ABET
Self-Study Report

for the

Chemical Engineering Department

at

University of Louisiana at Lafayette

Lafayette, LA

June 24, 2013

CONFIDENTIAL

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A. Contact Information

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B. Program History

The Chemical Engineering Department at UL Lafayette was started in 1942 to provide technical support to the chemical and petroleum industries in the State of Louisiana. The department first received ABET accreditation October 1, 1956. The last ABET general review occurred on December 5-7, 2007. The department received a six-year accreditation. Since that last visit there have been considerable changes in faculty personnel and several changes in the Chemical Engineering curriculum. These changes are summarized below:

B.1 Personnel

(1) Of the eight faculty members listed in the 2007 ABET report, four have retired from the University while another left after five years of service. The faculty members who remain are Dr. Rakesh Bajpai, Dr. William Chirdon, Dr. Devesh Misra, and Dr. Mark Zappi. Two of the retired faculty, Dr. James Garber and Dr. James Reinhardt are Emeritus Faculty and have offices in the Department of Chemical Engineering.
(2) The new faculty members are Dr. Stephen Dufreche, Dr. Rafael Hernandez, Dr. Carl McIntyre, and Dr. Ramalingam Subramaniam. In Fall 2013, a Professor of Practice, Dr. John Prindle, will join the faculty bringing the department to nine full-time faculty and Dr. Mark Zappi, Dean of Engineering, also continuing as part of the chemical engineering faculty.

B.2 Curriculum Changes

Based on information received from our senior students and from discussion with our Advisory Board, the faculty has made a number of changes in the curriculum:

(1) CMCN 310 (Public Speaking) replaced ENGL 365 (Technical Writing) in the junior year of the curriculum. The course better emphasized targeted communications skills by involving more students in presentations and speaking experiences within a number of

classes. Additionally, it was felt that a more structured course was needed to instruct students on different presentation and report styles.

(2) The instructor was replaced in CHEE 400 (Process Simulation). Due to student evaluations of instruction and the lack of course outcomes, a change of professor was initiated which produced successful results.

(3) ENGR 305 (Transport Phenomena) is now taught during the fall and spring semesters. This class was originally taught during the fall semester. The change was done due to high enrollment and to allow students to become more involved with the cooperative education program during the fall semester of the junior year.

(4) CHEE 101 (Introduction to Chemical Engineering) was changed to UNIV 100 and UNIV 200 as part of a campus-wide student development program initiated as part of the university's student education enhancement program.

(5) CHEM 317 (Biochemistry) was added as an advanced chemistry in the Biology-emphasis program by removing CHEM 402 (Chemistry of Materials). It was felt that this chemistry class provided those students interested in bioprocessing a critical educational experience in the key area of biochemistry and its industrial applications.

(6) A CHEE 416 elective course Biochemical Engineering was added in the Biology-emphasis program. This course emphasizes applications of chemical engineering principles in biology and chemistry.

(7) ENGR 218, originally Statics and Dynamics, has been changed to Statics and Mechanics because it was felt that the mechanics of material aspect was not well covered in the previous class and that an increased focus on mechanics of materials would better prepare the students for industrial applications.

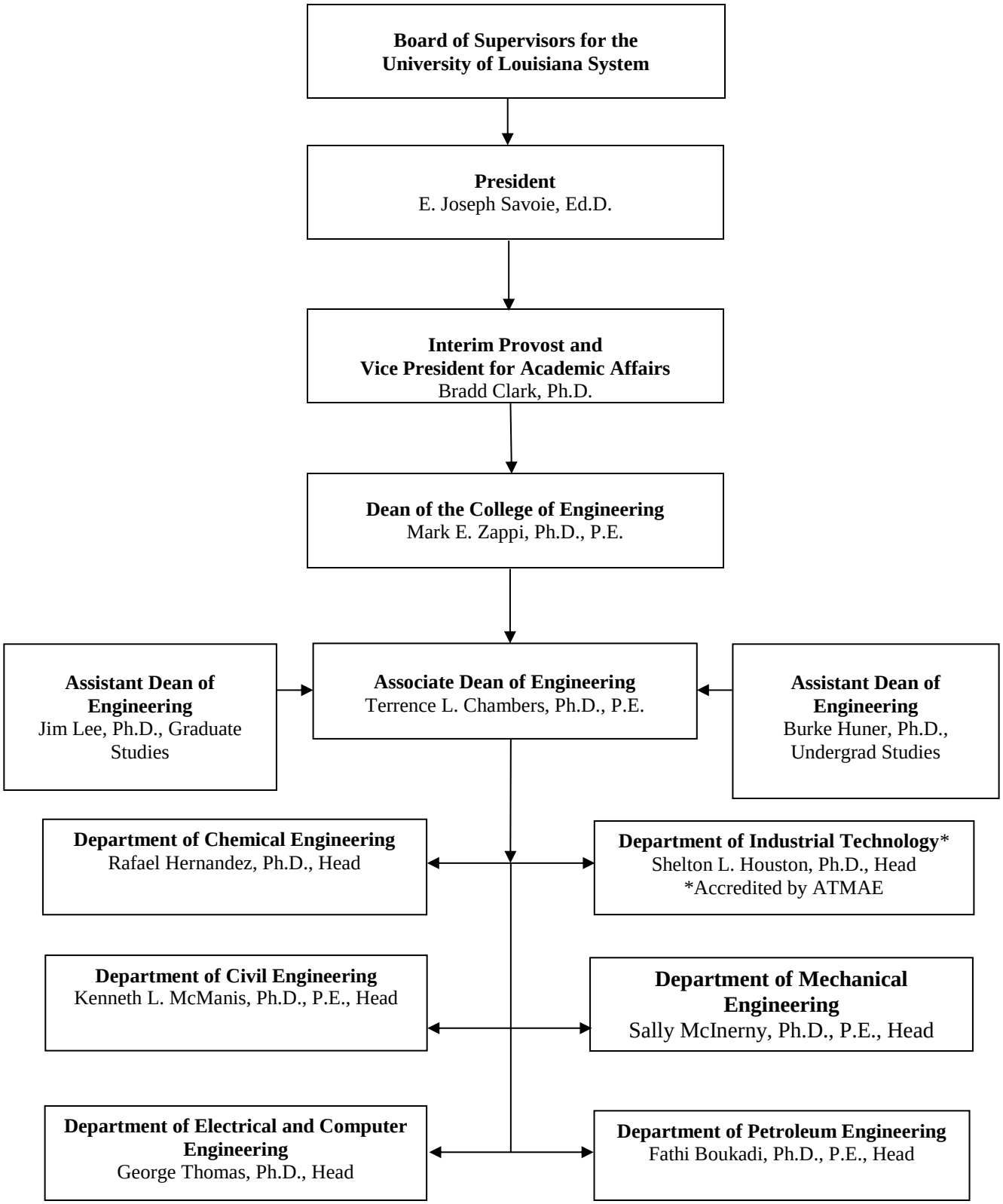
(8) A dual Chemistry and Chemical Engineering program has been designed for students desiring two BS degrees in 4 ½ years.

