Office of the Registrar FORM 40 REV. 12/09

### **PURDUE UNIVERSITY**

REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

EFD 36-11

DEPARTMENT		ESSION		
INSTRUCTIONS: Ple School of Chemical I	Engineering		spring	g 2012 (2012-20)
1. New course with supporting do	ocuments	= •	•	department head signature only)
<ol> <li>2. Add existing course offered at</li> </ol>	another campus	8. Change in ins	structional hours	•
3. Expiration of a course		<ul><li>9. Change in cor</li></ul>	urse description	l
4. Change in course number		√ 10. Change in cor	urse requisites	
5. Change in course title		11. Change in sei	mesters offered	(department head signature only)
<ul> <li>6. Change in course credit/type</li> </ul>		12. Transfer from	one departmer	nt to another
PROPOSED:	EXISTING:		Т	ERMS OFFERED
Subject Abbreviation	Subject Abbreviation CHE	1		Check All That Apply:
			Summer	Fall Spring
Course Number	Course Number	45000		IPUS(ES) INVOLVED
Course Northoda		10000	Calumet	N. Central
Long Title			Cont Ed	Tech Statewide
Long file			Ft. Wayne	W. Lafayette
Short Title			Indianapolis	·
Abbreviated title will be entered by the Office of the F	Registrar if omitted, (30 CHARACTERS ONLY)			· ·
	TT	OOUBDE ATTRIBUTED: 01	1.40.70 -1.5 -1	
CREDIT TYPE	<b>-1</b> 1,	COURSE ATTRIBUTES: Che		1.
1. Fixed Credit: Cr. Hrs.	1. Pass/Not Pass Only	6 Registration Appr	· · · · · ·	
2. Variable Credit Range:	2. Satisfactory/Unsatisfactory Only	Departm	nent 🔲	Instructor
Minimum Cr. Hrs	3. Repeatable	7 Variable Title		
(Check One) To Or	Maximum Repeatable Credit:	8 Honors		
Maximum Cr. Hrs	4. Credit by Examination	9 Full Time Privilege		
3. Equivalent Credit: Yes 4	ecial Fees	☐ 10 Off Campus Expe	erience	- <del> </del>
Schedule Type Min	eeks % of Credit			<del>○ P3</del>
Per Mtg Week	Offered Allocated			Cross-Listed Courses
Lecture <u>50</u>	3 16 /5			y:
Recitation Presentation		ب		
Laboratory TTU	16 25			ŲB
Lab Prep				
Studio Vistance				
Jinic				7
Experiential				
Research				
Ind. Study Pract/Observ				
COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICT	IONS):	<del></del>		
Restrictions: Must be enrolled in the School				· · · · · · · · · · · · · · · · · · ·
Prerequisites: CHE 30600, 37800	or orronnear angineering			
Concurrent Pre-reg: CHE 43500				
Use of process and product synthesis metho	ods and concepts: detailed desig	n of unit operation equipr	nent, the econ	omics of chemical plants and
flow sheet optimization methods. Synthesize				
specific product. Analysis of design alternati			z. p. 00000 1	
	too domig dado otaaloo ana opin			
*COURSE LEARNING OUTCOMES				
Apply systematic strategies for synthesizi	ng chemical process designs the	at involve conventional un	it operations (	1. 3).
Understand the difference between stead				
Know where and how to obtain information				
and materials, and associated safety and en		os, process operating par	annotoro, oqui	p
4. Understand the role of physical property e		l he able to use appropria	te physical pro	pperty estimation methods in un
operations design (1, 2, 3, 5).	atoo on process design and	. = 5 42.10 10 400 400100114	pjoioui pic	y
5. Estimate the capital and operating cost of	a process and to assess its pro-	fitability (1. 8)		
6. Perform detailed hands-on work with tools			5).	
7. Communicate project progress and final r				
Work effectively in a team to execute ope				and ethical manner (1 3 4 6 9
s. Trant encourery in a team to execute ope	in chaca accign projects with tim	io bound deliverables III d	, protocolorial	
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Calumet Department Head Date	Calumet School Dean	Date .		~ ^ ^ ~
			_	2 in Eakor M
Fort Wayne Department Head Date	Fort Wayne School Dean	Date	$()$ $\wedge$ $)$ $\wedge$	(/ I bi@)/NP() III L

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Office of the Registrar FORM 40 REV. 12/09

