COURSE #: CHE 466	**COURSE TITLE:** PROCESS DYNAMICS AND CONTROL
TERMS OFFERED: Fall	**PREREQUISITES:** ChE 343 Separation Processes ChE 344 Reaction Engineering and Design
TEXTBOOKS/REQUIRED MATERIAL: D. E. Seborg, D. A. Mellichamp, T. F. Edgar, and F. J. Doyle III, Process Dynamics and Control (3rd Ed.) (Wiley 2010) ISBN 978-0-470-12867-1	**COGNIZANT FACULTY:** Larson, Lin, Linic, Wang, Ziff
INSTRUCTORS: Ziff	**FACULTY APPROVAL:** 2014-03-24
CoE BULLETIN DESCRIPTION: Introduction to process control in chemical engineering. Control architecture design, notation, and implementation. Mathematical modeling and analysis of open-loop and closed-loop process dynamics. Applications to the control of level, flow, heat exchangers, reactors, and elementary multivariable systems. Statistical process control concepts.	**COURSE TOPICS:** (approximate number of hours in parentheses) 1. P&ID (Piping and Instrumentation Diagrams), sensors and valves (8) 2. Analysis of unsteady-state models of unit operations (12) 3. Tuning of PID (Proportional-Integral-Derivative) controllers (4) 4. Feed-forward, Cascade, Ratio and advanced control strategies (10) 5. Optimization, statistical process control (4)
COURSE STRUCTURE/SCHEDULE: Lecture: 2 per week @ 1.5 hours	

COURSE OBJECTIVES	Links shown in brackets are to course outcomes that satisfy these objectives. 1. To provide a conceptual and methodological framework for describing a process and its control system. [1-6] 2. To provide a conceptual and methodological framework for quantitatively analyzing and evaluating automatic control systems for chemical processes [3-7]
COURSE OUTCOMES	Links shown in brackets are to student outcomes a-k. 1. Draw piping and instrumentation diagrams following accepted standards and using appropriate symbols [c,e,k]. 2. Explain the operation of sensors and valves, including appropriate placement and linking [c]. 3. Formulate unsteady state models for common unit operations, and solve the resulting differential equations using analytical and numerical methods [e,k]. 4. Explain the operation of P, I, D, and PID controllers, and be able to simulate them and tune them using classical methods [k].. 5. Explain and implement feedback, feed forward, ratio, and cascade control architectures [e]. 6. Apply control strategies to address safety and environmental issues [j,k]. 7. Apply optimization to address design and economic considerations [j,k].
ASSESSMENT TOOLS	1. Home and class problems assess outcomes 1-7 2. Exams assess outcomes 1-7 3. End-of-term course evaluation provides student self-assessment of outcomes 1-7