C. Options

In addition to the curriculum shown in the 2013 - 2015 catalog and in Table 5.1 of this report, the department also has a Biology Emphasis Option (Table 5.2). Students interested in medical school or bioprocessing applications are attracted to the Biology emphasis. It provides students with additional laboratory experiences compared to the main Option. In the Biology Emphasis students are required BIOL 110 (Principles of Biology I), BIOL 112 (Principles of Biology I Lab), and Organic II as electives. BIOL 111 (Principles of Biology II) and BIOL 113 (Principles of Biology II Lab) are substitutes for ENGR 201 (Electrical Circuits). CHEM 221 (Analytical Chemistry) is substituted for PHYS 215 (Physics Lab I) and CHEM 234 (Organic II Lab). Students also take CHEM 232-Organic II for CHEE 427-Advanced Materials. There is also a curriculum sheet designed for the dual degree of Chemistry and Chemical Engineering. This allows students to obtain two BS degrees in 4 ½ years.

D. Organizational Structure of UL Lafayette and the College of Engineering.

Figure 1 - Organizational Chart



E. Program Delivery Modes

The Chemical Engineering Department operates a day time program for undergraduate and graduate students. None of our courses are offered after 5:00 p.m. or on the weekends. Note that all courses are taught via the traditional classroom format and not taught using on-line deliveries.

The College of Engineering has a cooperative education (CO-OP) program available to undergraduates that is administered by the University's Office of Career Services. Dr. Chambers, Associate Dean, currently administers the program for the College of Engineering; however, the college has just hired an Engineering Career Student Development Coordinator (Mrs. LaShaun Bordelon) who will be taking over the management of the CO-OP program for the college.

F. Program Locations

The courses in the Chemical Engineering Department are all offered on the University of Louisiana at Lafayette campus in Lafayette, Louisiana. There is a dual degree offered with the Chemistry Department, which also offers all courses on the UL Lafayette campus.

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

The ABET visit to the Department of Chemical Engineering occurred on December 5 through 7, 2007. This visit was separate from the full ABET team since the original assigned visitor became ill and could not make the group visit on November 4-6, 2007.

The results of the visit were very positive with only one Program Observation reported in the area of ethics. It was suggested that faculty members include more discussion of ethical issues within the courses so that program graduates have a stronger educational base of how ethics are a foundational aspect of chemical engineering practice, and how it is considered of significant importance by the faculty.

In response to the request, faculty members were encouraged to heighten their discussion of ethics in the classroom, laboratories, and in the design classes. Dr. Garber, Emeritus faculty member and Emeritus member of the Louisiana Professional Engineering and Land Surveying Board (LAPELS), has in the past given a one-hour seminar to the CHEE 101 class each fall and to the senior class every spring and discuss examples of ethics from his years in industry. UNIV 100 and UNIV 200 replaced CHEE 101. It is planned that ethics will continue to be part of the content of these new courses.

The three-hour Professional Ethics course, PHIL 316, is required in the last semester of the senior year. With this background, students have become aware of challenges they will be facing in the workplace. Table 4.10 in, Criteria 4, of this report shows that the faculty members have indicated that they are covering professionalism and ethics in 13 of the 18 courses that they teach. It can be seen that in four of the courses it is heavily covered. Likewise, in Table 4.6 the students indicated that they are receiving professionalism and ethics discussions in 17 of the

classes listed. It is believed that this is evidence that the faculty are following through on their commitment to discuss ethics and ethical behavior.

The fact that the majority of our senior students are taking the Fundamentals of Engineering (FE) exam to start the process of becoming a professional engineer is another positive indication of how much professionalism and ethics have become engrained in our students.

Our Educational Objectives survey in Table 2.1 of this report shows in Question 5 "Were you taught to consider ethical issues in your decision-making process?" that 67% of the graduates strongly agreed and 28% agreed. This was one of the most positive responses received on the 20 question survey.

H. Joint Accreditation

There is no joint accreditation in this "stand alone" program.

GENERAL CRITERIA

CRITERION 1. STUDENTS

A. Student Admissions

At the current time, requirements for a new student to enter the University are an American College Testing (ACT) of 23 composite. The Chemical Engineering Department has the same requirement.

To remain in the chemical engineering program, a student must maintain a 2.0 adjusted overall average and a 2.0 GPA in the major or be transferred into the College of General Studies. After raising his/her adjusted or overall average to a 2.0 GPA or higher, the student may reenter the program.

B. Evaluating Student Performance

Student performance in the Chemical Engineering Department is monitored each semester by the departmental academic advisors and by the university, which places a hold on all student computer accounts, which can only be released by the faculty advisor. A graduation check sheet located in each student's folder is used to quickly assess their academic status. If a student is seen to be having difficulty, he/she is given an appointment with the Department Head to discuss various options that are available.