# PURDUE UNIVERSITY REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF AN UNDERGRADUATE COURSE (10000-40000 LEVEL)

EFD 36-11

DEPARTMENT				ES	SION		
'NSTRUCTIONS:	<sub>Ple</sub> Scho	ol of Chemical	Engineering		_	spri	ng 2012 (2012-20)
1	. New cou	rse with supporting o	documents		7. Change in	course attributes	(department head signature only)
2.	. Add exis	ting course offered a	at another campus		8. Change in	instructional hou	ırs
3.		n of a course			9. Change in	course description	on
4.	. Change i	n course number		G	☑ 10. Change in	course requisite:	S
<u> </u>	U	n course title			11. Change in	semesters offere	ed (department head signature only)
✓ 6.	Change i	n course credit/type		Ĺ	_ 12. Transfer fro	om one departm	ent to another
PROPOSED:			EXISTING:	V-V-			TERMS OFFERED
Subject Abbreviation			Subject Abbreviation C	HE			Check All That Apply:
ł						Summer	Fall Spring
Course Number			Course Number		45000	CA	MPUS(ES) INVOLVED
						Calumet	N. Central
Long Title				_		Cont Ed	Tech Statewide
]		V-04-25-1				Ft. Wayne	W. Lafayette
Short Title						Indianapolis	]
Abbre	viated title will be	entered by the Office of the	Registrar if omitted. (30 CHARACTERS OF	NLY)			ĺ
	CREDIT TY	PE .		COURS	SE ATTRIBUTES: C	heck All That Apply	
1. Fixed Credit: Cr. H	rs.		1. Pass/Not Pass Only		6 Registration Ap	proval Type	
<ol><li>Variable Credit Rai</li></ol>	nge:		2. Satisfactory/Unsatisfactory Onl	ly 🔲	Depar	rtment	Instructor
Minimum Cr. H	lrs		3. Repeatable		7 Variable Title		
(Check One)	то 🗀	Or 📙	Maximum Repeatable Cree	dit:	8 Honors		
Maximum Cr. H	Hrs	<del></del> -	4. Credit by Examination		9 Full Time Privile	ege	
3. Equivalent Credit:	Yes		ecial Fees		10 Off Campus Ex	perience	
Schedule Type	Min	· · · · · · · · · · · · · · · · · · ·	eeks % of Credit	<del></del>			
00.1000.0 17,00		Mlg Week	Offered Allocated				Cross-Listed Courses
Lecture	-		3 16 /5				<u> </u>
Recitation Presentation	-				لـــا		]
Laboratory		ווי	1 16 25				
Lab Prep `'udio							
tance		·					
oinic							
Experiential Research							
Ind. Study							
Pract/Observ							
COURSE DESCRIPTION	ON (INCLUDE	REQUISITES/RESTRICT	IONS):				
Restrictions: Mu	ıst be enro	lled in the School	of Chemical Engineering				
Prerequisites: 0		•					
Concurrent Pre-							
Use of process	and produ	ct synthesis metho	ods and concepts; detailed	l design of unit	operation equip	ment, the ecor	nomics of chemical plants and
riow sneet optim	lization me	thods. Synthesize	, develop, and evaluate a	preliminary des	sign of a chemic	cal process tha	t meets market requirements for a
specific product	. Analysis	of design alternati	ves using case studies and	d optimization i	methods.		
*COURSE LEARNING	CUTCOUER						****
		vice for eynthocizir	ng chemical process desig	no that involve	conventional	ait anarations (	1 2)
Apply system     Understand the	ano su areg ne differen	gies iui syriliiesizii ce hetween steadi	y state and batch chemical	ins mai mvoive	d the implication	nt operations (	1, 3). n and appretion (1, 3)
3. Know where a	and how to	ohtain information	on industrial chemical pro	ocesses an	u trie irriplication	rameters equi	pment costs, cost of chemicals
			vironmental hazards (6, 8,		ss operating pa	iranieters, equi	priterit costs, cost of chemicals
					to use appropria	ate physical pro	pperty estimation methods in unit
operations desig	ın (1. 2. 3.	5).	aminated on product doorg	in and be able	to add approprie	ato priyologi pro	perty estimation methods in drift
			a process and to assess it	ts profitability (	1. 8).		
			that ultimately lead to the			5).	
7. Communicate	project pr	ogress and final re	esults in a professional ma	nner orally and	in written form	(7).	
							and ethical manner (1, 3, 4, 6, 9).
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Calumet Department He	ead	Date	Calumet School Dean	D	ate		
ort Wayne Department	t Head	Date	Fort Wayne School Dean	<u>n</u>	ate		
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Indianapolis Department Head	Date	Indianapolis School Dean	Date		
North Central Faculty Senate Chair	Date	Vice Chancellor for Academic Affairs	Date		
AVarmon.	12/7/2010	1 Michael Hay	2/16/11		
Vest Lafayette Department Head	Date	West Lafayette College/School Dean	Date V	Vest Lafayette Registrar	Date

OFFICE OF THE REGISTRAR

To: The Faculty of the College of Engineering

From: The Faculty of the School of Chemical Engineering

**Re:** Change of existing CHE 45000 from 2 credit hours to 4 credit hours resulting in a change in description and requisites.

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

From:

CHE 45000 - Design And Analysis Of Processing Systems

Sem 2, Class 1, problem lab. 2, cr. 2

Prerequisites: CHE 44900 Corequisite: CHE 43500

Synthesize, develop, and evaluate a preliminary design of a chemical process that meets market requirements for a specific product. Analysis of design alternatives using case studies and optimization methods.

