METROPOLITAN STATE UNIVERSITY OF DENVER
Office of Academic and Student Affairs

REGULAR COURSE SYLLABUS

School of: School of Professional Studies

Department: Engineering Technology

Prefix & Course Number: EET 3730 **Crosslisted With*:** ____

Course Title: Process Control Systems

Banner course title (30 characters): Process Control Systems

Check All That Apply: Required for Major: X Required for Minor: ____ Specified Elective: ____

Required for Concentration: __ Elective: __ Service Course: ____

To receive Title IV financial aid funds, all institutions of higher education must comply with the federal definition of a credit hour. The Higher Learning Commission requires institutions to maintain policies and procedures for verifying compliance with this definition.

Federal Credit Hour Definition: *A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:*
(1) one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or (2) at least an equivalent amount of work as required in paragraph (1) of this definition for other activities as established by an institution, including laboratory work, internships, practica, studio work, and other academic work leading toward to the award of credit hours. 34CFR 600.2 (11/1/2010)

Credit Hours: 2 (1.5+1)

Face-to-Face or Equivalent Hours per course:

Lecture 22.5 Lab 15 Internship ____ Practicum ____ Other (please specify type and hours):

Additional Student Work Hours per course: 60

Schedule Type: B **Grade Mode**: L

Variable topics umbrella course: **No** X **Yes** ____ If Yes, number of credit hours allowed ____

Specified repeatable course: No X **Yes** ____

APPROVED:

Department Chair **OR** Program Director — Date 01/29/14

Dean **OR** Associate Dean — Date 1-30-14

Associate VP, Academic and Student Affairs — Date 03/13/14

*If crosslisted, attach completed Course Crosslisting Agreement Form

Prefix and Course Number: EET 3730

Prerequisite(s): EET 1150 or EET 2000, with a grade of "C" or better

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Banner Enforced:

Prerequisite(s): EET 1150 or EET 2000, with a grade of "C" or better
Corequisite(s): _____
Prerequisite(s) or Corequisite(s): _____

Registration restrictions: Level _____ Class _____Program/Major _____ Student attribute _____

Catalog Course Description:
This course is an introduction to the applications of Proportional, Integral, & Derivative (PID) controllers in the process control industry. Topics include: structure of feedback, sensors, controllers, control valves, process dynamics, timing, piping and instrument drawing.

Specific Variable Topics Course Description (if applicable, umbrella course description included above): N/A

Required Reading and Other Materials will be equivalent to:
Johnson (2005). *Process Control Instrumentation Technology, 8/E,* Upper Saddle Hill, NJ: Prentice Hall

Specific, *Measurable* Student Behavioral Learning Objectives:
Upon completion of this course the student should be able to:
1. Understand Process Management and Process Controls in business environments.
2. Select PID controllers for business applications.
3. Design elementary process control systems.

Detailed Outline of Course Content:
I. Introduction
  A. Manual Control
  B. Automatic Control
  C. Open-Loop
  D. Closed-Loop

II. Structure of Feedback
  A. Block Diagrams
  B. Layout

III. Sensors
  A. Measurement Basics
    1. Sensor Dynamics
    2. Sensor Selection
    3. Accuracy and Precision
    4. Rangeability & Turndown
    5. Uncertainty
    6. Transmission Systems
      a. Electrical
      b. Pneumatic

  B. Smati Sensors

Prefix and Course Number: EET 3730

C. Types
   1. Pressure
   2. Flow
   3. Level
   4. Temperatures
   5. Analytical

IV. Controllers
   A. On-Off Control
   B. Proportional, Integral, & Derivative (PID) Control
   C. PID Control

V. Control Valves
   A. Basic Operation
   B. Selection & Sizing
   C. Performance
   D. Fail Safe Operation

VI. Process Dynamics
   A. First Order
   B. High Order
   C. Dead Time
      1. Transmiation Log
      2. Higher Order Approximation
   D. Closed-Loop vs. Open-Loop

VII. Tuning
   A. Performance Indexes
   B. Methods

VIII. Piping & Instrument Drawings

IX. Advanced Methods
   A. Ratio
   B. Cascade
   C. Feed Forward
   D. Multivariable (brief)

X. Process Management

Evaluation of Student Performance:
1. Written Exams
2. Homework
3. Lab Reports
4. Presentations