During the advising session, the advisors inform students as to which courses have prerequisites and that they will be checked by the faculty member and department to make sure these prerequisites are met. Failure to meet these requirements will result in being immediately dropped from the course. In the Chemical Engineering Department, at the beginning of each semester, the department administrative assistant checks that all students registered for each course have the required prerequisites. Students are informed of their deficiencies and the faculty member is given a list of students that may not take their course. It is the instructor's job to inform these students that they do not have the necessary prerequisites to take the course and the department will drop them from the course.

C. Transfer Students and Transfer Courses

The advising of students that transfer into the department from another university is handled by the Department Head. There are two types of transfer students and they are handled in somewhat different fashions.

C.1 Transfers from an American University

When a student transfers from an American university it is usually possible to use the catalog from that university to determine if a previously taken course is comparable. If the school is a Louisiana university there are articulation agreements available which list the exact equivalency

of a course between some of the universities involved. If any engineering courses at the 300 level or above are to be transferred, it is then necessary to check to ensure that the school is ABET-accredited before degree credit is given.

After the evaluation is completed, the course curriculum sheet is filled in and then the schedule established for the current semester. A transfer credit sheet listing all of the transferred courses is filled out, signed by the Department Head, and sent to the Associate Dean of Engineering for final approval.

C.2. Transfers from International Universities

A student transferring from a university outside the United States (international) will have their university course credits evaluated and potentially accepted by the University Office of Admissions. However, it is only after meeting with the Department Head that the final course evaluation can be performed. The university does not accept mathematics or English credit. Placement in these areas is determined by examination. The student must meet with the head of the respective department to be evaluated for these courses. Engineering courses are a concern in terms of appropriate rigor and content so the College of Engineering has a policy of not accepting any engineering courses at the 300 level or above. Students are allowed to challenge their knowledge in a course not accepted by taking written exams given by the faculty to show proficiency in an engineering subject. If they pass the exam, they are given credit for that course. Again, any courses that are approved by the Department Head must then be sent to the Associate Dean of Engineering for final approval.

D. Advising and Career Guidance

When seeing an advisor, the student is expected to prepare a proposed schedule. The student's assigned advisor obtains the student's folder from the departmental files to assist in the advising process. The administrative assistant has usually entered the most recent semester grades and has updated the student's curriculum sheet. The faculty member may also request this information to be entered into the student's record prior to advising. At that point, the student and advisor begin discussing the preferred courses for the upcoming semester. The advisor makes suggestions of substitute or additional courses. Prerequisites are checked before the advisor signs the advising form. The student signs the form indicating that he/she concurs with the proposed schedule.

In general, the process takes about 20-30 minutes and is concluded by the advisor lifting the student's hold through the University Link (ULINK) online portal. Registration is performed online through ULink. If courses are filled, the alternate courses suggested by the advisor are then selected.

During the advising session, the student is encouraged to ask any questions that they might have about the major, they are told about department scholarship opportunities and about the current employment opportunities in the major. This meeting generally provides an excellent time for faculty-student interaction concerning discussions relating to career goals and how their developing education experiences are preparing them for their career goals.

The students are formally advised twice a year. During the fall semester, the students are advised for the spring semester and summer session. Then in the spring semester they are advised for the fall semester. Students are divided among faculty members with the department head advising the seniors.

E. Work in Lieu of Courses

The Chemical Engineering Department does not award credit for work in lieu of courses. Students can register for CO-OP courses through the university, which acknowledges the courses on their transcript, but it is not used for credit toward graduation. Advance Placement (AP) credit from high school is used if accepted by the university. For students who do not have qualifying transfer credits but possess the knowledge and skills commensurate with the expected learning goals of specific courses, the University provides an opportunity to test out via a credit-by-exam process. Here the student consults with the current instructor of the concerned course (or a designee of the department head) and takes an exam equivalent in scope to a comprehensive final exam for that subject. The instructor then reports the results, through the department head and the dean, to the registrar with a recommendation for appropriate credit. The academic dean of each college should maintain a list of courses in the college that have been determined by academic departments to be appropriate for credit by examination. The University permits only regularly enrolled students to take credit examinations.

F. Graduation Requirements

The degree awarded by this department is a Bachelor of Science in Chemical Engineering. The program is a program that generally follows traditional chemical engineering education program content, but also one that strives to remain current via interactions with peer departments, industry, and attendance of focused meetings/conferences. There is a Biology emphasis option to prepare students interested in entering medical school or those students wanting more focused education in the area of bioprocessing.

The program uses a graduation check sheet method in order to ensure that the student is progressing in the curriculum and that they complete all graduation requirements of the program. The department head advises all of the senior students to provide consistency in advising of the seniors so that any problems or deficiencies, such as transfer credits, are easily recognized and taken care of at that point. Students must achieve an adjusted overall average and major GPA of 2.0 or higher to graduate.

G. Transcripts of Recent Graduates

The program will provide transcripts from some of the most recent graduates to the visiting team along with any needed explanation of how the transcripts are to be interpreted. **These transcripts will be requested separately by the ABET team chair.**

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

The University of Louisiana at Lafayette, the largest member of the University of Louisiana System, is a public institution of higher education offering bachelor's, master's, and doctoral degrees. The University is dedicated to achieving excellence in undergraduate and graduate education, in research, and in public service. For undergraduate education, this commitment implies a fundamental subscription to general education, rooted in the primacy of the traditional liberal arts and sciences as the core around which all curricula are developed. The University promotes regional economic and cultural development, explores solutions to national and world issues, and advances its reputation among its peers.

The College of Engineering is committed to excellence in education and research while maintaining national accreditation for all of its programs. The College directs its activities towards research and associated economic development. At the same time, it acts as a technical resource for the industrial and business communities by providing technology transfer and technical assistance. Engineering graduates of the College consistently score well on the Fundamentals in Engineering (F.E.) Exam, and graduates of the College of Engineering find employment locally, nationally, or internationally. The basic natural sciences and mathematics component of the curricula, together with the required courses in humanities and social sciences, provide students an excellent educational basis for entry into the engineering or industrial professions or for further educational studies leading to advanced degrees. The College also sets a high priority in terms of recruiting and hiring of students, faculty and other related personnel from under-represented minority groups.

