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 6110

4. Proposed title*: Green Engineering Applc

   Proposed effective term*: 201410 (e.g. 201140 for 2011 Fall)

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

   Yes  No

   Approval of other academic unit (signature and title)

   Is the course offered at more than one level?

   Yes  No

   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

   Variable: to

7. Delivery Mode:

   Primary*  Secondary  Tertiary

   a. Activity Type *

      Lecture

   b. Minimum Credit Hours *

      3

   c. Weekly Contact Hours *

      3

7. Maximum Credit Hours *

   3

8. Terms offered:  Fall  Spring  Summer

   Date Added: 1-2-14

   Council Approved: 1-21-14

   To Provost: 2-7-14

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

10. Grading System*:  
   ☑ Normal Grading (A-F, PS/NC, PR, I)  
   ☐ Passing Grade/No Credit (A-C, NC)  
   ☐ Credit/No Credit  
   ☐ Grade Only (A-F, PR, I)  
   ☐ Audit Only  
   ☐ No Grade

11. Prerequisites (must be taken before): i.e. C or higher in (BIOE 4500 or BIOE 5500) and C or higher in MATH 4200
   CHEE 6010 or Bachelor’s Degree in Chemical Engineering
   PIN (Permission From Instructor)  
   PDP (Permission From Department)

Co-requisites (must be taken together):

12. Catalog Description* (75 words Maximum)
   Applications of green engineering principles in the chemical industry are discussed. Metrics for comparing process options are introduced along with common techniques for improving process performance.

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

<table>
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**Course Approval:**

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

Department Chairperson: [Signature]  
Date 2013/04/18

CHEE 6110 Green Engineering Applications in Chemical Industries
Department of Chemical and Environmental Engineering
University of Toledo

Credit Hours: 3 (fixed)
Contact Hours: 3 (fixed)
Term Offered: Spring
Grading: Normal Grading (A-F, PS/NC, PR, I)
Prerequisites: CHEE 6010 or Bachelor’s Degree in Chemical Engineering

Catalog Entry
Applications of green engineering principles in the chemical industry are discussed. Metrics for comparing process options are introduced along with common techniques for improving process performance.

Text
Green Engineering: Environmentally Conscious Design of Chemical Processes
David T. Allen and David R. Shonnard
©2002 • Prentice Hall • Paper, 576 pp
http://catalogue.pearsoned.co.uk/catalog/academic/product?ISBN=9780130619082#sthash.u785C0h5.dpuf

Student Learning Outcomes
1. Apply green engineering principles in design, commercialization and use of processes and products.
2. Identify and evaluate sources of environmental, health and safety impacts in chemical processes and products.

Tentative Syllabus
1. Introduction to Green Engineering and Sustainability in Chemical Process Engineering
2. Environmental Health & Safety (EHS)
3. Metrics in EHS
4. Green Chemistry Metrics
5. Sources of Environmental Impacts
6. Waste Minimization in Reactors and Process Intensification
7. Waste Minimization in Separations
8. Environmental Impacts of Utilities
9. Mass and Heat Integration
10. Life Cycle Assessment

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 and Exams
3. Term paper on emerging technology area and presentation
4. Preparation of lecture material on term paper topic