



CURRICULUM PROPOSAL FORM 2001-2002

NON-GENERAL EDUCATION PROCESS A

***DEADLINES:** Deadline dates for 2001/2002 submissions: Regular proposals: October 19, 2001 to be implemented in Fall 2002; Short-Term proposals: December 7, 2001 to be implemented in Fall, 2002; Regular proposals February 15, 2002 to be implemented in Spring, 2003; March 22, 2002 for short-term courses to be implemented in Spring 2003.

PROPOSAL TITLE: Course Proposal: Unit Operations Laboratory II

SPONSOR(S): Kevin Dahm

DEPARTMENT: Chemical Engineering

COLLEGE: Engineering

IF LAS CHECK ONE: History/Humanities Math/Sciences Social/Behavioral Sciences

Check one: Undergraduate Graduate

THE ATTACHED **NON-GEN-ED** PROPOSAL IS BEST DESCRIBED BY THE ITEM(S) CHECKED.

New non-gen-ed course

Short-term non-gen-ed course

Minor curricular changes (fewer than three) to:

existing non-gen-ed course

non-gen-ed degree requirements

major

minor, specialization, concentration, track, certificate program

DEPARTMENT

(Signature indicates approval)

Dept. Curriculum Chair //Date

Dept. Chairperson //Date

ACADEMIC DEAN

Approved

Not Approved

Comments:

Dean's Signature/Date

Dianna Ireland 4/22/02

Change to be implemented without increase in resources

COLLEGE CURRICULUM COMMITTEE

Date of open hearing (if necessary) 4/26/02 Approved Not Approved

Comments: Implement Fall 2003, not Fall 2002.

Signature of College Chair/Date: Kevin D. Schan

UNIVERSITY CURRICULUM COMMITTEE

Date Received/Processed _____

Comments:

Curriculum Chair Signature Maquette Reeves Date Announced At Senate 6/5/02

EXECUTIVE VICE PRESIDENT/PROVOST

Approved Not Approved If no, reasons are as follows:

Student Credit Hours _____ Faculty Load Hours _____ Equalized Credit Hours _____

Official Copy & Approval Sheet Filed (Date): _____ Executive VP/Provost Signature/Date _____

REGISTRAR

Date Approved Course Description Received _____ Hegis Taxonomy & Course Number Assigned _____

Registrar Signature/Date Edwin C. Engel 7/10/02

NOTIFICATION FORWARD

Senate Curriculum Committee Chairperson

Academic Dean(s)

Department Chairpersons

Registrar

CAP
IRP
ru 7/23/02
____ Sponsor(s)

Course Proposal

1. Details:

- | | |
|--|---|
| a) Course Title: | Unit Operations Laboratory II (0906.404) |
| b) Sponsor: | Dr. Kevin Dahm and the Chemical Engineering faculty |
| c) Credit Hours: | 2 credit hours |
| d) Course Level: | Senior |
| e) Curricular Effect: | Requirement for Chemical Engineering students |
| f) Prerequisites: | Unit Operations Laboratory I (0906.403) |
| g) Suggested Time/
Scale of Implementation: | Fall 2002 Fall 2003 Kevin D. Dahm
1 section 4/29/02 |
| h) Resources: | Laboratory equipment and computer software has been obtained consistent with the College of Engineering capital budget. |

2. Rationale:

The current Unit Operations Laboratory is a 3 semester-hour course, required for all Chemical Engineering majors, typically taken in the spring of the senior year. The Chemical Engineering faculty has collected assessment data that indicates the following:

- Chemical engineering students would like to see more hands-on experience with real chemical process equipment in the curriculum.
- The Industrial Advisory Board would like to see more hands-on exposure to emerging technologies, such as the biochemical engineering field, in the curriculum, but not at the expense of traditional chemical engineering unit operations.
- The Industrial Advisory Board would like to see more emphasis on software applications in the solution of practical engineering problems in the curriculum.
- Chemical engineering students find the spring semester of senior year extremely demanding.

Consequently, the Chemical Engineering faculty has reached the conclusion that increasing the Unit Operations Laboratory from 3 s.h. to 4 s.h. is necessary to allow coverage of more emerging technologies without sacrificing any of the current content. Rather than increase the workload in the spring senior semester, the Chemical Engineering faculty propose a sequence of two 2 s.h. courses, taken in the fall and spring of the senior year, and therefore wish to add Unit Operations Laboratory II to the University catalog. A concurrent proposal reduces the existing Unit Operations course from 3 s.h. to 2 and changes its name to Unit Operations Laboratory I.

