ENG ME 535/MS 535 Green Manufacturing

2008-2009 Catalog Data:

ENG ME 535/MS 535 Green Manufacturing Prereq: senior/graduate standing; background knowledge of chemistry CAS CH 101 or CAS CH 131; calculus through differental equations CAS MA 226; thermodynamics ENG ME 304 or ENG EK 424; and process kinetics ENG ME 465 or ENG ME 529; or consent of instructor. Relevant process engineering principles will be reviewed and utilized to study unit operations and processes that are employed in various manufacturing industries to comply with environmental laws and regulations. 4 cr.

Class/Lab Schedule: 4 lecture hours per week

Status in the Curriculum: Elective

Textbook(s) and/or Other Required Material: "GREEN ENGINEERING" by David T. Allen and David R. Shonnard, Prentice Hall, NJ, 2002.

Reference: Uday Pal, Green Manufacturing, Report to NIST, Gaithersburg, MD, August 1998
T.D. Reynolds and P.A. Richards, Unit Operations in Environmental Engineering, PWS Publishing Company

Coordinator: Uday B. Pal, Professor, Mechanical Engineering

Prerequisites by topic:

1. An understanding and knowledge of basic chemistry as taught in CAS CH 131 or CAS CH 101.
2. An understanding and knowledge of basic calculus through differential equations as taught in CAS MA 226.
3. An understanding of chemical thermodynamics and kinetics as taught in MN 465 or MN 529.

Goals:

Enable students to understand and design manufacturing processes that comply with environmental laws and regulations

Course Learning Outcomes:

As an outcome of completing this course the students:

i. Learn to identify air, water and land pollutants resulting from a manufacturing operation.
ii. Design cost-effective manufacturing processes in compliance with environmental regulations.
iii. Gain an understanding of the standard unit operations used to treat end-of-pipe pollutants.
iv. Understand the general impact of various pollutants on the environment and society as a whole.
v. Learn to make a clear and well-organized presentation.
vi. Be able to relate theory and practice through project work.

Course Learning Outcomes mapped on to Program Outcomes:

Program:	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Course:	iii	i, ii, iii	i, ii, iii, iv	iv, vi	i, ii, iii, iv	iv	v, vi	i, ii, iii, iv	i, ii, iv	i, ii, iii, iv	i, ii, iii, iv	i, ii	i, ii, iii, iv	ii, iv
Emphasis:	5	5	5	5	5	5	5	5	4	5	4	5	5	4

Topics (time spent):
1. Introduction (4 hours)
2. Physical Chemistry (12 hours)
3. Relevant Microbiology (4 hours)
4. Treatment Processes (20 hours)
5. Environmental Issues in Manufacturing Industries (8 hours)
6. Student presentations (Remaining hours)

Contribution of Course to Meeting the Professional Component:
Engineering topics: 100%

Status of Continuous Improvement Review of this Course:
Prepared by: Professor Uday B. Pal **Date:** 4/1/2009