The mission of the Chemical Engineering program at the University of Louisiana at Lafayette is to provide highly qualified graduates who are well trained for industry or for graduate school

B. Program Educational Objectives

The Educational Objectives of the Chemical Engineering Department at the University of Louisiana at Lafayette will produce chemical engineers who a few years after graduation:

1. Apply scientific and engineering knowledge to solve engineering problems.

2. Perform and communicate, both in teams and individually.

3. Effectively apply modern software tools in the solution of scientific and engineering problems.

4. Consider the economic, environmental, safety, and ethical issues in solution of scientific and engineering problems.

5. Understand the need for lifelong learning to continue to meet the current needs of local, state, and global industries, and adapt to engineering challenges of the future.

The Program Educational Objectives of Chemical Engineering at UL Lafayette are published on the department's web site and in the department office as well as in the student room.

C. Consistency of the Program Educational Objectives with the Mission of the Institution

The Mission of the Institution regarding undergraduate education is a continuous dedication to achieving excellence. This commitment implies a fundamental subscription to general education, rooted in the primacy of the traditional liberal arts and sciences as the core around which all curricula are developed.

Objective No. 1 Our graduates apply scientific and engineering knowledge to solve engineering problems.

This objective relates to the mission of providing highly trained graduates to industry and to graduate schools. The continued hiring of our graduates by industry and the success of our students who have gone on to graduate school verifies achievement of this objective.

Objective No. 2 Our graduates perform and communicate effectively, both in teams and individually.

This objective relates to the mission of our department by providing graduates who go into industry with the ability to speak to a group, write effectively, and work successfully within the group. Communication skills are essential to illustrate the benefits of a new chemical process, or lead teams of engineers to achieve clear goals and objectives. These skills are very important to the success of engineers within corporations. Several of our graduates are in leadership positions in the organizational structure of companies like Shell, BP, and Chevron. Some of our graduates have selected advanced degrees as a career path. Most of them perform excellently in graduate school in part because of the ability to clearly communicate ideas and defend experimental results.

Objective No. 3 Our graduates effectively apply modern software tools in the solution of scientific and engineering problems.

One of the most important needs of industry and graduate school is to have graduates who are well-versed in process simulation software, and applications of spreadsheets and programming to solve chemical engineering problems. Our curriculum starts using these software programs from the very first semester and throughout the program. Programming in Visual Basic is a requirement as well as using packages such as MatLab, Aspen, Polymath, etc. The students use all Microsoft packages to develop lab reports, and prepare technical presentations.

Objective No. 4 Our graduates consider economic, environmental, safety, and ethical issues in solution of scientific and engineering problems.

The issues listed here are the heart of the way industry survives. Successful chemical industries develop and apply processes that are environmentally friendly, cost efficient, and safe.

Engineers must always consider the ethical standard of the profession to protect the environment and the health and safety of the population. Feedback from industry suggests that students are prepared in these areas. These same principles apply to research and development careers, such as the national laboratories or academia.

Objective No. 5 Our graduates understand the need for lifelong learning to continue to meet the current needs of local, state and global industries, and adapt to engineering challenges of the future.

Industry looks for graduates with the desire to continuously improve their skills after graduation. Individuals that see graduation as an opportunity to apply a degree to contribute to society by providing solutions to engineering problems, developing new processes and/or products. The desire to keep up with current developments in the field of chemical engineering is important. At UL Lafayette, the student is challenged to search for solutions to open-ended problems. This teaches them to perform research through peer discussion, or literature and web research. These techniques teach the engineer to problem solve by seeking out resolutions which results in life-long learners.

D. Program Constituencies

The primary constituent of the program are the undergraduate students who progress through the 4-year program. They have numerous opportunities for input into our educational objectives and outcomes. Opportunities include, but are not limited to, meeting with our Advisory Board, exit interview with the department head, and student evaluations of instruction and course assessments. The educational objectives meet the needs of our students by ensuring they graduate with the skills to succeed in the work place. It provides them with the skills needed to find, maintain, and grow within an industry. Surveys performed 3-5 years after they graduate show that our graduates meet our educational objectives.

The faculty is a very important constituency since they are the ones who ultimately design the curriculum to meet these objectives. They make sure that our Program Outcomes (a-l) are achieved in our various courses. Since the outcomes are incorporated into the objectives, they are satisfying the objectives.

Our External Advisory Board is another very important constituency since they come to the department twice a year and provide help by probing the students about problems in various courses or with various faculty members. They represent a variety of industries such as chemical, refining, oil/gas and service companies. Their input allows us to assess whether our product is satisfying their needs. They discuss the Educational Objectives and make suggestions to the Department Head.

Our alumni, who represent the department in industry and in graduate schools, are an important part of the program. The department keeps in close touch with the alumni through four mail outs per year and with the annual newsletter each summer. In letters and emails they communicate with faculty members how things are going in industry and graduate school. Requests are made in the newsletter to have them communicate any issues that they might have with the graduates

of our department. The alumni 3-4 years out of the program are an important group of alumni who help us by responding to our Program Objectives survey.

Employers of our graduates are another important constituent. The companies who recruit and hire our graduates have continuously indicated the quality of their training. A testament of the quality of our graduates is the fact that a relatively stable core of companies in the specialty chemicals- and petroleum-related fields are providing job opportunities to our graduates every year. They have mentioned during visits that our graduates demonstrate commitment to their organization and quickly make important contributions to the bottom line.

E. Process for Review of the Program Educational Objectives

This is our third ABET visit since the institution of the ABET 2000 guidelines which required that Educational Objectives be established by each department. The department has implemented periodic reviews of the objectives based on input from our students, alumni, and employers. Faculty members communicate with alumni, faculty from other universities, and industry and government representative to determine the skills that are needed for our graduates to be internationally competitive in the chemical engineering field. Our faculty members also participate in different educational and research forums over the year, contributing ideas and gaining knowledge on contemporary issues specifically related to chemical engineering practice and education. These discussions provide the motivation for changes in the curriculum. Proposed changes are presented to the External Advisory Board for their review and suggestions. After suggested changes are implemented, feedback from the students is requested to ensure they understand the importance of implementing new educational techniques and degree content to the marketability of the degree. Over the past six years, the changes to our Educational Objectives have been minor.

