

Lake Michigan College

Course Cover Sheet



M-CAM Training Area:

CNC/Machining Multi-Skilled Mechatronics Production Operation Welding/Fabrications

Program(s): Machine Tool Technology

Course: Engineering Design & Graphics

Course Description:

SUBJECT	TITLE	CONTACT HOURS	COURSE DESCRIPTION
ENGR 113	ENGINEERING DESIGN & GRAPHICS	90	Beginning engineering drawing course that introduces principles of computer aided drafting, basic 3D solid modeling, orthographic projection, sectional views, dimensioning techniques and auxiliary view construction. Textbook assignments, handout assignments and chapter tests are used to support and access student learning.

Date Created: Work completed on 06/30/15

Faculty Developer(s)/Instructional Designers(s): Steve Huycke

Employer/Industry Partner: Whirlpool (Chuck Nearpass)

College Contact: Kenneth W. Flowers, PhD.

Phone: (269) 927-4103

Email: flowers@lakemichigancollege.edu

Additional Information/Comments:

This course existed at Lake Michigan College prior to the involvement in the TAACCCT grant. The development done linked to the grant was to incorporate SolidProfessor, an online curriculum vendor. Course adaptation was completed in July, 2015. The college’s Drafting & Design Advisory Committee provided guidance regarding the adaptation of this course. Edgewater Automation, Whirlpool Corporation, Wightman Associates, are members of the Drafting & Design Advisory Committee.

This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

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ENGINEERING DESIGN AND GRAPHICS COURSE SYLLABUS

I. COURSE IDENTIFICATION

A.	Discipline	Engineering Technology
B.	Title & Number	Engineering Design and Graphics ENGR 113
C.	Credit Hours	4
D.	Contact Hours	6
E.	Instructor	
F.	Office Number	
G.	Telephone	
H.	Email address	
I.	Prerequisite(s)	E,M,R
J.	Semester & Academic Year	Fall & Spring

II. TEXTBOOKS AND/OR EQUIPMENT /SUPPLIES

1. Texts: On-line SolidProfessor subscription
2. Equipment:
3. Paper, Pencils, Calculator
4. Pen Drive minimum 4GB

III. COURSE DESCRIPTION FROM CATALOG

Beginning engineering drawing course that introduces principles of computer aided drafting, basic 3D solid modeling, orthographic projection, sectional views, dimensioning techniques and auxiliary view construction. Textbook assignments, handout assignments and chapter tests are used to support and access student learning.

Prerequisites: E, M, R,

IV. GENERAL EDUCATION AREA(S) MET

There are no General Education areas met by this course.

V. GOALS AND OBJECTIVES

Upon completion, students will/should be able to:

- A. COMPREHEND THE ORTHOGRAPHIC PROJECTION METHOD OF CONSTRUCTING MULTI-VIEW DRAWINGS (**Third Angle Projection**)
 - 1. Understand/apply proper view placement within given mechanical/engineering drawings
 - 2. Describe spatial relationships of entities from view to view within given mechanical/engineering drawings

- B. APPLY PRINCIPLES OF DIMENSIONING TO GIVEN MECHANICAL/ENGINEERING DRAWINGS
 - 1. Construct part dimensions in proper views on given drawing assignments
 - 2. Recognize incorrect placement of dimensions within a drawing
 - 3. Discuss the proper use of tolerancing within mechanical/engineering drawings

- C. UNDERSTAND THE CONCEPTS OF SECTIONAL VIEW CONSTRUCTION
 - 1. Recognize where to apply and where not to apply sectional views within a drawing
 - 2. Apply the various types of sectional views to a given drawing
 - 3. Understand dimensioning as applied to sectional views

- D. COMPREHEND THE THEORY OF AUXILIARY VIEW PROJECTION
 - 1. Apply the theory of auxiliary view projection to given drawings
 - 2. Recognize when auxiliary view construction is necessary within given mechanical/engineering drawings
 - 3. Construct proper dimensions in auxiliary views
 - 4. Apply the various types of auxiliary views to given drawing problems

VI. EXPECTED STUDENT OUTCOME(S)

During the semester you may be asked to participate in Assessment of learning activities that will not be graded. Your instructor will use the information that you provide to better gauge your comprehension of course material: and, as appropriate, will modify how course material is presented in order to better prepare you to successfully complete graded assignments.