To:

CHE 45000 - Design And Analysis Of Processing Systems

Sem 2, Class 3, Lab 2, Cr. 4

Restrictions: Must be enrolled in the School of Chemical Engineering

Prerequisites: CHE 30600, 37800 Concurrent Pre-req: CHE 43500

Use of process and product synthesis methods and concepts; detailed design of unit operation equipment, the economics of chemical plants and flow sheet optimization methods. Synthesize, develop, and evaluate a preliminary design of a chemical process that meets market requirements for a specific product. Analysis of design alternatives using case studies and optimization methods.

APPROVED FOR THE PACELLY OF THE SCHOOLS OF ENGINEE MY BY THE ENGINEERING CURRICULUM COMMITTEE	y g
ECC Minutes #10	
Date 2/2/2011  Continuan ECC R. Cipra	-

Engineering Faculty Document No. 36-11 December 5, 2010 Page 2 of 2

**Reason:** In light of the removal of CHE 44900 and the consolidation of senior design back into one course, CHE 45000 will become 4 credit hours to incorporate all relevant material. This will allow for three lectures per week to cover material as well as 2 hours of lab per week for the actual design project.

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A. Varma, Head School of Chemical Engineering 12/5/10

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#### CHE 450 Design And Analysis Of Processing Systems (current)

Level: Undergraduate

Course Instructors: Professors R. Agrawal, J. Pekny, G. Reklaitis, and V. Venkatasubramanian

**Textbook:** Products and Process Design Principles – Synthesis, Analysis and Evaluation, W. D. Seider, J. D. Seader & D. R. Lewin, J. Wiley & Sons, 2004.

#### **Course Outline:**

Тор	pics Lectr	ires
1.	Course Introduction	1
2.	Adv. material & energy balances for process flow sheets w. recycle	2
3.	Synthesis and design of process flow sheets	6
4.	Advanced equipment costing .	4
5.	Process flow sheet economic evaluation	4
6.	Advanced Aspen simulation methods	8
7.	Exams	3
Tot	tal	28

#### **Course Objectives:**

Synthesize, develop, and evaluate a preliminary design of a chemical process that meets market requirements for a specific product.

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

- 1. Apply systematic strategies for synthesizing chemical process designs that involve conventional unit operations (1, 3).
- 2. Create process flow sheet through conceptualization, process synthesis, process design and assessment (1, 3, 5).
- 3. Know where and how to obtain information on industrial chemical processes, process operating parameters, equipment costs, cost of chemicals and materials, and associated safety and environmental hazards (8, 9).
- 4. Estimate the capital and operating cost of a process and to assess its profitability (1,8).

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- 5. Communicate project progress and final results in a professional manner orally and in written form (7).
- 6. Work effectively in a team to execute open-ended design projects with time-bound deliverables in a professional and ethical manner (1, 3, 4, 6, 9).

Assessment Methods for Course Outcomes: Each of the outcomes will be assessed by giving the students the appropriate homework problems, exams, team projects, and peer evaluation

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## CHE 450 Design And Analysis Of Processing Systems (proposed)

Level: Undergraduate

Course Instructors: Professors R. Agrawal, J. Pekny, G. Reklaitis, and V. Venkatasubramanian

**Textbook:** Products and Process Design Principles – Synthesis, Analysis and Evaluation, W. D. Seider, J. D. Seader & D. R. Lewin, J. Wiley & Sons, 2004.

#### **Course Outline:**

Topics Lecture				
1.	Course Introduction	1		
2.	Process and Product Synthesis methods, concepts and heuristics	6		
3.	Adv. material & energy balances for process flow sheets w. recycle	2		
4.	Design of major unit operation equipment	4		
5.	Synthesis and design of process flow sheets	6		
6.	Cost accounting and capital cost estimation	4		
7.	Advanced equipment costing	4		
8.	Process flow sheet economic evaluation	4		
9.	Advanced Aspen simulation methods	8		
10.	Exams	3		
	Total	42		

## **Course Objectives**

To understand process and product synthesis methods and concepts; detailed design of unit operation equipment, the economics of chemical plants and flow sheet optimization methods; synthesize, develop, and evaluate a preliminary design of a chemical process that meets market requirements for a specific product.

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

1. Apply systematic strategies for synthesizing chemical process designs that involve conventional unit operations (1, 3).

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2. Understand the difference between steady state and batch chemical processes and the implication on their design and operation (1, 3).

3. Know where and how to obtain information on industrial chemical processes, process operating parameters, equipment costs, cost of chemicals and materials, and associated safety and environmental hazards (6, 8, 9).

4. Understand the role of physical property estimates on process design and be able to use appropriate physical property estimation methods in unit operations design (1, 2, 3, 5).

5. Estimate the capital and operating cost of a process and to assess its profitability (1, 8).

6. Perform detailed hands-on work with tools that ultimately lead to the design of a chemical plant (1, 5).

7. Communicate project progress and final results in a professional manner orally and in written form (7).

8. Work effectively in a team to execute open-ended design projects with time-bound deliverables in a professional and ethical manner (1, 3, 4, 6, 9).

Assessment Methods for Course Outcomes: Each of the outcomes will be assessed by giving the students the appropriate homework problems, exams, team projects, and peer evaluation