

TOTAL CREDIT HOURS

PREREQUISITE(S): must be a 5th semester student in Mechanical Technology.

I. PHILOSOPHY/GOALS

It is the intent of this course to familiarize the students of Mechanical Technology sufficiently in the basics of Process Control so that in the general practice of Classical Mechanical Engineering, there will be a sound understanding of the Control equipment and processes encountered.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course, the student will be able to:

- describe various methods of temperature, flow, level and pressure measurement.
- explain the fundamental scientific concepts behind these measurement methods.
- perform many of the above methods in the laboratory.
- calculate solutions to assigned problems dealing with measurement fundamentals.
- explain the theoretical concepts of Process Control
- list the role of specific hardware components used in process control.
- describe how an industrial control loop is tuned.
- briefly outline the concepts in;
 - cascade control
 - ratio control
 - feed forward control
 - multivariable control

teOCESS CONTROL
COURSE NAME

MCH315
CODE NO

V. METHOD(S) OF EVALUATION

Two tests will be conducted during the semester, Tests will be announced one week in advance.

In addition, labs will be examined by two performance tests.

Quizzes will be conducted at sporadic intervals and without prior warning. Quiz questions will be based directly on homework assignments.

The final course mark is calculated according to the formula:

$$\begin{aligned} & 0.60 * \{(test1 + test2)/2\} \\ & + 0.25 * \{(lab1 + lab2)/2\} \\ & + 0.15 * quiz \end{aligned}$$

The following list indicates the relationship between numerical mark and the letter grades:

A+	90 - 100
A	80 - 89
B	70 - 79
C	60 - 69
I	Incomplete with permission from instructor and deadline for completion , failing which, the grade will automatically become R
R	less than 60% : Repeat course

Only one rewrite **will** be given and is available only to students with an overall mark of 45% or more plus a good attendance record. The Maximum grade possible with a re-write is 60% or C.

PROCESS CONTROL

MCH315

COURSE NAME

CODE NO.

VI. REQUIRED STUDENT RESOURCES (including textbooks and workbooks)

PROCESS MEASUREMENT FUNDAMENTALS

and

PROCESS CONTROL FUNDAMENTALS

from "LABVOLT" & "QUINTECH
reprinted with permission by College and available from the
college book store,

VIII, SPECIAL NOTES

All classes and labs are compulsory. If it is necessary to miss a class or a lab, the student MUST explain his absence to the instructor and obtain all missed materials from a classmate.

***** end *****

- III. TOPICS TO BE COVERED

- 1. FUNDAMENTALS OF MEASUREMENT

- 1.1 Process Measurement System Terminology

- 1.2 Static and Dynamic Characteristics

- 2. PRESSURE MEASUREMENT

- 2.1 Manometer, Bourdon Tube, Diaphragm Pressure Devices,

- 2.2 Pressure Capsules, Bellows Pressure Devices, Dead Weight Gauge

- 2.3 Capacitance Type Sensor

- 2.4 Strain Gauge

- 3. TEMPERATURE MEASUREMENT

- 3.1 Liquid in glass & filled system thermometers

- 3.2 Thermocouples

- 3.3 RTD & thermistors

- 4. FLOW MEASUREMENT

- 4.1 Bernoulli's Equation

- 4.2 Primary elements

- 4.3 Flowmeters

- 5. LEVEL MEASUREMENT

- 5.1 Direct level measurement techniques

- 5.2 Hydrostatic level measurement techniques

- 6. PROCESS CONTROL BASICS

- 6.1 Fundamental terminology

- 6.2 Block diagrams

- 6.3 Closed and Open Loops

t

6.4 Feedback

6.5 Criteria for closed loop control

7. CHARACTERISTICS OF THE PROCESS

7.1 Single capacity process

7.2 Dead Time, Lag and Time Constant

8. CONTROL STRATEGIES

8.1 On-off Control

8.2 PID Control

9. CONTROLLER TUNING BASICS

9.1 Factors affecting stability

9.1 Closed Loop Methods

9.2 Open Loop Methods