VII. INSTRUCTIONAL METHODOLOGY

The methods of instruction throughout this course include: lecture presentation, use of computer, written exercises, handouts, group discussions, question and answer sessions, and laboratory assignments.

VIII. WRITING ACROSS THE CURRICULUM STRATEGY (*which may or may not be graded*)

Students are responsible for correct spelling and punctuation on all written assignments. Tests and quizzes will contain some writing and word definition. Assigned writing projects will be relevant to all applied/specific subject materials taught in this class.

IX. GRADING CRITERIA AND REQUIREMENTS

Grading criteria is based on average points scored determined by labs, SolidProfessor assessments, and/or other assignments listed on assignment schedule. See grading scale below to identify averages.

X. GRADING SCALE

Grading Scale: 90 - 100 = **A** 80 - 89 = **B** 70 - 79 = **C** 60 - 69 = **D** 00 - 59 = **E**

XI. MAKE-UP POLICY

Make-up Policy will be at the discretion of the instructor.

XII. ATTENDANCE POLICY/WITHDRAWAL POLICY

Students are expected to attend all class sessions. If classes are missed, it is the student's responsibility to complete all assignments. A sign-in sheet will be used for attendance. Failure to sign-in may result in an absence. For withdrawal policy, see College catalog.

Mindful of the diverse student body that Lake Michigan College serves, and the varied belief systems that its students represent, the College will make a reasonable effort to accommodate students who need to be excused from classes for the observance of religious holidays. This policy does not apply to students who knowingly register for classes scheduled to meet on days that consistently conflict with their day of worship, e.g., a student who signs up for Saturday classes when the student normally worships on Saturday.

XIII. ACADEMIC HONESTY POLICY

The principles of truth and honesty are recognized as fundamental to a community of teachers and scholars. Lake Michigan College expects that both faculty and students will honor these principles and in doing so protect

the integrity of College grades. This means that all academic work will be done by the student to whom it is assigned without giving or receiving unauthorized aid of any kind. Instructors will exercise care in the planning and supervision of academic work so that honest effort will be positively encouraged. Cheating and plagiarism are the two most obvious violations of academic honesty. In brief, plagiarism is borrowing ideas, words, organization, etc. from another source or person and claiming them as original.

Any dishonest activity may result in failure of specific assignments or an entire course. Flagrant and/or repeated violations of Academic Honesty will result in disciplinary action up to and including expulsion from Lake Michigan College.

XIV. DISABILITY STATEMENT

Should you have any questions about this course and your success, please arrange to meet with me. If you determine that disability related accommodations are necessary, please register with the Student Success Center-Disability Resources on the Napier Campus, and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations.

Students with a documented disability may wish to consult with the Student Resource Center. They can be reached at 269-927-8866. A counselor can work with you to develop an accommodation plan that will be shared with your instructors. See me if you need further information.

XV. ASSIGNMENT SCHEDULE

The Assignment Schedule will be followed as closely as possible; however, changes may be made at the instructor's discretion.

NOTE: Additional information regarding the course may be added to the syllabus at the discretion of the faculty member prior to distribution

ASSIGNMENT SCHEDULE

Areas to be covered:

BASIC 2D/3D SolidWorks Commands (**CAD**)
Multiple Views (**CAD**)
Dimensioning Techniques (**CAD**)
Sectional Views (**CAD**)
Auxiliary Views (**CAD**)

DESCRIPTION

ORIENTATION: A lecture/demonstration on how to get started will be given. Course requirements will also be discussed.

