To: The Faculty of the College of Engineering

From: The Faculty of the School of Chemical Engineering

Re: Curriculum Change

The faculty of the School of Chemical Engineering has approved the following change and submits it for your approval.

New Requirements: The change indicated below alters the senior year sequence of classes. CHE 43400 will be removed from the curriculum. In light of the removal of these three credit hours, the following changes will be made to accommodate the three hours elsewhere. CHE 43500 will become a 4 credit hour course, CHE 40000 will become a 1 credit hour course, and the remaining credit hour will become a free elective requirement. These new requirements will be made available to current Chemical Engineering sophomores, but will be required for all Chemical Engineering majors entering the School of Chemical Engineering in the fall of 2010.

Reasons: Due to previous curriculum changes which incorporated a lab component into CHE 34800, 37700, and 37800, much of the laboratory content in CHE 43400 is now being taught in those three courses. The remaining content will be incorporated into the additional credit hour in CHE 43500. One credit hour will be added to CHE 40000 to allow graded assignments to be incorporated into the course and the addition of a free elective is to keep the curriculum at 131 credit hours.

Present			Proposed
FRESHMAN YEAR (First Year Engineering)			
		First Semester	
(4)	CHM	12300 or 11500[a] Gen. Chemistry	
(4)	ENGL	10600 or 10800 (3)b English Comp	no change
I			
(1)	ENGR	10000 First Year Engr Lec	
(3)	ENGR	12600 Intro to Engr Prb Solv&Comp	
(4)	MA	16500 or 16100[c] Geom & Calc I	
16			
		Second Semester	
(4)	CHM	12400 or 11600 Gen. Chemistry	
(3)	COM	11400 Fund. of Commun	no change
(4)	MA	16600 or 16200 Geom & Calc II	
(4)	PHYS	17200 Mechanics	
15			

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes #19

Date 3/9/2010

Chairman ECC R. Cipra

	Present			Proposed
SOPHOMORE YEAR				
		Third Semester		
(0)	CHE	20000	Chem Engr Seminar	
(3)	CHE	20500[d]	Chemical Engr Calc	no change
(3)	CHM	26100	Organic Chemistry I	
(1)	CHM	26300	Organic Chem Lab I	
(4)	MA	26100	Multivar Calculus	
(3)	PHYS	24100	Electricity & Optics	
(3)	Gen-Ed Elective			
17				
		Fourth Semester		
(4)	CHE	21100	Chem Engr Thermo	
(3)	CHE	32000	Statistical Modeling	no change
(3)	CHM	26200	Organic Chemistry II	
(1)	CHM	26400	Organic Chm Lab II	
(4)	MA	26200	Liner Algebra & Diff Eq.	
(3)	Gen-Ed Elective			
18				
JUNIOR YEAR				
		Fifth Semester		
(3)	CHE	30600	Staged Separations	
(4)	CHE	37700	Momentum Transfer	no change
(3)	CHM	37000	Physical Chemistry	
(3)	BIOL	23000	Biology of the Living Cell	
(3)	MA	30300	Diff Eqs for Engr	
16				
		Sixth Semester		
(0)	CHE	30000	Chem Engr Seminar	
(3)	CHE	33000	Prin of Molec Engr	no change
(4)	CHE	34800	Chem Reaction Engr	
(4)	CHE	37800	Heat & Mass Transfr	
(3)	Gen-Ed Elective			
(3)	Engineering Elective			
17				
SENIOR YEAR				
		Seventh Semester		
(0)	CHE	40000	Professional Guidance	(1) CHE 40000 Professional Guidance
(3)	CHE	43400	Chemical Engr Lab I	(3) CHE 45600 Process Dyn & C'trol
(3)	CHE	45600	Process Dyn & C'trol	(3) CHE 44900 Design + Cost Analysis
(3)	CHE	44900	Design + Cost Analysis	(3) Gen-Ed Elective
(3)	Gen-Ed Elective			(3) CHE Elective
(3)	CHE Elective			(3) Technical Elective
15				16

Eighth Semester			
(3)	CHE	43500	Chem Engr Lab II
(2)	CHE	45000	Design...Process Sys
(3)	Gen-Ed Elective		
(3)	Gen-Ed Elective		
(3)	CHE Elective		
(3)	Technical Elective		
17			
Total: 131			