Note that the chemical engineering department is also proposing a new 3 s.h. computing elective that effectively replaces a 4 s.h. required course (Computer Science and Programming.) This change is detailed in the proposal "Minor Curricular Change: Chemical Engineering Degree Requirements," submitted concurrent with this proposal. The net effect of all these changes is to

leave the total number of semester hours required to earn a chemical engineering degree unchanged at 131. However the credits will be distributed in a manner that is more consistent with the expressed recommendations of our faculty, students and advisory board, as well as being consistent with national trends.

3. *Essence of the Course:*

a) Objectives:

Upon completion of the course, students will be able to:

1. Understand the operation and functionality of various pilot-scale chemical engineering unit process equipment. This will include both traditional and emerging chemical engineering operations. Examples include filtration, tubular flow reactors, liquid-liquid extraction, fluidized beds, continuous distillation, fermentation, crystallization, leaching, reverse osmosis, gas permeation, absorption and stripping, spray dryers, etc.
2. Determine the cause-effect relationships between various design parameters and individual chemical process system performance.
3. Verify the underlying theoretical and empirical relationships with actual performance data on pilot scale process systems.
4. Understand the role of technicians and operators in the operation and data collection function of chemical processes.
5. Apply the principles of safety and haz-op analysis to pilot scale chemical unit operations
6. Use computer software (from CACHE and other sources) to analyze and correlate data from various pilot-scale chemical engineering unit processes.
7. Prepare reports that describe the performance of a chemical unit process in terms of the key operating parameters: pressure, flow rate, temperature, composition, concentration, etc.
8. Work in teams to solve open-ended experimental problems.

b) Topical Outline:

The topics to be covered are listed below. The instructor will supply the students with a syllabus during the first week of classes. The instructor will assess any technology advances in the subject matter prior to the course and make topic changes as deemed appropriate to maintain the level and currency of instruction.

The lecture/laboratory format from the first course will be continued. Introductory general information presented in the first course will not be repeated so lecture will focus on principles and safety issues associated with the specific experiments.

- Introduction to each experimental system
 - Principles, design and applications

- Application of data collection and analysis to unit operations
 - Review of data correlation and presentation (graphing and tables)
 - Statistical error analysis

- Safety and Haz-Op Analysis
 - Pilot plant safety
 - Storage, handling, use and disposal practices
 - Hazards and operating analysis of chemical processing equipment

Laboratory Experiments
(Groups rotate among the laboratory experiments)

- Plate-and-frame filtration
- Ultrafiltration
- Tubular flow reactors
- Liquid-liquid extraction
- Fluidized beds
- Continuous distillation
- Fermentation
- Crystallization or Leaching
- Reverse osmosis
- Gas permeation
- Absorption and stripping
- Spray drying

c) Evaluation and Grading Procedure of Students:

Student grades will be based on laboratory experimentation and lecture material. Required laboratory reports will be graded on technical and merit and organization and clarity. Laboratory preparation and performance will be included in the lab grade. A course syllabus with a stated method of arriving the final grade, e.g., number of experiments, other out of class assignments and in-class work, will be distributed to students the first week of classes.

d) Course Evaluation:

The proposed course will be evaluated on the basis of student evaluations and curriculum

review by appropriate faculty.

4. *Results of Consultations:*

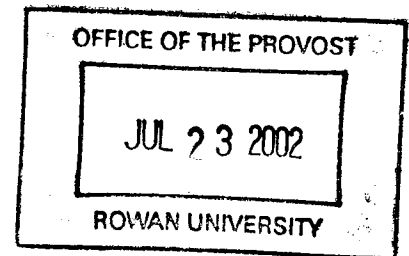
This proposal is not expected to significantly impact students or faculty outside the department of Chemical Engineering, and no consultations have been sought.

Catalog Description

Unit Operations Laboratory II (0906.404)

Prerequisite: Unit Operations Laboratory I

This course is a direct continuation of Unit Operations Laboratory I, examining a different series of unit operations but with similar goals and expectations. Students will again engage in pilot-scale process experimentation on various systems and relate theory and phenomenological principles to performance of a realistic industrial operation.