LECTURE # 1: Starting SolidWorks

View the SolidProfessor videos; [Lesson 1-Starting SolidWorks - Lecture](#)

What is SolidWorks

Interface Tour

View Manipulation

Also, under the **Labs and Resources LECTURE #1 MTEC Templates** tab in SolidProfessor, download the ANSI-MM, ANSI-Inches, ENG Graphics-Inches and

ENG Graphics-MM files to your C: drive. Make a directory titled MTEC Templates on your C: drive and place these files in that directory. You will use these four templates for all required part and drawing files for this course.

View the file titled: How to use the MTEC Templates.

LECTURE #2: Intro to Sketching

View the SolidProfessor videos;

Lesson 2-Intro to Sketching

The Sketcher

Starting a Part

The Sketcher

Starting a Sketch

Lines

Sketch Tools

Rectangles

Geometric Relations

Circles & Arcs

Dimensions (Sketch)

Geometric Relations

Extrude Feature

Dimensions

Editing Geometry

Numeric Sketch Input

Over Defined Sketches

Sketch Fillets

DESCRIPTION

Offset Entities
Convert Entities
Sketches on Faces
Trim Tools
Automatic Relations
Fully Defined Sketches
Sketch Mirroring
Sketched Text
Rapid Sketch

ASSIGNMENT: From the **Lesson 2 – Intro to Sketching – Exercises-Hands-On** download and complete the 3 pdf exercises, Basic Sketching, Basic Extrude and Editing Geometry. You may also want to view the Lesson 2 Intro to Sketching- Exercises – Walkthrough video files to aid in the completion of the Hands-On exercises.

Under the **Labs and Resources** tab **LECTURE #2**, complete any 3 extrude exercises found in the **LECTURE #2** Problem handout. Save these 3 part files to your local drive. You will be creating dimensioned drawings from these models later in this course.

TEST: Complete the online **Section Test** found at the end of Lesson 2.

LECTURE #3: Basic Part Design

View the SolidProfessor videos; **Lesson 3 – Basic Part Design -Lecture**
Overview of Design
Creating the Base Feature
The Tab
Hole in Tab
Mirror Feature
Rollback Bar and Order of Features
Hole Wizard
Fillet
Materials
Mass Properties

ASSIGNMENT: From the **Lesson 3-Basic Part Design – Exercises – Hands-On**, download and complete the 3 pdf exercises, Mounting Block, Face Plate and Lock Mechanism. You may also want to view the Lesson 3 Basic Part Design-Walkthrough video files to aid in the completion of the Hands-On exercises.

DESCRIPTION

Under the **Labs and Resources tab** LECTURE #3, complete any 4 exercises found in the LECTURE #3 Problem handout. Save these 4 part files to your local drive. You will be creating dimensioned drawings from these models later in this course.

TEST: Complete the online **Section Test** found at the end of Lesson 3.

LECTURE #4: Intermediate Part Design

View the SolidProfessor videos; **Lesson 4 – Intermediate Part Design-Lecture**

Revolve Feature

Cutout and Circular Pattern

Linear Pattern

Ribs

Shell

Chamfer

Planes I

Planes II

ASSIGNMENT: From the Lesson 4-Intermediate Part Design-Exercises-Hands-On, download and complete the 3 pdf exercises, Latch Plate, Handle 1 and Rose Cover 1. You may also want to view the Lesson 4 Intermediate Part Design Walkthrough video files to aid in the completion of the Hands-On exercises.

Under the **Labs and Resources tab** LECTURE #4, complete any 4 exercises found in the LECTURE #4 Problem handout. Save these 4 part files to your local drive. You will be creating dimensioned drawings from these models later in this course.

TEST: Complete the online **Section Test** found at the end of Lesson 3.