E.1 Survey of UL Lafayette Chemical Engineering Educational Objectives

A survey of the Educational Objectives was performed by our department on graduates who were in industry for 3-4 years. This department alumni group was selected because it was felt that they best represent an alumni constituency who were recently assessing their preparedness through recent work challenges. The Educational Objectives have been broken down into a total of 20 questions. The responses to the questions are in five categories. These are 1) Strongly agree, 2) Agree, 3) Somewhat agree, 4) Disagree, 5) Strongly Disagree. The last survey was performed in the Fall of 2011. Sixteen graduates from the classes of 2007 and 2008 participated in the survey. The questions asked came from the five Educational Objectives (EO). Questions 1, 11, 13, and 18 represent EO #1 while Questions 6, 7, 8, and 9 go with EO #2. Questions 15, 16, and 17 came from EO #3 while Questions 2, 3, 4, and 5 go with EO #4. Finally, Questions 10, 12, 19, and 20 were designed to capture issues relating to EO #5.

Table 2.1 shows the results of the survey which gives results for each of the five Educational Objectives. Questions were compared by taking the total of the first two columns, strongly agree and agree. The average of answers for strongly agree and agree categories was above 80% for all objectives. This is an indirect measurement of satisfaction with the degree and self-assessed performance of our graduates. A more detailed summary of each objective follows:

1. Objective #1. The first Educational Objective asked about applying scientific and engineering knowledge to solve engineering problems. Four questions were asked. Question 1: "Do you possess engineering skills…" had the highest total score and Question 18: "Have you been capable of adapting …" had the lowest total score. However the average value of all four questions was very positive with 95% that agreed or strongly agreed about this objective being achieved. This is equivalent to a score of 1.4 on a 1-5 point scale with 1 being the best.
2. Objective #2. This Educational Objective asked for feedback on the ability to work on teams and about oral and written communications. There were a total of four questions asked covering questions 6 through 9. The best response was Question 6 which asked: "Do you work well on team-based projects?" and Question 9: "Are your oral communication skills effective?" was the lowest. The average of the four questions was very positive with 97% agreed or strongly agreed about the objective being achieved. This is equivalent to a score of 1.4 on the 1-5 point scale.
3. Objective #3. This Educational Objective asked about effectiveness of using software tools in solving scientific problems. There were three questions asked and they were questions 15, 16, and 17. The best response was Question 15: "Do you have computer skills to succeed in the work place?" The lowest result was Question 16: "Was computer usage in college diverse enough?" The average of the three questions was 83% agreed or strongly agreed about the objective being achieved. This is equivalent to the score of 1.7 on the 1-5 point scale.
4. Objective #4. This Educational Objective asked about considering economics, environment, safety, and ethics in engineering problems. A total of four Questions 2, 3, 4, and 5 were considered. The best response was Question 5: "Were you taught ethical issues?" The lowest response was Question 4: "Were you taught to consider safety issues in your decision process?" The average of the four questions was 86% agreed or strongly agreed about the objective being achieved. This is equivalent to a score of 1.7 on the 1-5 point scale.
5. Objective #5. This Educational Objective wants to measure lifelong learning to be able to adapt to engineering challenges of the future. A total of four questions: Numbers 10, 12, 19, and 20 were evaluated. The best response was Question 20: "Have you continued to learn new skills since graduation?" The lowest response was Question 10: "Are you aware of contemporary issues in the profession?" The average of the four questions was 90% agreed or strongly agreed about the objective being achieved. This is equivalent to a score of 1.5 on the 1-5 point scale.

A summary of these results is shown in Figure 2.1. It is clear that the chemical engineering program is successfully achieving the established objectives. Our graduates demonstrate a high degree of satisfaction with their education.

E.2 Industry Survey of How Graduates Achieve our Educational Objectives

A survey of six different companies who hire graduates from the UL Lafayette Chemical Engineering Department was done to assess their opinion as to how effective our graduates are about achieving our five Educational Objectives. The results of this survey used a scale of 1-10, with 10 being the best. The industrial representative gave one number for each of the EOs and those numbers were averaged and converted to a scale from 1-5 with 1 being the best. The results are shown in Figure 2.2. It can be seen that they range from a low of 1.7 for Objective #2

to a high value of 2.4 for Objective #4. These values show the same trend as the Alumni Survey, but they are somewhat less favorable as can be seen in Figure 2.2. However, on average, industry representatives agree that our graduates are meeting all the established educational objectives.

E.3 Comparison of survey results shown in the last ABET report of 2007.

This section does a comparison of the questions used to improve the Educational Objectives of the program. In 2006, specific changes were made to the curriculum in an attempt to improve the seven questions of the Educational Objectives that were identified as needing improvement. The actions taken should be reflected as an improvement in the second survey. Table 2.2 shows the seven questions and the survey number shown in the 2007 ABET report and the result shown in this report in Table 2.1. A positive (+) value in the change column indicates that the change made gave an improved score while a negative (-) value shows that this objective got worse. Six of the questions surveyed showed an improvement while the question on safety issues showed a worsening response.

