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|---|--|---|--|--|---------------------------|--------------------------------------|---------------------------------------|-----------------------|-------------------------------------|------------------------------------|---------------|--|---------------------------------------|--|---------------------------------|
| <b>COURSE #:</b> CHE 489 (3 credits)  |  | <b>COURSE TITLE:</b> Chemical Product Design II   |  |  |                           |                                      |                                       |                       |                                     |                                    |               |  |                                       |  |                                 |
| <b>TERM OFFERED:</b> Winter   |  | <b>PREREQUISITES:</b> CHE 488: Chemical Product Design I, CHE 360: Chemical Engineering Laboratory I, preceded or accompanied by CHE 485: Chemical Engineering Process Economics and MSE 220/250  |  |  |                           |                                      |                                       |                       |                                     |                                    |               |  |                                       |  |                                 |
| <b>TEXTBOOKS/REQUIRED MATERIAL:</b> None  |  | <b>COGNIZANT FACULTY:</b> Hirshfield, Tadd, Wisniewski  |  |  |                           |                                      |                                       |                       |                                     |                                    |               |  |                                       |  |                                 |
| <b>INSTRUCTORS:</b> Hirshfield, Wisniewski  |  | <b>FACULTY APPROVAL:</b> 2019-11-05   |  |  |                           |                                      |                                       |                       |                                     |                                    |               |  |                                       |  |                                 |
| <b>CoE BULLETIN DESCRIPTION:</b><br>Part two of a two-semester chemical product design sequence. Teams produce a consumer-ready prototype of a chemical product. Development of control and regulatory tests to ensure the product meets all relevant industrial, federal, and local regulations. Oral and written technology and economic reports. Safety, environmental and ethical issues. |  | <b>COURSE TOPICS:</b><br><table border="0"> <tr> <td>1. Team dynamics and interpersonal relationships (1)</td> <td>6. Energy integration (1)</td> </tr> <tr> <td>2. Process drawings and analysis (1)</td> <td>7. Sustainability and environment (3)</td> </tr> <tr> <td>3. Process Design (4)</td> <td>8. Intellectual property issues (2)</td> </tr> <tr> <td>4. Product &amp; Process Economics (4)</td> <td>9. Ethics (3)</td> </tr> <tr> <td>5. Developmental requirements &amp; Experimental evaluation (16)</td> <td>10. Team meetings with instructor (4)</td> </tr> <tr> <td></td> <td>11. Technical communication (8)</td> </tr> </table> |  | 1. Team dynamics and interpersonal relationships (1) | 6. Energy integration (1) | 2. Process drawings and analysis (1) | 7. Sustainability and environment (3) | 3. Process Design (4) | 8. Intellectual property issues (2) | 4. Product & Process Economics (4) | 9. Ethics (3) | 5. Developmental requirements & Experimental evaluation (16) | 10. Team meetings with instructor (4) |  | 11. Technical communication (8) |
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| <b>COURSE STRUCTURE/SCHEDULE:</b> Lecture: 1 per week, 1.5 hour, with lab time available for project work   |  |   |  |  |                           |                                      |                                       |                       |                                     |                                    |               |  |                                       |  |                                 |
| <b>COURSE OBJECTIVES</b>  | Links shown in brackets are to course outcomes that satisfy these objectives.<br>1. To provide a basis for students to function effectively in teams on a major project [i, j].<br>2. To equip students to conceptualize and develop effective product designs [a, d-h].<br>3. To equip students to design products consistent with the constraints that govern (process, environmental, safety, regulatory) [d, h].<br>4. To provide experience structuring and designing laboratory work to develop and validate a design. [h].<br>5. To develop students' skills in written and oral technical communication [b-c].<br>6. To equip students to integrate economic realities into all stages of the Design and Development process [d, f].<br>7. To integrate and apply subject matter from previous courses to solve open ended problems [d-h].   |   |  |  |                           |                                      |                                       |                       |                                     |                                    |               |  |                                       |  |                                 |
| <b>COURSE OUTCOMES</b>  | Links shown in brackets are to ABET student outcomes 1-7<br>a. Research and analyze technical and business-related information [1,7].<br>b. Write, edit, revise, and critique technical memos and formal written reports [3].<br>c. Prepare and present effective oral reports [3].<br>d. Design a product that meets the engineering and economic requirements defined by the marketplace [2,6].<br>e. Assemble a logical sequence of interconnected unit operations to produce the product designed [2].<br>f. Assess the economic impact of a product and its related production process [2].<br>g. Design a development program to enable and validate a design [2].<br>h. Account for environmental, safety and applicable regulatory issues in designing a product [2].<br>i. Work as a member of a team [5].<br>j. Recognize and analyze professional situations requiring ethical decisions with global context [4]. |   |  |  |                           |                                      |                                       |                       |                                     |                                    |               |  |                                       |  |                                 |
| <b>ASSESSMENT TOOLS</b>   | 1. Regular team meetings with the course instructors and peer evaluations assess course outcomes g, i<br>2. Oral reports assess outcomes a, b-h<br>3. Written reports assess outcomes a-b, d-f, h<br>4. An individual assignment assessed outcome j  |   |  |  |                           |                                      |                                       |                       |                                     |                                    |               |  |                                       |  |                                 |