LECTURE #5: Drawings

View the SolidProfessor videos; **Lesson 6-Drawings Lecture**

Drawings Overview – Starting a New Drawing

Model Views

Projected Views

Model Items

Dimensions

Associativity

DESCRIPTION

Annotations

Detail View

Section View

ASSIGNMENT: From Lesson 6- Drawings-Hands-On, download and complete the Part Drawing Clevis pdf file. You may want to review the Lesson 6-Drawings-Walkthrough video to aid in the completion of the Hands-On exercise.

Under the **Labs and Resources** tab LECTURE #5, complete any 3 exercises found in the LECTURE #5 Problem handout. Save these 3 part files to your local drive. You will be creating dimensioned drawings from these models later in this course.

LECTURE #6: Advanced Sketching

View the SolidProfessor videos; **Advanced Sketching**

Polygon

Ellipse

Splitting Entities

Derived Sketches

Sketch Expert

LECTURE #7: Sweeps and Lofts

View the SolidProfessor videos; **Sweeps** Introduction to Sweeps

The Basic Sweep

Path Options

Guide Curves

Multiple Guide Curves

Profile Orientation

Twist

Swept Cut

Lofts Introduction to Lofts

The Basic Loft

Closing a Loft

Loft Profiles

ASSIGNMENT: Under the **Labs and Resources** tab LECTURE #8, complete any 3 **Sectional View** exercises and any 3 **Auxiliary view** exercises found in the LECTURE #8 Problem handout. Save these 3 part files to your local drive. You will be creating dimensioned drawings from these models later in this course.

TEST: Complete the online **Section Test** found at the end of 2014 Drawings.

Instructions for turning in your assignments for evaluation

Now that you have completed viewing the SolidProfessor videos and created the assigned models for LECTURES #2,3,4,5 &8, you are ready to create engineering drawings for these models and submit them for evaluation. When preparing your engineering drawings please follow the following steps prior to submission;

1. Make sure to use one of the **MTEC drawing templates** as a basis for all required drawings
2. All dimensions will be 3 place decimals.
3. All tolerances will be **4 place LIMIT Tolerances**
4. Show **only the views necessary** for the manufacture of your part. All views will be at a scale factor of 1:1
5. Include a shaded isometric image with edges removed in the upper right corner of your drawing sheet. Scale of this isometric view is to be 1:2

SUBMITTING ASSIGNMENTS:

All material should be submitted as you complete it. To submit your drawings for evaluation, come to MT110, log on to one of the computers and launch SolidWorks. Open your drawing file and send your plot to the Canon plotter. When finished, TRIM excess paper from your plot, and place your plot in the drawing file located in the front of the classroom.

I will evaluate the drawings, **mark them for revision** if needed and return them to the drawing file. If you need to revise your drawings, make the needed changes, re-plot your corrected drawing. **Staple** your **"REVISED"** plot to the marked up plot and resubmit your drawing for evaluation. If your drawings are correct, you will receive a grade which will show up on the drawing when I return it to you. If your drawings still are not correct, I will return them for further revision.

STUDENT EVALUATION SHEET

LECTURE #2 Pts.

ENG ____ ____ 5

ENG ____ ____ 5

ENG ____ ____ 5

LECTURE #3 Pts

ENG ____ ____ 5

ENG ____ ____ 5

ENG ____ ____ 5

ENG ____ ____ 5

LECTURE #4 Pts

ENG ____ ____ 5

ENG ____ ____ 5

ENG ____ ____ 5

ENG ____ ____ 5

LECTURE #5 Pts.

ENG ____ ____ 5

ENG ____ ____ 5

ENG ____ ____ 5

LECTURE #8 Pts.

