lines used with section views.
- Identify the seven (7) kinds of section views.
- Explain the purpose of each kind of section view.
- Describe how an isometric drawing is developed.
- Explain the difference between an oblique and a perspective drawing.
- Define tolerance.
- Identify and interpret dimensions and tolerances.
- Define the four types of notes normally found on a print.
- Describe the information given in a bill of materials.
- Describe the information found in a revision notes block.
- Explain the purpose of the title block and the information located in the identified areas of a title block.
- Explain how flow is indicated on a schematic.
- Identify types of lines on schematics.
- Identify Electrical, Electronic, Fluid Power, Piping schematics by their symbols.
- Explain how to trace an electronics circuit.
- Describe a fluid power system.
- Explain the purpose of the main parts of a hydraulic system.
- Explain the purpose of the main parts of a pneumatic system.
- Explain the main methods of fusion welding.
- Define the five (5) types of joints and three (3) ways of welding each joint.
- Demonstrate how to read and interpret a complete welding symbol

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105 Robotics consists of two modules:

1041 – Drafting Fundamentals (9 lessons to read on your own, 2 labs to do at LCC with an instructor)
This learning module provides the student with the fundamental information in drafting necessary to retrieve read, manipulate and understand a mechanical part print. In addition, he or she should be able to identify different types of prints as well as being able to analyze them.

1042 – Symbols and Schematics (9 lessons, 4 labs)
This module helps the learner to recognize, identify, describe and relate the components used in schematics, along with their symbols and connectors, to describe electrical, electronics, pneumatics, hydraulics, and piping circuits, as well as welding and joining symbols interpretation.

Plan on up to 2 hours for each lab you attend at LCC. See the “Time Requirements” section of each Student Guide for details.

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 1041 and 1042 to access the lessons, labs specifications and assessments for this course.

Hands-on labs portion of the class:

- Tools and equipment specified per module for each hands-on lab.

| AMT 1041: Drafting Fundamentals |
|---|
| Lab 1: Prints & Fundamental Drawing Practices |
| AMTEC Manufacturing System Simulator (or equivalent) |
| Prints |
| 1114 - AMTEC - Integrated System Trainer Pneumatic REV0 |
| 1114 - AMTEC Manufacturing System Simulator REV1 |
| 1114-305 Conveyor Plan View |
| 1390 - Trainer Template - Hydraulic REV0 |
| CMM Part |
| CMM Part WO P |
| LH Widget |
| LH Widget WO P |
| Mill Block PMC |
| Mill Block PMC WO P |
| Step shaft PMC |
| Step shaft PMC WO P |
| Basic Drafting Equipment (pencil, paper, etc.) |

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MATERIALS: *(continued)*

1041 continued:

| |
|---|
| Lab 2: Print Reading, Interpretation, and Analysis |
| AMTEC Manufacturing System Simulator (or equivalent) |
| Prints |
| 1114 - AMTEC - Integrated System Trainer Pneumatic REV0 |
| 1114 - AMTEC Manufacturing System Simulator REV1 |
| 1114-305 Conveyor Plan View |
| 1390 - Trainer Template - Hydraulic REV0 |
| CMM Part |
| CMM Part WO P |
| LH Widget |
| LH Widget WO P |
| Mill Block PMC |
| Mill Block PMC WO P |
| Step shaft PMC |
| Step shaft PMC WO P |
| Basic Drafting Equipment (pencil, paper, etc.) |

| |
|---|
| AMT 1042: Symbols and Schematics |
| Lab 1: Symbols Recognition and Identification |
| AMTEC Manufacturing System Simulator (or equivalent) |
| Prints |
| 1114 - AMTEC - Integrated System Trainer Pneumatic REV0 |
| 1114 - AMTEC Manufacturing System Simulator REV1 |
| 1114-305 Conveyor Plan View |
| 1390 - Trainer Template - Hydraulic REV0 |

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MATERIALS: *(continued)*

1042 continued:

| |
|--|
| Lab 2: Electrical & Electronic Circuit Analysis |
| Print |
| 1114 - AMTEC Manufacturing System Simulator REV1 |
| 1114 - AMTEC Manufacturing System Simulator REV1 |
| 1114-305 Conveyor Plan View |
| 1390 - Trainer Template - Hydraulic REV0 |
| Lab 3: Piping Diagram Analysis |
| Print |
| 1114 - AMTEC Manufacturing System Simulator REV1 |
| 1114-305 Conveyor Plan View |
| 1390 - Trainer Template - Hydraulic REV0 |
| Lab 4: Hydraulic & Pneumatic Circuit Analysis |
| Print |
| 1114 - AMTEC Manufacturing System Simulator REV1 |
| 1114-305 Conveyor Plan View |
| 1390 - Trainer Template - Hydraulic REV0 |
| Lab 5: Welding Symbols Interpretation |
| No materials needed |
| Lab 6: Interpretation of Diagrams and Schematics |
| No materials needed |

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% |

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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: <input type="checkbox"/> CNC/Machining <input checked="" type="checkbox"/> Multi-Skilled/Mechatronics <input type="checkbox"/> Production Operation <input type="checkbox"/> Welding/Fabrication | |
| Degree Program Name: | |
| Title of Course: Mechatronics Print Reading | |
| 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: | |
| <ol style="list-style-type: none"> 1. All Labs hyperlinks 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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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 | |