

## COURSE OUTLINE

**COURSE:**                    **AQS110     Introduction to Quality and Metrology**  
4 credit – laboratory course (2 hours lecture, 2.5 hours lab)

**TEXT (Primary):**        The Metrology Handbook, 2nd Edition  
Bucher, PhD, Jay L (Editor)  
Quality Press  
ISBN 13: 978-0-87389-838-6

Additional Reference:    Quality Technician's Handbook, 6<sup>th</sup> Edition  
Griffith, Gary  
Pearson Education, Inc.  
ISBN 13: 978-0-13-262128-1

### COURSE DESCRIPTION

This course provides an introduction to the concepts used in STEM disciplines and manufacturing processes to ensure defined procedures are used to deliver results for materials of known and sufficient quality. Prerequisites: ENG098, FYE101, MAT096, RDG098, or placement.

### COURSE OBJECTIVES

Students will learn the fundamentals of Metrology used in current manufacturing and service industries. Students will learn about formal procedures and defined processes as a means to control quality, along with the methods by which quality is evaluated. The procedures and processes include: measurements and associated error/uncertainty, calibration, statistical process control tools, lean six sigma practices and quality assurance/control concepts.

### OUTCOME ASSESSMENTS:

1. Identify and apply sampling methods, inspection, measurement and test equipment as fundamental quality control techniques.
2. Describe metrology concepts including gage reproducibility and repeatability, calibration and traceability to recognized standards.
3. Demonstrate the ability to collect and statistically review data collected and distinguishing the variability and errors associated with inspection, measurement and test equipment.
4. Demonstrate the ability to utilize the basic seven quality tools: Pareto chart, flow chart (run chart), check sheets, control charts, cause and effect diagrams, histograms and scatter diagrams.
5. Express the principles of validation and qualification as it applies to manufacturing processes.
6. Describe the principles of lean manufacturing and six sigma improvement techniques.
7. Demonstrate the ability to write and speak effectively through written assignments, lab reports and discussions.

### TENTATIVE SCHEDULE OF CLASSES

WEEK Date	LECTURE TOPIC	Text Reference Chapter(s)	LAB EXERCISE
1	Concepts in Quality Industry and Regulatory Overview	Chapter 2, 3	Create Standard Operating Procedure
2	Quality Control & Quality Assurance Functions	Chapter 4	Continue SOP
Test #1 – Quality Concepts (beginning class, Week 3)			
3	Metrology / Specifications	Chapter 17 (pages 107-120) Chapter 19 Chapter 21 (pages 171-172)	Generate Specification
4	Measurement Fundamentals	Chapter 5, 6 Chapter 20 (pages 153-154)	Understanding drawings & prints
5		Chapter 9 Chapter 16	Dimensional Measurements
6	Calibration	Chapter 10 Chapter 18	Physical testing (mass, volume)
7		Chapter 11 Chapter 14	Sampling & Analysis
8	Inspection Systems & Sampling	Lecture slides	[Local company tour?]
Test #2 – Measurement (beginning class, Week 9)			
9	Shop Math	Chapter 24 Chapter 25 (pages 233-237)	Data Analysis – Excel Measurement Uncertainty & applied math
10	Statistical Parameters	Chapter 27 (pages 259-262) Chapter 20 (pages 164-165)	Gage Repeatability & Reproducibility
11	Understanding Variability & Error	Chapter 29 (pages 297-298, 308-309)	Temperature Mapping
23-Nov	No class – Thanksgiving Break		
13	Statistical Process Control	Chapter 20 (pages 158-164)	Temperature Mapping (cont.)
Test #3 – Statistical Analysis (beginning Class Week 14)			
14	Validation / Qualification	Lecture slides	Process Flow using dice game
15	Lean Manufacturing / Six Sigma	Lecture slides	Review – Final preparation
16 21-Dec	Final Exam - Cumulative		

**PLEASE NOTE:** The instructor reserves the right to make any necessary adjustments to this syllabus.

**NOTE:** The textbook contains a glossary of terms beginning on Page 470.  
IM&TE is used throughout the text and refers to “inspection, measurement and test equipment”