**Course Map**

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| **Course Name:** MTE130 Metrology |
| **Instructor Name:**  | **Date:** July 2015 |
| **Course Competencies:** 1. Demonstrate hands on use of geometric dimensioning & tolerancing metrology methods.  2. Use common measuring tools found in manufacturing.  3. Operate a coordinate-measuring machine.  4. Perform calibration activities on various measuring instruments.  5. Collect and record data for SPC documentation.  6. Verify accuracy of machined parts.  7. List ISO standards and requirements.  8. Interpret and report measurement data on databases.  9. Describe other quality standards required in manufacturing.  |

**Course Materials (Text, Edition and any other publisher items)**

**Textbooks and/or Resources:**

**Resources:**

**Rubrics:** Rubrics and specific grading criteria for EACH assessment should be included at the end of the course map.

| **Module # and Title** | **CCNS Competencies and Measurable Objectives** | **Content, Activities or Challenges****(Learner Interaction** **& Engagement)**  | **Assessments, Rubrics (Feedback)** |
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| Start Here |  | CHAMP Course License and Attribution |  |
| Module 1: Measurement and Metrology | 7, 9 | * View the presentations
	+ Measurement--The Unit of Length
	+ Geometric Dimensioning and Tolerancing Fundamentals
	+ Geometric Dimensioning and Tolerancing Geometry
	+ Geometric Dimensioning and Tolerancing Geometry Symbols
	+ Geometric Dimensioning and Tolerancing Form Tolerances
	+ Geometric Dimensioning and Tolerancing Orientation Tolerances
	+ Fundamental and Conversions
* Complete: Metrology--The Science of Measurement Assignment #1
* Complete: Metrology--The Science of Measurement Assignment #2
 | * Metrology--The Science of Measurement Assignment #1
* Metrology--The Science of Measurement Assignment #2
 |
| Module 2: Statistics and Metrology | 6, 8 | * View the presentations
	+ Bonus Tolerance and Calculation
	+ Material Hardness
* Complete the Metrology - Statistics and Metrology: Hardness Assignment #1
* View the Presentation
	+ Surface Roughness
* Complete the Metrology - Statistics and Metrology: Surface Roughness Assignment #2
 | * Metrology - Statistics and Metrology: Hardness Assignment #1
* Metrology - Statistics and Metrology: Surface Roughness Assignment #2
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| Module 3: Systems of Measurements | 2, 4, 5 | * Complete: Metrology – Systems of Measurement: Units of Measurements Assignment #1
* View the presentations
	+ Precision Accuracy and Tolerance
	+ Ture Position Calculation
* Reveiw Module 1 presentations if necessary
	+ Geometric Dimensioning and Tolerancing Geometry
	+ Geometric Dimensioning and Tolerancing Form Tolerances
	+ Geometric Dimensioning and Tolerancing Orientation Tolerances
* Complete: Metrology--Systems of Measurement: GD&T Assignment #2
 | * Complete: Metrology – Systems of Measurement: Units of Measurements Assignment #1
* Complete: Metrology--Systems of Measurement: GD&T Assignment #2
 |
| Module 4: Measuring Instruments | 1, 2, 3, 4, 8 | * Review and Complete the worksheets located in the Practice Worksheet folder as needed for understanding the material in this module
* View the presentations
	+ Steel Rule
	+ Gage Blocks
* Complete: Steel Rule and Gage Block Lab
* View the presentations
	+ Attribute Gages
	+ Air Gages
* Complete: Air Gage Lab
* View the presentation: Height Gage
* Complete: Height Gage Lab
* Complete: Metrology--Measuring Instruments--Height Gage Assignment #1
* View the presentation: Thread Gages
* Complete: Metrology--Measuring Instruments--Blocks and Measurement Assignment #2
* View the presentation: Bore and Telescoping
* Complete: Bore and Telescoping Gage Lab
* Complete: Metrology--Measuring Instruments--Go/No-Go Gage Assignment #3
* View the presentation: Calipers
* Complete: Caliper Reading Worksheet Assignment
* Complete: Caliper Lab Assignment
* View the presentations:
	+ Vernier Instruments
	+ Micrometers
* Complete: Micrometer Lab Assignment
* View the presentation: Depth Micrometers
* Complete: Depth Micrometer Lab
* Complete: Metrology--Measuring Instruments--Micrometers Assignment #4
* View the presentation: Dial Indicators
* Complete: Metrology--Measuring Instruments--Dial Indicators Assignment #5
 | * Practice Worksheets
* Steel Rule and Gage Block Lab
* Air Gage Lab
* Height Gage Lab
* Complete: Metrology--Measuring Instruments--Height Gage Assignment #1
* Metrology--Measuring Instruments--Blocks and Measurement Assignment #2
* Bore and Telescoping Gage Lab
* Metrology--Measuring Instruments--Go/No-Go Gage Assignment #3
* Caliper Reading Worksheet Assignment
* Caliper Lab Assignment
* Micrometer Lab Assignment
* Depth Micrometer Lab
* Metrology--Measuring Instruments--Micrometers Assignment #4
* Metrology--Measuring Instruments--Dial Indicators Assignment #5
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| Module 5: Angle Measurements | 1, 2, 3, 4, 8 | * Review and Complete the worksheets located in the Practice Worksheet folder as needed for understanding the material in this module
* View the presentation: Angle Measurement
* Complete: Angle Lab
* View the presentation: Surface Plates
* Complete: Metrology--Angle Measurements Plates Assignment #1
 | * Practice worksheets
* Angle Lab
* Metrology--Angle Measurements Plates Assignment #1
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| Module 6: Optical Metrology | 1, 2, 3, 4, 8 | * Review and Complete the worksheets located in the Practice Worksheet folder as needed for understanding the material in this module
* View the presentation: Optical Comparator
* Complete: Metrology--Optical Metrology: CMM's Assignment #1
* Complete: Metrology--Optical Metrology: Optical Comparators Assignment #2
 | * Practice Worksheets
* Metrology--Optical Metrology: CMM's Assignment #1
* Complete: Metrology--Optical Metrology: Optical Comparators Assignment #2
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| Module 7: Coordinate Measuring Machines | 1, 2, 3, 4, 8 | * View the presentation: Coordinate Measuring Machines
* Complete: Coordinate Measuring Machines CMM Lab
 | * Coordinate Measuring Machines CMM Lab
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