Course Outcome Summary

MONROE COUNTY COMMUNITY COLLEGE

QSTC 220 (Calibration & Gage R&R)

Course Information

Division	ASET
Contact Hours	45
Theory	15
Lab Hours	30
Total Credits	3

Prerequisites **MATH 090 and RDG 090 or qualifying scores on accepted placement tests. QSTC 150 or instructor consent.**

Course Description

This course covers techniques of gage calibration and gage repeatability and reproducibility studies (Measurement System Analysis). Hands-on work includes calibration of measuring tools and computerized gage documentation using calibration software.

This course is a required course for students pursuing an AAS in the Metrology/Quality program..

Program Outcomes Addressed by this Course:

Upon successful completion of this course, students should be able to meet the program outcomes listed below:
  A. Learn aspects of the maintenance of a calibration system, including proper calibration techniques for common measuring and test equipment used within a facility.
  B. Create and perform gage repeatability, reproducibility and correlation studies
  C. Summarize calibration results, and quality concepts, then communicate these to engineering, customers and others, as needed.
  D. Acquire and analyze measurement and other data using appropriate statistical methods to facilitate process analysis and improvement.

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Course Outcomes

In order to evidence success in this course, the students will be able to:

1. Identify and recognize measurements and measurement systems and the procedures that guide this, including their relation to quality systems.

Program outcomes linked:
   A. Learn aspects of the maintenance of a calibration system, including proper calibration techniques for common measuring and test equipment used within a facility.
   B. Summarize calibration results, and quality concepts, then communicate these to engineering, customers and others, as needed.

2. Demonstrate an ability to perform a variable gage repeatability and reproducibility study, pressure gauge calibrations and studies, temperature device calibrations and studies, mass balance calibrations and studies, torque calibrations and studies and multimeter calibrations and studies.

Program outcomes linked:
   A. Create and perform gage repeatability, reproducibility and correlation studies
   B. Summarize calibration results, and quality concepts, then communicate these to engineering, customers and others, as needed.
   C. Acquire and analyze measurement and other data using appropriate statistical methods to facilitate process analysis and improvement.

3. Understand and describe similarities and differences of pressure, vacuum, absolute pressure, low, medium and high pressure calibrations, pressure calibration standards, below freezing, ambient, and high temperature calibrations, temperature calibration standards, high medium and low torque calibrations, torque calibration standards, electronic calibrations, including current, voltage, resistance, inductance, capacitance and frequency, electronic calibration standards, time calibrations.

Program outcomes linked:
   A. Summarize calibration results, and quality concepts, then communicate these to engineering, customers and others, as needed.
   B. Acquire and analyze measurement and other data using appropriate statistical methods to facilitate process analysis and improvement.

4. Perform measurement systems studies, including determining adequacy of the standards to be used for measurements made. Verify that the equipment is set up correctly so that measurements made will be adequate for requirements. Verify that the laboratory area and environment is adequate for measurements to be made, e.g temperature, humidity, cleanliness, lighting, air currents, etc. Ensure that personnel making measurements have a clear understanding of the use of the standards and also instruments to be calibrated.

Program outcomes linked:

    A. Learn aspects of the maintenance of a calibration system, including proper calibration techniques for common measuring and test equipment used within a facility.

    B. Summarize calibration results, and quality concepts, then communicate these to engineering, customers and others, as needed.

    C. Acquire and analyze measurement and other data using appropriate statistical methods to facilitate process analysis and improvement.

5. Application and interpretation of measurement system studies, including use of a measurement system study to determine adequacy of measurements made, and performing analyses based on a previous measurement system studies, to troubleshoot measurement problems, such as non-repeatable measurements, measurements consistently out of tolerance, or consistently perfect measurements.

Program outcomes linked:

    A. Create and perform gage repeatability, reproducibility and correlation studies.

    B. Summarize calibration results, and quality concepts, then communicate these to engineering, customers and others, as needed.

    C. Acquire and analyze measurement and other data using appropriate statistical methods to facilitate process analysis and improvement.

6. Demonstrate understanding for revision and creation of procedures for calibration of measuring tools and gages, and what needs to be included so a clear and understandable calibration procedure exists.

Program outcomes linked:

    A. Summarize calibration results, and quality concepts, then communicate these to engineering, customers and others, as needed.

    B. Acquire and analyze measurement and other data using appropriate statistical methods to facilitate process analysis and improvement.

7. Understand and describe aspects and sources of calibration errors and uncertainties, including, sources and significance of measurement uncertainties, types of error, parallax, visual distortion, lighting, temperature, humidity, air currents, dirt, measurement system setup, e.g. levelness, all connections properly made, and software versions compatibility issues.

Program outcomes linked:

    B. Create and perform gage repeatability, reproducibility and correlation studies

    C. Summarize calibration results, and quality concepts, then communicate these to engineering, customers and others, as needed.

    D. Acquire and analyze measurement and other data using appropriate statistical methods to facilitate process analysis and improvement.

    E. Collect quality related data; then interpret measurement output and graphic data by use of SPC tools and the performance of Cp and Cpk analysis.

Course Outcome Summary

Required Program Core Course

QSTC 220 (Calibration & Gage R&R)

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By: Michael L. Taylor