(SECTIONAL VIEWS)

ENG ____ ____ 5

ENG ____ ____ 5

ENG ____ ____ 5

(AUXILIARY VIEWS)

ENG ____ ____ 5

ENG ____ ____ 5

ENG ____ ____ 5

GRADE PTS

SCALE

A	=	5.0 PTS
A-	=	4.7
B+	=	4.6
B	=	4.4
B-	=	4.2
C+	=	4.1
C	=	3.9
C-	=	3.7
D+	=	3.5
D	=	3.4

FINAL GRADE

A=	100.00 – 90.00
B=	89.99 – 80.00
C=	79.99 – 70.00
D=	69.99 – 65.00



Subject Matter Expert (SME) Course Review Summary

College: Lake Michigan College

M-CAM Training Area: CNC/Machining Multi-Skilled/Mechatronics Production Operation Welding/Fabrication

Degree Program Name: Machine Tool Technology

Title of Course: Beginning Engineering Graphics

Subject Matter Expert (SME) Reviewer Information

Name: Charles Nearpass

Title: Lead Designer

Phone: (269) 923-7709

Email: charles_e_nearpass@whirlpool.com

Organization/Affiliation: Whirlpool Corporation

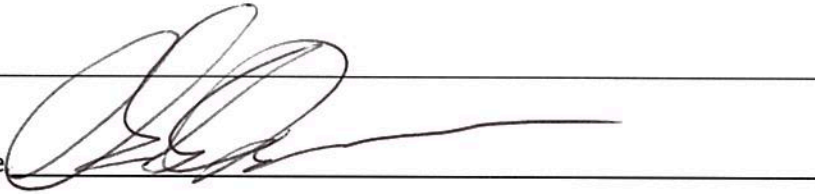
Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content):

See attached

Synopsis of Findings: This course uses Solid Works which is a widely used 3D CAD software. Solid Works offers a online training course which should be kept up to date with the current version of the software. The basic knowledge gained from this course will allow students to apply their knowledge to many other CAD softwares used in manufacturing. A basic understanding of 3D CAD software allows students to apply that knowledge in programming CNC machines and modeling for 3D printing devices as well as opening opportunities in part design and development. A degree or journeyman card in machine tool or 3D design can open doors in many different industries. This course will also help students interpret the drawings they will encounter in the machine tool industry.

Michigan Coalition for Advanced Manufacturing

Reviewers Signature

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke extending to the right, positioned above a horizontal line.

Date: 6-20-2017

**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: Goals and objectives of the course in the syllabus reflect the drawing aspect of the course but they do not reflect the 3D modeling aspect of the course. The prerequisites are not specified on the material provided.			
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: Online vendor training is typically very thorough. Solid Works is a good software for a base to expand into other 3D CAD software.			
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: Online training along with in class lecture provide an open environment for students to resolve any problems/questions they may have during the class.			

**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: Online courses will have specific questions that the students will answer. The grading scale is specified. Specific criteria for evaluation are not specified but most tests are online according to the assignment schedule.			
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: Solid Works software is widely used in the industry. The knowledge acquired from this course will allow the student to gain a basic understanding of 3D modeling which can be used in to run many other 3D software packages.			

This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

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CHARLES E. NEARPASS
PRODUCT DESIGNER
ST. JOSEPH TECH CENTER
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Work experience

2013 - Present Whirlpool Corporation St. Joseph MI – Product Designer

1989 - 2013 Hanson Mold St. Joseph MI - Designer

- Lead, design and create concepts for die cast, plastic and trim dies
- Produce detailed drawings for the design of die cast, plastic and trim dies using several CAD software packages including; ANVIL 1000, AutoCAD and Unigraphics
- Develop stock list and material quotes for tooling process

Education

Watervliet High School

- Honor Society
- Graduated with honors

Lake Michigan College - Associates in Drafting and Design

- Board of Trustee Scholarship
- State of Michigan Competitive Scholarship
- National Honor Society - Phi Theta Kappa
- Graduated with honors

Lake Michigan College - Plastics Technology

- Started acquiring second associates.
- Did not complete due to college dropping curriculum.
- Unigraphics/NX offsite training thru Hanson Mold.
- CATIA introductory offsite training thru Hanson Mold.
- Pro-e/Creo thru Whirlpool