COURSE #: CHE 487 (5 credits)	**COURSE TITLE:** Chemical Process Design
TERMS OFFERED: Fall, Winter	**PREREQUISITES:** CHE 360: Chemical Engineering Laboratory I, CHE 344: Reaction Engineering and Design, and MSE 250 or 220, or graduate standing
TEXTBOOKS/REQUIRED MATERIAL: RECOMMENDED: Towler, Gavin and Ray Sinnott, Chemical Engineering Design - Principles, Practice and Economics of Plant and Process Design, 2nd ed., Amsterdam, Butterworth-Heinemann, Elsevier, 2013. Turton, R., Bailie R.C.,Whiting, W. B., Shaeiwitz, J.A., Analysis, Synthesis, and Design of Chemical Processes, 2nd Edition, Prentice Hall	**COGNIZANT FACULTY:** Tadd, Wang, Schwank, Casper, Grimble
INSTRUCTORS: Tadd, Wang, Casper	**FACULTY APPROVAL:** 2019-11-05
CoE BULLETIN DESCRIPTION: Process conceptualization and design using chemical process simulators. A major team design project with progress reports, oral presentation, and a technical report with process drawings and economics.	**COURSE TOPICS:** (number of hours in parentheses) 1. Team dynamics and interpersonal relationships (1) 2. Conceptual design (6) 3. Process drawings and analysis (4) 4. Energy integration (1) 5. Safety and environment (4) 6. Process simulation (1) 7. Equipment function and sizing (4) 8. Equipment design (2) 9. Materials of construction (1) 10. Process economics (10) 11. Intellectual property issues (1) 12. Ethics (3) 13. Team meetings with instructor (10) 14. Technical communication (13)

COURSE STRUCTURE/SCHEDULE: Lecture: 3 per week @ 1 hour plus 1 per week @ 2 hours

COURSE OBJECTIVES	Links shown in brackets are to course outcomes that satisfy these objectives. 1. To provide a basis for students to function effectively in teams on a major project [a-i]. 2. To equip students to conceptualize and develop a chemical engineering process [a, d-h]. 3. To equip students to design the essential elements of a chemical engineering process (equipment sizes, material & energy balances, economics, environmental, safety) [a, d-h]. 4. To provide experience using commercial process simulation software as a design tool [e]. 5. To develop students' skills in written and oral technical communication [b, c]. 6. To integrate and apply subject matter from previous courses to solve open ended problems [d-h] 7. To provide opportunities to apply design concepts to biological systems [a-i]
COURSE OUTCOMES	Links shown in brackets are to ABET student outcomes 1-7. a. Research chemically related technical and business-related information [7] b. Write, edit, revise, and critique technical memos and formal written reports, including status reports submitted via e-mail [3] c. Prepare and present effective oral reports [3]

	d. Assemble a logical sequence of interconnected unit operations for an effective chemical engineering process, with consideration of global, cultural, economic, and public health factors [1,2] e. Use, and interpret results from a commercial process simulation software package [1,2] f. Determine sizes, materials, and capital and operating costs of equipment commonly used in the chemical processing industries [1,2,4] g. Assess the profitability of a chemical engineering process [4] h. Recognize professional situations requiring ethical decisions [4] i. Incorporate environmental and safety concerns into a chemical engineering process design, with consideration of global and ethical factors [4] j. Work in an industrial-type based team environment [5]
ASSESSMENT TOOLS	1. Regular team meetings with the course and project instructors including environmental and safety reviews, and status memos, assess course outcomes a-j 2. Oral reports assess outcomes a and c-j 3. Written reports assess outcomes a, b and d-j 4. Written critique of other teams' final design reports assesses outcomes b and d-j 5. Periodic self and peer evaluations assess outcome j 6. End-of-term course evaluation provides student self-assessment of outcomes a-j 7. Ethics workshop participation and essay assesses outcome h.