Table 2.1
2011 Survey Results

	Strongly Agree	Agree	Somewhat Agree	Disagree	Strongly Disagree
Objective 1	%	%	%	%	%
1. Do you possess the science and engineering skills needed to solve engineering problems?	67	33	0	0	0
11. Has your engineering training at UL Lafayette prepared you adequately to address the needs of your employer?	61	33	6	0	0
13. Has your education prepared you for the needs of modern industry?	39	56	6	0	0
18. Have you been capable of adapting to the use of modern engineering tools, skills, and techniques?	61	28	11	0	0
Average EO #1	57	38	6	0	0
Objective 2					
6. Do you perform well on team-based projects?	89	11	0	0	0
7. Do you perform well on your individual assignments?	72	22	6	0	0
8. Are your written communication skills effective?	67	28	6	0	0
9. Are your oral communication skills effective?	44	56	0	0	0
Average EO #2	68	29	3	0	0
Objective 3					
15. Do you have the computer skills necessary to succeed in various facets of your workplace?	61	22	17	0	0
16. Was the computer usage at UL Lafayette diverse enough to help you to easily adapt to new computer challenges?	44	33	17	6	0
17. Did you have enough laboratory experience to allow you to analyze data and interpret results in the workplace?	56	33	6	6	0
Average EO #3	54	29	13	4	0
Objective 4					
2. Were you taught to consider economic issues in your decision making process?	56	33	11	0	0
3. Were you taught to consider environmental issues in your decision making process?	33	50	17	0	0
4. Were you taught to consider safety issues in your decision making process?	33	44	17	6	0
5. Were you taught to consider ethical issues in your decision making process?	67	28	6	0	0
Average EO #4	47	39	13	2	0
Objective 5					
10. Are you aware of contemporary issues in the profession?	28	44	28	0	0
12. Are you confident of your ability to adapt to new engineering challenges in the future?	61	33	6	0	0
19. Are you confident in your ability to adapt to new engineering challenges in the future?	56	39	6	0	0
20. Have you continued to learn new skills since your graduation from UL Lafayette?	83	17	0	0	0
Average EO #5	57	33	10	0	0

Figure 2.1
Educational Objectives

Weighted Average of Survey
(1-5, with 1 Being Best)

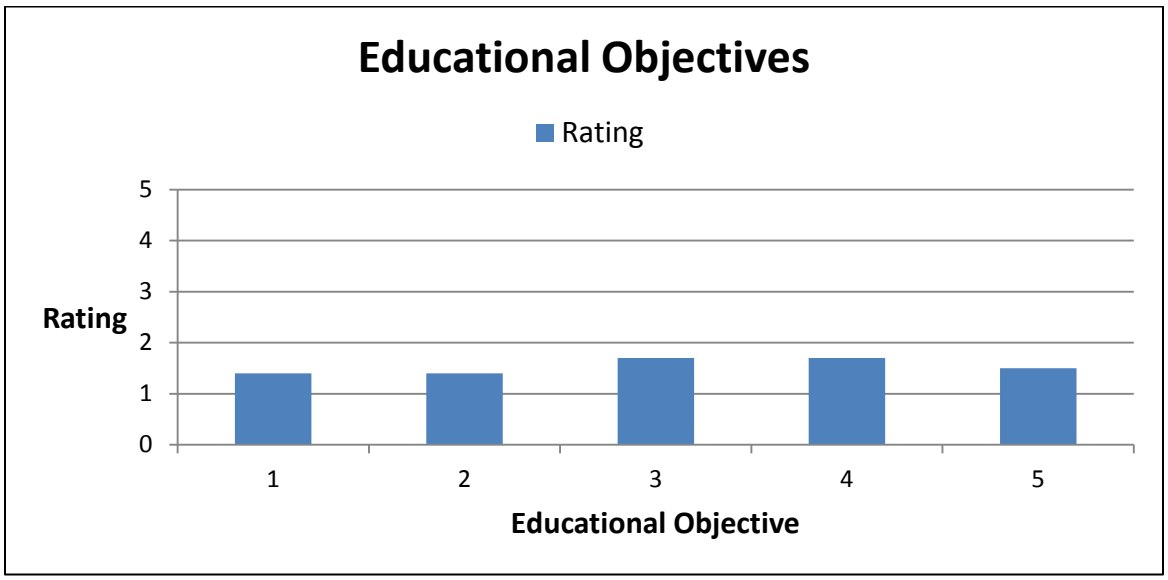


Figure 2.2
Educational Objective Results
of Industrial Survey

Weighted Average of Industrial Survey
(1-5, with 1 Being Best)

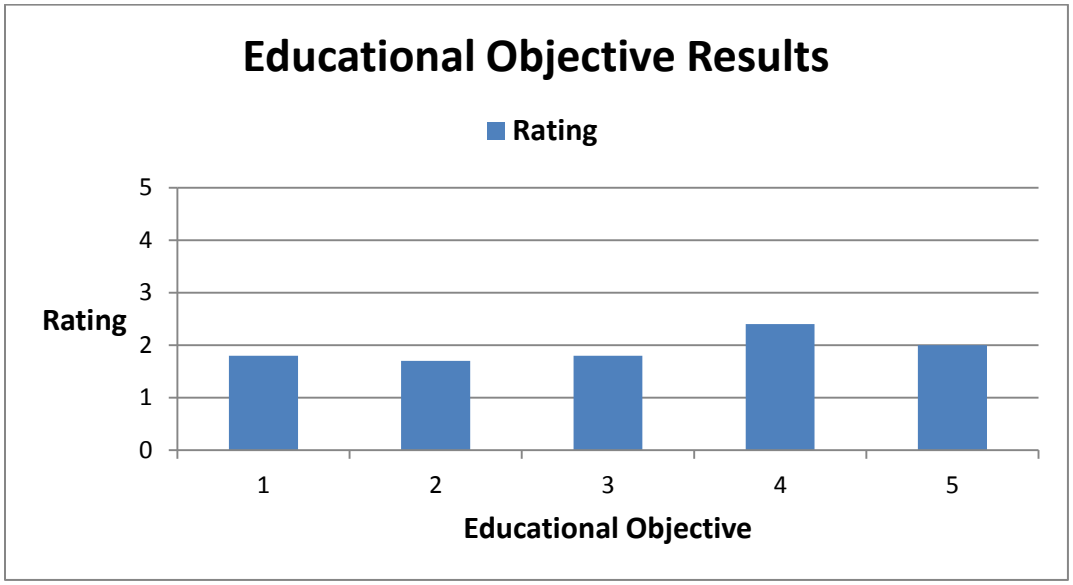


Table 2.2
Comparison of 2006 to 2011 Survey

Question	2006 Survey	2011 Survey	Change + improve - worse
#3 Environmental Issues	1.88	1.83	+ 0.05
#4 Safety Issues	1.69	1.88	- 0.19
#9 Oral Communication	1.69	1.56	+ 0.13
#10 Contemporary Issues	2.07	2.00	+ 0.07
#11 Engineering Preparation from Training	1.64	1.45	+ 0.19
#15 Computer skills to succeed at work	1.88	1.56	+ 0.22
#16 Computer usage helped adapt to work	2.51	1.83	+ 0.68

E.4 New Areas of 2011 Survey Report That Need Attention and How to Address Them.

