

Course Description**ETI1152C | Mechanical Measurement and Instrumentation | 3.00 credits**

This course provides the basic foundation for mechanical measurement techniques used in manufacturing environments. Students will learn to integrate the concepts, principles, and techniques of mechanical measurement with the use of various types of instruments including micrometers, verniers, calipers, gages, and other types of measuring equipment.

Course Competencies

Competency 1: The student will understand the procedures of using the interface by:

1. Defining the terms associated with measurement and metrology
2. Explaining why measurement is essential for communication in industry
3. Describing the characteristics of measurement in production manufacturing
4. Explaining the role of metrology in national and international trade
5. Define the application of measurement to inspection techniques

Competency 2: The student will understand the basic functionality of solid works software by:

1. Defining tolerance as applied to metrology
2. Defining basic symbols used in geometric dimensioning and tolerancing
3. Defining the maximum material condition (mmc) and the least material condition (lmc)
4. Describing the different types of geometric characteristics

Competency 3: The student will demonstrate an understanding of the language and systems of measurement by:

1. Summarizing the features of a work space
2. Describing a line of measurement
3. Defining precision, accuracy, and reliability
4. Differentiating between the English and metric systems
5. Summarizing the strengths and disadvantages of each measurement system
6. Stating the steps taken to choose the correct system
7. Explaining measurement points on documents

Competency 4: The student will understand how parts & assemblies are related by:

1. Describing the differences between rules and scales
2. Describing the roles that rules and scales have in measurement technique
3. Use graduated scales in application measurement within recognized limitations
4. Describing the error of measurement, with graduated scales, in application work
5. Explaining the role of error in repeated measurement
6. Describing the role and the use of basic measurement instruments
7. Describing the fundamental principles of metrology using the basic instruments
8. Describing the relationship between scale divisions and discrimination
9. Using a variety of precision instruments such as rules, tapes, and calipers, in measurement applications
10. Selecting the instrument with the necessary accuracy required for the task
11. Applying the appropriate safety measures when using measuring equipment

Competency 5: The student will demonstrate an understanding of the language and systems of measurement by:

1. Defining the terms associated with verniers and micrometers
2. Describing the vernier and micrometer family of instruments
3. Reading the vernier instruments in measuring parts
4. Describing the differences between precision, accuracy, and reliability for these instruments.

5. Identifying the positional problems inherent in measurement applications
6. Using a variety of vernier and micrometer instruments in measurement applications
7. Explaining the way the micrometer screw adapts to the measurement of linear displacements
8. Explaining how micrometer cleanliness and alignment increase as the amplification increases

Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Use computer and emerging technologies effectively