

REQUEST FOR COURSE-EQUIVALENCY CREDIT

PART I (by Jan Kania)

QCC Course Prefix and Number: MNT 110

QCC Course Title: Manufacturing Processes I

Summarize the goal of the course and attach current course description from college catalog:

Course Goal:

The content of this course provides the student with a well rounded knowledge of the Manufacturing environment. The focus is on materials and machining processes that encompass a wide variety of manufacturing industries. Upon completion of this course the student should have a good understanding of the materials they will encounter along with how they can be modified to provide the goods and services that society uses on a daily basis.

Course Description:  
 This course examines present day manufacturing processes and occupations. Students learn various manufacturing processes including precision inspection and measurement, forging and casting, and powder metal processing. Students gain an understanding of the properties of metal, process automation, and the basics of cost estimating. In addition, students learn a practical approach to managing a project to provide the technical experience necessary in current manufacturing industries.

1. INSTRUCTIONAL OBJECTIVE:

Understand the differences and applications for Ferrous and Nonferrous materials

MEASURABLE STUDENT OUTCOME(S):

- a) Identify the makeup and history for materials.
- b) Identify the process methods for materials.
- c) Identify proper material selection, usage and applications.

2. INSTRUCTIONAL OBJECTIVE:

Understand the purpose and process of Heat treating and annealing various materials

MEASURABLE STUDENT OUTCOME(S):

- a) Identify how differing materials respond to heat treating and annealing.
- b) Identify the limits of heat treating and annealing.
- c) Identify differing heat treating and annealing processes.

Date of Request: Summer 2012
Date Sent to CPS Representative: Summer 2012
Originator: Kathy Rentsch
Sponsoring Agency: QCC and MassMBP
Instructional Dean: Kathy Rentsch
Coordinator/Faculty: Lee Duerden
CPS Representative: Faith Wong

3. INSTRUCTIONAL OBJECTIVE: Understanding Measurement, Inspecting, and testing tolerances

MEASURABLE STUDENT OUTCOME(S):

- a) Identify standard measurement and inspection methods.
- b) Identify differing materials response to the environment.
- c) Identify how tolerances are specified, controlled and inspected.

4. INSTRUCTIONAL OBJECTIVE: Understanding casting processes and selection

MEASURABLE STUDENT OUTCOME(S):

- a) Define casting terminology.
- b) Identify the history and equipment required for casting
- c) Identify casting processes for differing materials and required volumes.
- d) Identify advantages and disadvantages of different casting methods.
- e) Identify how materials respond to the casting process.

5. INSTRUCTIONAL OBJECTIVE: Understanding Metal forming process

MEASURABLE STUDENT OUTCOME(S):

- a) Describing independent and dependent processing variables.
- b) Identifying process lubrication affects and requirements.
- c) Identifying temperature concerns.
- d) Describing bulk deformation including rolling, forging, and extrusion,
- e) Identifying the shearing process including bending, drawing, stretching, and alternative production methods.

6. INSTRUCTIONAL OBJECTIVE: Understanding Nonmetallic materials: Plastic, Elastomers, Ceramics, Composites and their fabrication.

MEASURABLE STUDENT OUTCOME(S):

- a) Identify various types of nonmetallic materials and their applications.
- b) Identify manufacturing processes for differing nonmetallic materials including rubber.
- c) Describe the manufacture and application for composite materials.

7. INSTRUCTIONAL OBJECTIVE: Understanding Powder Metallurgy

Understanding Powder Metallurgy

MEASURABLE STUDENT OUTCOME(S):

- a) Describe the manufacturing process for powder materials P/M.
- b) Identify the makeup of common P/M.
- c) Identify design parameters, concerns, and limitations for P/M products.

INSTRUCTIONAL OBJECTIVE:

Understanding Electrochemical, Chemical, and Thermal Machining

MEASURABLE STUDENT OUTCOME(S):

- a) Describe electrochemical, chemical, and thermal machining processes.
- b) Analyze application techniques.
- c) Identify unique capabilities of electrical discharge machining.

INSTRUCTIONAL OBJECTIVE:

Understanding Cutting, Turning, Drilling, Milling Machining processes along with Work holding Devices

MEASURABLE STUDENT OUTCOME(S):

- a) Describe cutting tools required for the machining processes.
- b) Identify and calculate feeds and speeds required for differing materials.
- c) Analyze and describe the machinery required to perform the machining process.
- d) Identify the proper work holding techniques to accurately hold the work and reduce the risk of injury.

INSTRUCTIONAL OBJECTIVE:

Overview of Numerical Control (NC) and automated machining equipment

MEASURABLE STUDENT OUTCOME(S):

- a) Describe differing NC, equipment in the modern machining environment.
- b) Identify the capabilities of modern NC equipment.
- c) Analyze the types of machining processes that would lend themselves to NC equipment.

INSTRUCTIONAL OBJECTIVE:

Understanding other machining processes: Broaching, Shaping, Planing, Sawing, Filing and Cost estimating

MEASURABLE STUDENT OUTCOME(S):

12. INSTRUCTIONAL OBJECTIVE: Understanding Abrasive Machining
- MEASURABLE STUDENT OUTCOME(S):
- a) Describe the design and purpose of other machining processes.
  - b) Identify the components and operating techniques involved.
  - c) Demonstrate basic knowledge behind cost estimating including cycle time and varying material costs.

13. INSTRUCTIONAL OBJECTIVE: Understanding Thread and Gear Manufacturing
- MEASURABLE STUDENT OUTCOME(S):
- a) Describe equipment and cutting tools utilized in abrasive machining.
  - b) Identify standard classifications for grinding wheel structure and grades.
  - c) Describe different grinding and abrasive machining equipment.
  - d) Identify the proper safety precautions when working with high speed grinding equipment.

14. INSTRUCTIONAL OBJECTIVE: Project: Research, Review, Analyze, and offer Corrective action Recommendations on Ergonomic issue of a student choosing.
- MEASURABLE STUDENT OUTCOME(S):
- a) Describe cutting tools required for machining threads and gears.
  - b) Describe thread and gear cutting methods.
  - c) Identify thread and gear tooth types and styles.
  - d) Identify and calculate thread dimensions.
  - e) Identify and calculate gear tooth dimensions.

15. INSTRUCTIONAL OBJECTIVE: Series of three interrelated case studies: CASE #1 Review your (own) current Plant Manufacturing Operations. Points:
- MEASURABLE STUDENT OUTCOME(S):
- a) Research and selection.
  - b) Analyze an ergonomic issue using critical thinking techniques.
  - c) Demonstrate the ability to improve a situation to increase operator comfort and reduce the possibility of injury.

- Employee turnover
- Employee skills (required)
- Training
- Capacity
- Unusual Circumstances

CASE #2  
 Review your company's "Major Product" (OR a product you are most familiar with). Present the manufacturing process as a case study object with the following discussion points:  
 - What is the Number One Cost of Manufacturing?  
 - What parts of the manufacturing costs could be "directly controlled"?  
 - How might cost reduction affect product quality?

CASE #3  
 Present a hypothetical case study explaining ONE change in your company's manufacturing process that would maximize product profit, have a minimal effect on product quality, and reduce overhead costs.

MEASURABLE STUDENT OUTCOME(S):

- a) Research and selection.
- b) Analyze using critical thinking techniques.
- c) Demonstrate the ability to analyze and understand costs associated with producing a product.
- d) Demonstrate the ability to understand the effect material along with machining options may have on final product cost and quality.