Just like in the 2006 ABET report, there were a number of questions on the 2011 Survey that were of concern. Based on the responses, a cut point of 1.6 or above was established by the faculty as a point of concern and attempts have been made and are being made in some areas to improve these areas of our outcomes. The five questions being specifically addressed for comparison are as follows:

1. Question 3. "Were you taught to consider environmental issues in your decision-making process?" - This question was addressed last time and there was a slight improvement. Dr. Bajpai, who has been teaching the senior design experience courses, has been placing more emphasis on the environmental issues and it is believed this objective will be improved.

2. Question 4. "Were you taught to consider safety processes in your decision-making process?" - This was the only question on the 2011 Report which showed a negative change. The last two spring semesters, Dr. Bajpai has been using alumni from industry to come in one day a week to discuss the incorporation of safety considerations during system design. Our laboratory has become an area where safety films are seen and discussed. Additionally, students are now required to pass a CACHE Safety Certificate as a requirement for the course CHEE "407 Plant Design and Economics for Chemical Engineers".

3. Question 10. "Are you aware of contemporary issues in the profession?" - This question was another one that has been followed since the 2006 Survey. The seniors are now being required to attend at least three of our graduate seminars during the spring semesters. They are also being challenged to seek and evaluate information on specific topics and report these topics in report form during engineering operations laboratories.

4. Question 13. "Has your education prepared you for the needs of modern industry?" - This is a hard one to get a handle on since our graduates go into a variety of industries such as the oil/gas exploration and production, chemical technical service, chemical production, petroleum refineries, pulp and paper production, etc. Having speakers in our seminars who can speak on these various industries is one way to provide exposure to issues facing these different industries (both common and unique industry perspectives). Professional engineering graduates have made presentations in our design class this past spring semester during which a presentation and discussion on industry needs and challenges are discussed.

5. Question 16. "Was the computer usage at UL Lafayette diverse enough to help you to adapt?" - The amount of computer work was greatly increased with a greater emphasis on Microsoft Office packages along with more engineering process-oriented programs such as MatLab, Aspen, and Polymath. This area will continue to improve given the new faculty members in the department who have exhibited a strong computer interest. Improvement can already be observed in the increase in % of correct answers in the Computers sections of the FE exam.

CRITERION 3. STUDENT OUTCOMES

The Engineering Criteria 2000 requires that institutions have a curriculum which meets the goals of the institution's program in order for that program to be accredited. At a minimum, the ABET criteria (a-k) must be met. Additional outcomes can be established that help satisfy the Educational Objectives.

A. Program Outcomes

The program outcomes used by UL Lafayette are the (a-k) criteria listed by ABET plus one additional outcome, outcome (l), which states that students have "an ability to utilize computers to solve engineering problems". This outcome satisfies our Educational Objective #3. Table 3.1 lists the outcomes. The outcomes are prominently displayed on the departmental web site just below our Educational Objectives. They are also posted in the American Institute of Chemical Engineers (AIChE) student room and in the departmental office foyer, where they are clearly visible for all students to see. Students also see them each spring when they participate with an assessment of outcomes achieved by each course.

B. Relationship of Student Outcomes to Program Educational Objectives

The objective of this section of the report is to show that the Program Outcomes relate to the Program Educational Objectives.

The Program Outcomes that have been adopted by the Chemical Engineering Department at UL Lafayette are the ABET (a-k) Outcomes with one additional outcome added to meet all of the Educational Objectives of our program. How the outcomes link to the Educational Objectives is described below.

a) An ability to apply knowledge of mathematics, science, and engineering

This outcome is the easiest to link to the Educational Objectives. Four of the five objectives, Numbers 1, 3, 4, and 5 are directly related. Objective 1 states that graduates will use their "science and engineering skill set" to solve problems. Objectives 3 and 4 intend that graduates are able to apply modern chemical engineering software in the solution of engineering problems. Objective 5 requires that our graduates meet the needs of the engineering community.

b) An ability to design and conduct experiments, as well as to analyze and interpret resultant data

Data analysis is a critical part of solving contemporary problems as proposed in Objective 4. This outcome also links strongly with Objective 1 since industry problems all revolve around a decision-making process which analyzes and interprets data.

c) An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

Students are trained to integrate economics, environmental factors, safety, and sustainability into product development and plant design. They are tested on these parameters during defense of assignments involving development of concepts/solutions, preparation of reports, and presentations before industry representatives.

Our two capstone design classes are primarily where this process occurs and Objective 4 encompasses this process. These courses also contribute to achieving Objective 2 by developing in our students the ability to work in teams, and the skills to prepare technical presentations and reports. These designs are relevant to the chemical process industry, and thus meet the requirements of Objective 5. Additionally, they will require the knowledge of CAD, process simulation, and mathematical solver softwares, which covers Objectives 1 and 3.

d) An ability to function on multi-disciplinary teams

The obvious objective that this outcome satisfies is Objective 2, which focuses on team work. The other objectives that would relate to this outcome are Objectives 1 and 4, since design and industrial projects will always be multidisciplinary in nature. The ability to implement this outcome requires that employees in various departments work together.

e) An ability to identify, formulate, and solve engineering problems

This outcome is directly related to all five of our Educational Objectives. All of the objectives require that problems be solved and then the developed solutions be presented in oral or written form.

f) An understanding of professional and ethical responsibility

The engineering profession and AIChE have a code of ethics and professional registration is important to the practice of engineering. It is critical that graduates practice ethical behavior in the work place. Therefore this outcome would have to be applied to all of the Educational Objectives. In all five of our objectives, ethical behavior is critical. It is specifically mentioned in Objective 4.

g) An ability to communicate effectively

This outcome is directly related to Objective 2 which states the importance of communications. Objectives 1 and 4, deal directly with solving engineering problems. Objective 2 would utilize this outcome since there are always communications required in any project. Any written report and presentation will incorporate the use of communication software which would involve Objective 3.