(4)	CHE	43500	Chem Engr Lab
(2)	CHE	45000	Design...Process Sys
(3)	Gen-Ed Elective		
(3)	Gen-Ed Elective		
(3)	CHE Elective		
(1)	**Free Elective**		
16			
Total: 131			

Footnotes:

Present

[a] ChE prefers that students take the CHM 12300/12400 sequence. Students who have taken CHM 11500/11600 will also be accepted into the School of Chemical Engineering.

b Students who complete ENGL 10800 will need 1 free elective hour in addition to the stated requirements

[c] The MA 16500/16600 (4 cr. each) sequence is preferred; however, the MA16100/16200 (5 cr. each) sequence may be taken. If MA 16100 and/or 16200 is taken, these courses will be accepted as only 4 credit hours each toward meeting the graduation requirements for ChE.

d A "C" or better must be earned in CHE 20500 to continue to enroll in CHE courses.

Proposed

[a] ChE prefers that students take the CHM 12300/12400 sequence. Students who have taken CHM 11500/11600 will also be accepted into the School of Chemical Engineering.

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d A "C" or better must be earned in CHE 20500 to continue to enroll in CHE courses.

AVarma

A. Varma, Head
School of Chemical Engineering
11/5/09

ChE 43400 Chemical Engineering Laboratory I (current)

A. Instructors: Vary/TBD

B. Catalog Description: Quantitative experimental study of thermodynamics, fluid mechanics, and heat and mass transfer; operation and evaluation of equipment; application of methods of data analysis in practice; use of computers in controlling and simulating experiments; strong emphasis on report writing and oral communication.

C. Prerequisites: CHE 32000, CHE 34800, CHE 37800

D. Textbooks: *Unit Operations of Chemical Engineering* (7th ed.), W. L. McCabe, J. C. Smith & P. Harriott, McGraw-Hill, 2005. *The Who/What/When/Where of CHE 434/435*, Chemical Engineering Laboratory, Purdue University, 2006.

E. Course Objective

Apply the engineering fundamentals and concepts developed in the chemical engineering core courses to design and conduct experiments, analyze the results, and present the results to a group of peers.

F. Course Outcomes (numbers in parentheses refer to related program educational objective)

1. Obtain experimental data and calculate physical quantities from these data (1, 2).
2. Understand experimental error, estimate it, and infer its significance in the experimental results (2).
3. Design statistically sound experiments, conduct these experiments, and analyze the results (1, 2, 3).
4. Effectively report results in written form and be able to communicate the results orally (7).
5. Understand different personality types, how these types respond, and how they can function effectively together as a team (4).
6. Develop an understanding of the professional responsibilities of the engineer as a member of a team (4, 6).
7. Practice safety as an integral part of laboratory work (8).

G. Course Topics: Flow measurement, rotameters, temperature measurement, electronic thermometers, analytical chemistry measurements, gas chromatography, CSTRs, bioreactors, agitation, natural convection evaporator, liquid/liquid extraction, concentric tube heat exchangers, RO water purification, fixed and fluidized beds, water pumping.

H. Assessment of Course Outcomes

Laboratory reports; Peer evaluation; Oral communication rubric.

ChE 43500 Chemical Engineering Laboratory II (current)

A. Instructors: Vary/TBD

B. Catalog Description: Continuation of CHE 43400 covering operations involving mass transfer such as distillation, absorption, extraction, drying, humidification, etc.; study of rates and equilibria in simple chemical and reaction systems; study of chemical processes; library work and report writing.

C. Prerequisites: CHE 43400

D. Textbook: *Unit Operations of Chemical Engineering* (7th ed.), W. L. McCabe, J. C. Smith & P. Harriott, McGraw-Hill, 2005. *The Who/What/When/Where of CHE 434/435*, Chemical Engineering Laboratory, Purdue University, 2006.

E. Course Objectives

Apply chemical engineering fundamentals to design, conduct, and analyze the results of experiments constructed to obtain intrinsic performance data required to complete design projects.

