The University Of Toledo
New Graduate Course Proposal

* denotes required fields

1. College*: College of Engineering
Department*: Chemical and Envrnmntl Engnrng

2. Contact Person*: Glenn Lipscomb Phone: 530-8088 (xxx - xxxx) Email: glenn.lipscomb@utoledo.edu

3. Alpha/Numeric Code (Subject area - number)*: CHEE 6010

4. Proposed title*: Green Engineering Princi
   Proposed effective term*: 201340 (e.g. 201140 for 2011 Fall)

5. Is the course cross-listed with another academic unit?

   Approval of other academic unit (signature and title)
   Is the course offered at more than one level?

If yes, an undergraduate course proposal form must also be submitted. If the undergraduate course is new, complete the New Undergraduate Course Proposal; if the undergraduate course is existing, submit an Undergraduate Course Modification Proposal.

6. Credit hours*: Fixed: 3 or Variable: to

7. Delivery Mode:
   a. Activity Type *
      Primary* Lecture
      Secondary --SelectType--
      Tertiary --SelectType--
   
   b. Minimum Credit Hours *
      3
   
   Maximum Credit Hours *
      3
   
   c. Weekly Contact Hours *
      3
   
8. Terms offered: Fall Spring Summer
   Date Added: 1-8-14
   Council Approved: 1-21-14
   Provost: 2-7-14

https://curriculumtracking.utoledo.edu/GradNewCourse.aspx?Mode=View&ID=CHEE60... 11/21/2013
9. Are students permitted to register for more than one section during a term? ☐ No ☑ Yes

May the courses be repeated for credit? ☐ No ☑ Yes

    ☐ Passing Grade/No Credit (A-C, NC)
    ☐ Credit/No Credit
    ☐ Grade Only (A-F, PR, I)
    ☐ Audit Only
    ☐ No Grade

Maximum Hours

11. Prerequisites (must be taken before): i.e. C or higher in (BIOE 4500 or BIOE 5500) and C or higher in MATH 4200

   Admission to Masters Program in Engineering or Natural Sciences

   PIN (Permissio From Instructor)   PDP (Permission From Department)

   Co-requisites (must be taken together):

12. Catalog Description* (75 words Maximum)

   The principles of chemical process analysis and design are introduced for the development of green engineering processes. Common components of chemical processes are reviewed and quantitative analyses of process performance and economics developed. The impact of design variables on materials and energy usage is demonstrated.

13. Attach a syllabus and an electronic copy of a complete outline of the major topics covered. Click here for template.

<table>
<thead>
<tr>
<th>File Type</th>
<th>View File</th>
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<tbody>
<tr>
<td>Syllabus</td>
<td>View</td>
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Course Approval:

Department Curriculum Authority: C.A. Schall  Date: 2013/04/17

Department Chairperson: Glenn Lipscomb  Date: 2013/04/18

https://curriculumtracking.utoledo.edu/GradNewCourse.aspx?Mode=View&ID=CHEE60...  11/21/2013
CHEE 6010 Green Engineering Principles for Chemical Processes  
Department of Chemical and Environmental Engineering  
University of Toledo  

Credit Hours: 3 (fixed)  
Contact Hours: 3 (fixed)  
Term Offered: Fall  
Grading: Normal Grading (A-F, PS/NC, PR, I)  
Prerequisites: Admission to Masters Program in Engineering or Natural Sciences  

Catalog Entry  
The principles of chemical process analysis and design are introduced for the development of green engineering processes. Common components of chemical processes are reviewed and quantitative analyses of process performance and economics developed. The impact of design variables on materials and energy usage is demonstrated.  

Text  
Principles of Chemical Engineering Practice  
George DeLancey  
Wiley • 456 pages  

Handbook of Chemical Engineering Calculations  
Nicholas Chopey  
McGraw Hill • 800 pp  

Student Learning Outcomes  
1. Identify different types and the components of chemical process diagrams  
2. Perform mass and energy balances for chemical processes  
3. Identify different types of fluid flow, heat transfer, separation, and reactor equipment and determine required size  
4. Determine process economic analysis and profitability  

Tentative Syllabus  
2. Mass Balances  
3. Energy Balances  
4. Thermodynamics  
5. Pumps and Compressors  
6. Heat Transfer  
7. Chemical Separations  
8. Reactor Design  
9. Engineering Economic Analysis: Capital and Operating Costs  
10. Profitability Analysis
Assessment and Grading
Letter grades will be assigned based on the percentage of points accumulated using the scale: A, 100-90; B, 89-80; C, 79-70; D, 69-60; F, 59-. The point total will consist of a weighted sum of the following assessment items:

1. Homework
2. Quizzes
3. Tests
4. Term paper on an emerging technology area in chemical engineering
5. Preparation of lecture material on term paper topic