Department of Chemical Engineering

July 24, 2002

Dr. Helen Giles-Gee
Office of the Provost
Rowan University

Dr. Giles-Gee:

I am writing concerning the curriculum proposals (SCC #01-02-400, 401 and 402) that I have sponsored on behalf of the chemical engineering department. I know that you have been in communication with Dean Dorland and with Dr. Reeves, as chair of the University Curriculum Committee, on this issue, but Dr. Reeves suggested that I also write you directly. I will not reiterate the content of the proposals, but will attempt to clarify the motivation behind the proposals and give our perspective on some of the issues that have been raised subsequent to the submission of the proposals. I will confine my comments to the proposed changes in our computer programming requirements, since the aspects of the proposals regarding the Unit Operations Laboratory are, to my knowledge, agreeable to everyone.

I have just completed my third year with the College, and my department's concerns over the required Computer Science and Programming course started before I arrived. The proposal mentions the assessment information we have collected over the past three years as we attempted to gauge the extent of the problem. I am enclosing for your reference the raw data, cut from student surveys, exit interviews and focus groups, as well as the minutes of our Industrial Advisory Board meetings. We admit that these are imperfect indicators, as are all individual assessment instruments. It is the fact that they were all telling us the same thing, coupled with the lack of any indication that the CS&P course is beneficial to our students, which prompted us to seek change.

We were, and continue to be, sensitive to the College-wide desire for a common first year, and the proposal as written is the best compromise we, as a department, could conceive. It is intended to provide an alternative for students who were not satisfactorily prepared for the CS&P course while minimizing the disruption to the current first year curriculum. As both sponsor of the proposal and Chair of the Curriculum Committee, I have been involved in many lengthy discussions of this issue over the past year. From my perspective, people have taken exception to the proposal but no alternative solution to our problem has been forthcoming. It was suggested that a new computer science course could be created- one that would not require any prior programming experience. However, the current CS&P course is a prerequisite for other courses in the electrical and computer engineering curriculum. Members of the department of computer science have told us that while they are always willing to work with us on new curricular ideas, there is really no way to have a single, 4-s.h. course that assumes no prior programming experience and could still cover the material that the ECE students need to continue their course of study. Thus, creating a new, single course that would meet everyone's needs does not appear to be viable, and no other compromise has been suggested. We have simply been asked to live with the current situation, which we view as a disservice to the students.


The major concern over our proposal is one that I did not foresee when I wrote the proposal- that the common first year is a good recruiting tool. I call it the "major concern" because from my perspective it was the predominant one raised at both open hearings and at a recent college meeting. People believe that the flexibility to change majors within engineering is an attractive feature of our program and that if we no longer have a common first year, our program will be of diminished interest to prospective freshmen and their parents. I am frankly baffled by this

argument, and always have been. First of all I believe in creating the curriculum that best serves the student, and then figuring out how best to market that curriculum, rather than letting marketing concerns dictate curricular decisions. I believe this sentiment was echoed by the decisive vote of the University Curriculum Committee. However, separate and apart from this philosophical consideration, I don't accept the idea that the proposal weakens our marketability. The proposal creates a computer programming elective, for which CS&P is one of the acceptable choices. A student who wishes to keep options open can simply enroll in CS&P, and will not be disadvantaged in any way if he/she chooses chemical engineering or any other engineering discipline. A student who has no prior programming experience and who is prepared to commit to chemical engineering has the option of taking the introductory course instead of CS&P. We may have to revise the precise way in which we describe our program to prospective students because of this or any other modification to the curriculum, but ultimately I fail to see how creating more options for a student can make the program less attractive to that student.

The other point that has been raised is that the common first year helps to build a sense of community for the engineering students, and that this will be diminished if freshmen students in the four disciplines are not all taking the same courses. I am far more receptive to this concern, and ideally I too would like to see all students take the same course. However, CS&P requires prior programming experience that our students do not necessarily have when they enter. I see it as predictable that a number of students will withdraw from CS&P every spring not because they aren't capable but because they aren't prepared. (I have been told there were 10 engineering students who did this past year, and that these students were predominantly chemical and civil engineering majors.) This experience cannot contribute to a student feeling like part of the engineering community. The proposal, in my opinion, simply creates a better alternative for those 10 or so students. It is also the case that the first year is not, and never has been, 100% uniform, as some students enter with AP credit and do not need to take certain courses with the bulk of the engineering cohort. The building of a sense of community by having students sit in the same classes is a worthwhile goal, not an absolute restriction.

I am happy to discuss the proposal with you further if you wish. My extension is x5318 and my email address is dahm@rowan.edu. Just so you know, I will be out of town the week of July 29 and again the week of August 12.