F. Course Outcomes (numbers in parentheses refer to related program educational objective)

1. Determine the intrinsic performance data required to complete the design, process, or process equipment (1, 2, 3).
2. Design and conduct an experimental program to determine the required performance data (1, 2, 3).
3. Use the requisite performance data to obtain a technically feasible and economical design to meet desired needs (1, 2, 3, 8).
4. Effectively report results in written form and be able to communicate these results in an oral presentation (7).
5. Understand different personality types, how these types respond, and how they can function effectively together as a team (4).
6. Develop the ability to identify, formulate, and solve engineering problems (1).
7. Develop the capability of independent and lifelong learning (9).
8. Develop knowledge of contemporary issues and understand the impact of engineering solutions in a global and societal context (8).
9. Develop ability to use modern techniques and engineering tools (5).
10. Develop an understanding of the professional and ethical responsibilities as a member of an engineering team (4).
11. Understand and practice appropriate safety measures (8).

G. Course Topics: Bioreactor and enzymatic reactor design and scale-up; distillation in a packed column and in a sieve-tray column; gas absorption in a packed column; gas separation by membrane permeation; gas-phase dehydrogenation; liquid-liquid extraction; ion exchange; food-grade solution production.

H. Assessment of Course Outcomes

Laboratory reports; Oral communication rubric; Peer evaluation.

ChE 435 Chemical Engineering Laboratory (proposed)

A. Instructors: Vary/TBD

B. Catalog Description: Credit Hours: 4.00. Quantitative experimental study of projects involving problems in fluid mechanics and heat and mass transfer or operation and evaluation of equipment; projects include analysis and data-based design of operations involving mass transfer such as distillation, absorption, extraction, drying, humidification, etc; study of rates and equilibria in simple chemical reaction systems; study of chemical processes; application of methods of data analysis in practice; some library work; emphasis on group work, report writing, and oral communication. May be offered Fall or Spring, or both semesters, in cases of large enrollments.

C. Prerequisites: CHE 37700 Minimum Grade of D-; CHE 32000 Minimum Grade of D-; CHE 34800 Minimum Grade of D-; CHE 37800 Minimum Grade of D-; CHE 30600 Minimum Grade of D-
Concurrent Pre-requisite: CHE 44900

D. Textbook: *Unit Operations of Chemical Engineering* (7th ed.), W. L. McCabe, J. C. Smith & P. Harriott, McGraw-Hill, 2005. Also a set of notes and instructions, prepared by the instructors, is used on laboratory procedures, written reports, and oral reports, "*The Who/What/When/Where of CHE 435*," Chemical Engineering Laboratory, Purdue University, 2009.

E. Course Objectives

Apply chemical engineering fundamentals to design and conduct experiments; analyze and interpret the results of experiments to obtain intrinsic engineering parameters or equipment performance data needed in design projects; and propose and evaluate a specific process or equipment design.

F. Course Outcomes (numbers in parentheses refer to related program educational objective)

1. Obtain experimental data and calculate physical quantities from these data (1, 2).
2. Understand experimental error, estimate it, and infer its significance in the experimental results (2).
3. Design statistically sound experiments, conduct these experiments, and analyze the results (1, 2, 3).
4. Determine the intrinsic performance data required to complete the design, process, or process equipment (1, 2, 3).
5. Design and conduct an experimental program to determine the required performance data (1, 2, 3).
6. Use the requisite performance data to obtain a technically feasible and economical design to meet desired needs (1, 2, 3, 8).
7. Effectively report results in written form and be able to communicate these results in an oral presentation (7).
8. Understand different personality types, how these types respond, and how they can function effectively together as a team (4).

9. Develop the ability to identify, formulate, and solve engineering problems (1).
10. Develop the capability of independent and lifelong learning (9).
11. Develop knowledge of contemporary issues and understand the impact of engineering solutions in a global and societal context (8).
12. Develop ability to use modern techniques and engineering tools (5).

13. Develop an understanding of the professional and ethical responsibilities as a member of an engineering team (4).
14. Understand and practice appropriate safety measures (8).

G. Course Topics: CSTRs, bioreactors, agitation, natural convection evaporator, liquid/liquid extraction, concentric tube heat exchangers, RO water purification, fixed and fluidized beds, water pumping. Bioreactor and enzymatic reactor design and scale-up; distillation in a packed column and in a sieve-tray column; gas absorption in a packed column; gas separation by membrane permeation; gas-phase dehydrogenation; liquid-liquid extraction; ion exchange; food-grade solution production.

H. Assessment of Course Outcomes
Laboratory reports; Peer evaluation; Oral communication rubric; Written report rubric.