Sincerely,


Kevin Dahm

Rowan University
Chemical Engineering Industrial Advisory Board (ChEIAB)
1st Meeting – June 14, 2001

The Board questioned the need for a Computer Science course like the present one that offers C++. The overall view was that this is a waste of time for a modern chemical engineering program where the focus should be on how to use software applications to engineering problems and not on how to write code. Richard Libutti suggested tailoring a course towards engineering software like Matlab, etc. Robert LaCerra suggested focusing on Excel spreadsheets, process simulation and design.

Department of Chemical Engineering
Rowan University

Programmatic Assessment
Student Focus Group

Responses from Student Focus Group
11-30-00

Questions asked by Dr. James Newell and recorded and transcribed by Dr. C. Stewart Slater. Questions asked of 2 Sophomore, 2 Junior and 2 Senior Chemical Engineering students representing a diverse cross-section of the student body.

2. Comp. Sci. Has the Computer Sci. & Programming course helped you in your ChE curriculum?

Course is a total waste of time.

Like to learn about approach to programming, but has never used the material in his courses or internship. Does not see any ChE's from internship companies doing any C++ programming.

Several students voiced the need for a course on computer applications to ChE. C++ is of no use to them. They want to see applications like Polymath that would help them succeed in their courses.

This is the best encouragement to avoid ECE curriculum because it is a waste.

Responses from Student Focus Group

AICHe/ABET

11-29-99

Responses either directly quoted or paraphrased. Questions asked by Dr. Newell and notes taken by both Drs. Slater and Newell

2. Comp. Sci. How has the Computer Science and Programming course helped you succeed in your curriculum? Are the topics relevant?

Better if Basic or some other programming language was required.
 Student almost dropped ChE major because of the Computer course.
 This was a worthless course and no ChE major uses it anywhere in their other courses.
 Student like the professor, but never used C++ programming anywhere.
 Student would have liked to have had an applications of software class like he heard about at the AIChE meeting.
 Student commented that Dr. δ was abusive and made student cry twice in class.
 Dr. δ goes too fast in class and is way above other sections in terms of projects (comparison between him having student doing joystick programming project and other sections)
 Student said the course was useless to him, but he liked Dr. ϵ because she tried to bring material down to level of students. he thought the topics were too advanced for a Freshman level class.
 Students thought this material was focused for Electrical Engineering majors and they see a greater need in their ChE courses to learn about applications of software to solve the problems.
 Students do not see the need for a required Computer Science course, especially one that is 4 credits and only has C++, would have preferred integration of computer methods into ChE courses.

Rowan University
Department of Chemical Engineering
Senior Exit Interviews
May 9, 2002

	YES	MAYBE	NO
12. How has the Computer Science and Programming course helped you in the curriculum?		3	9
<i>Comments:</i> <i>Wants Visual Basic</i> <i>Never used anything – Too advanced</i> <i>Does not apply to anything I've done in courses or on job</i> <i>Would prefer Basic or Intro course.</i> <i>Did nothing for me at all.</i> <i>Never used it.</i>	<i>0%</i>	<i>25%</i>	<i>75%</i>

Rowan University
Department of Chemical Engineering
Senior Exit Interviews
May 2, 2001

12. How has the Computer Science and Programming course helped you in the ChE curriculum?		3	9
<i>Comments:</i> <i>Waste of time, too high level and had no idea of what was going on</i> <i>Worthless course – absolutely no value to a ChE student</i> <i>Nothing to do with ChE curriculum or internship assignments</i> <i>Never used this material again in any part of curriculum</i> <i>Worthless to a ChE – This is for ECE's. My internship supervisor was surprised we still teach computer programming</i> <i>All that I got from course was an idea of programming, but this didn't help me in ChE (Student took course at Community College and gave Maybe score)</i> <i>C++ is of no value, course taught at too high a level of dissiculty, would have been better to have a general into to computer programming and computer packages for ChE</i> <i>The only reason this course could be of value was in programming Mathematica which I did for a minor</i> <i>Not relevant to ChE's</i>	0%	25%	75%

Rowan University
Department of Chemical Engineering
Senior Exit Interviews
May 2000

12. How has the Computer Science and Programming course helped you in the curriculum.		3	15
<i>Comments: Absolutely NO- No good whatsoever</i> <i>Very little relevant material to ChE</i> <i>Only in Math class</i> <i>Nothing Relevant, just C++ programming language taught.</i> <i>Never even used this at Rowan or industrial job</i> <i>No programming used in ChE and internship</i> <i>Should have had more basic course or applications course on software.</i> <i>Not relevant at all-should spend more time on computer software we actually use in our courses</i> <i>Nothing relevant</i> <i>The only thing positive is logical sequence from prog.</i>		17%	83%