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

Our students take 31 semester hours of general education courses to increase their awareness of global and societal issues of today. This outcome is primarily related to Objective 5 which deals with industry needs in a global context, and also to Objectives 2 and 4 which deal with design, problem solving and communications. Objective 3 is also satisfied by this outcome since the computer provides a link to the entire world.

i) A recognition of the need for, and an ability to engage in life-long learning

Students are often asked to perform literature searches for reports or to obtain data from web resources. They are strongly encouraged to take the FE examination and become registered professional engineers (PE). The PEs in the State of Louisiana are required to have 15 hours a year of continuing education to maintain their licenses. This includes a one-hour ethics course. This outcome is especially applicable to Objective 5 which wants graduates to adapt to new challenges. It also applies to Objectives 1, 4, and 3 since changes in environmental and safety issues, and computers are constantly occurring.

j) A knowledge of contemporary issues

Similar to the previous outcome this outcome requires that whatever industry our graduates enter, it will be necessary to keep up with contemporary issues. This outcome feeds directly into Objectives 4 and 5 since this requires knowledge of design issues in industry to solve problems correctly. It equally applies to Objective 3 since computer usage is a dynamic area that is experiencing constant change.

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

This outcome is strongly related to Objectives 2, 3, 4, and 5. The solutions for chemical engineering problems involve the use of chemical process simulation and mathematical software to solve complex processes and designs. To meet the challenges of the future requires continual update of tools. For example in Objective 3, the ASPEN program, the main process simulation software used by industry, is used from the sophomore to the senior year in core chemical engineering courses, such as heat transfer, stage operations, and plant design.

l) An ability to utilize computers to solve engineering problems

This outcome is specifically aimed at Objective 3 which emphasizes different facets of computers in the workplace. The computer permeates the other objectives. Everything from making presentations and searching the internet for new materials to CAD programs that design and control plants are the domain of computers. For that reason it is believed that they are an important emphasis in Objectives 1 through 5.

It is believed that these outcomes mesh well with the department's Educational Objectives and that the department does a good job with implementing these outcomes.

Table 3.1

Program Outcomes Chosen to Satisfy Departmental Educational Objectives

a. an ability to apply knowledge of mathematics, science, and engineering

b. an ability to design and conduct experiments and to analyze and interpret data

c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d. an ability to function on multi-disciplinary teams

e. an ability to identify, formulate, and solve engineering problems

f. an understanding of professional and ethical responsibility

g. an ability to communicate effectively

h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context

i. a recognition of the need for and an ability to engage in life-long learning

j. a knowledge of contemporary issues

k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

l. an ability to utilize computers to solve engineering problems

CRITERION 4. CONTINUOUS IMPROVEMENT

This section of the self-study report documents the process used to regularly assess and determine how the student outcomes are being attained. Assessment is defined as one or more processes that identify, collect, and prepare the data for evaluation. In the evaluation step, the acquired data is checked to determine how well these outcomes are being attained.

A.1 Student Outcomes

The development of Program Outcomes derives from the Educational Objectives which have been established by the constituents of the program. Assessment of the Educational Objectives was presented in Section 2E. Figure 4.1 shows the Program Assessment Procedure, which was a methodology established by the faculty and all of the constituents to develop Educational Objectives and Program Outcomes. This process has been used since the Spring of 2002 and has produced numerous program changes. All constituents have had ample opportunity to suggest improvements to the program.

The process by which assessment is made involves ten steps and two loops. Loop 1 involves the method of assessing and changing the Educational Objectives by Steps 8-10. This was described in Criteria 2 of this report. Step 1 describes the process by which the outcomes are linked to the objectives. These outcomes are then evaluated and assessed in Loop 2 using Steps 1-7. The step of interest in this part of the report is Step 1 where the outcomes are determined to achieve the Educational Objectives. The expected outcomes would be the current ABET required list of a-k or a variation of this list. The program constituents decided to continue with the a-k list. One additional outcome is the emphasis on computer utilization skills, Outcome (l). The first 11 outcomes satisfied ABET Criteria 3 and they cover the Educational Objectives. The additional outcome adds emphasis on Educational Objective #3. Table 3.1 lists the outcomes of the department.

A.2 Processes Used to Assure That Graduates Have Achieved the Program Outcomes

A number of sources such as the faculty, students, and advisory board can be used to examine whether graduates are achieving the Program Outcomes. A number of assessment tools are used to quantify this achievement. Table 4.1 lists the assessment tools used and where they contribute to the outcomes. A brief description of how each is used follows:

A.2.1 Projects (Individual or Group)

Projects involve a much longer duration of work than a test and involve open-ended problems. The senior Unit Operations laboratories, CHEE 403 and 404, involve two different types of project reports. The students work in groups of three or four and run the experiments as a team. Upon completion of the work, within two weeks, the students turn in a group report on which they have all contributed. A final individual report is required of each student. This provides an evaluation on the level of education achieved by the individual member of the team during the team component of the course. Students prepared oral team presentations using Microsoft PowerPoint. All (a)-(k) outcomes are covered in these courses at different levels (see ABET

syllabus). Since these courses apply chemical engineering, and mathematical and chemistry concepts obtained in previous courses, students passing with C or better are considered proficient in Outcomes (a)-(i), and (k)-(l) related to the activities performed in these courses, and Outcomes (a), (e), (k), and (l) of the requisites to enroll in these courses (chemical engineering core).

Figure 4.1 Program Assessment Procedure

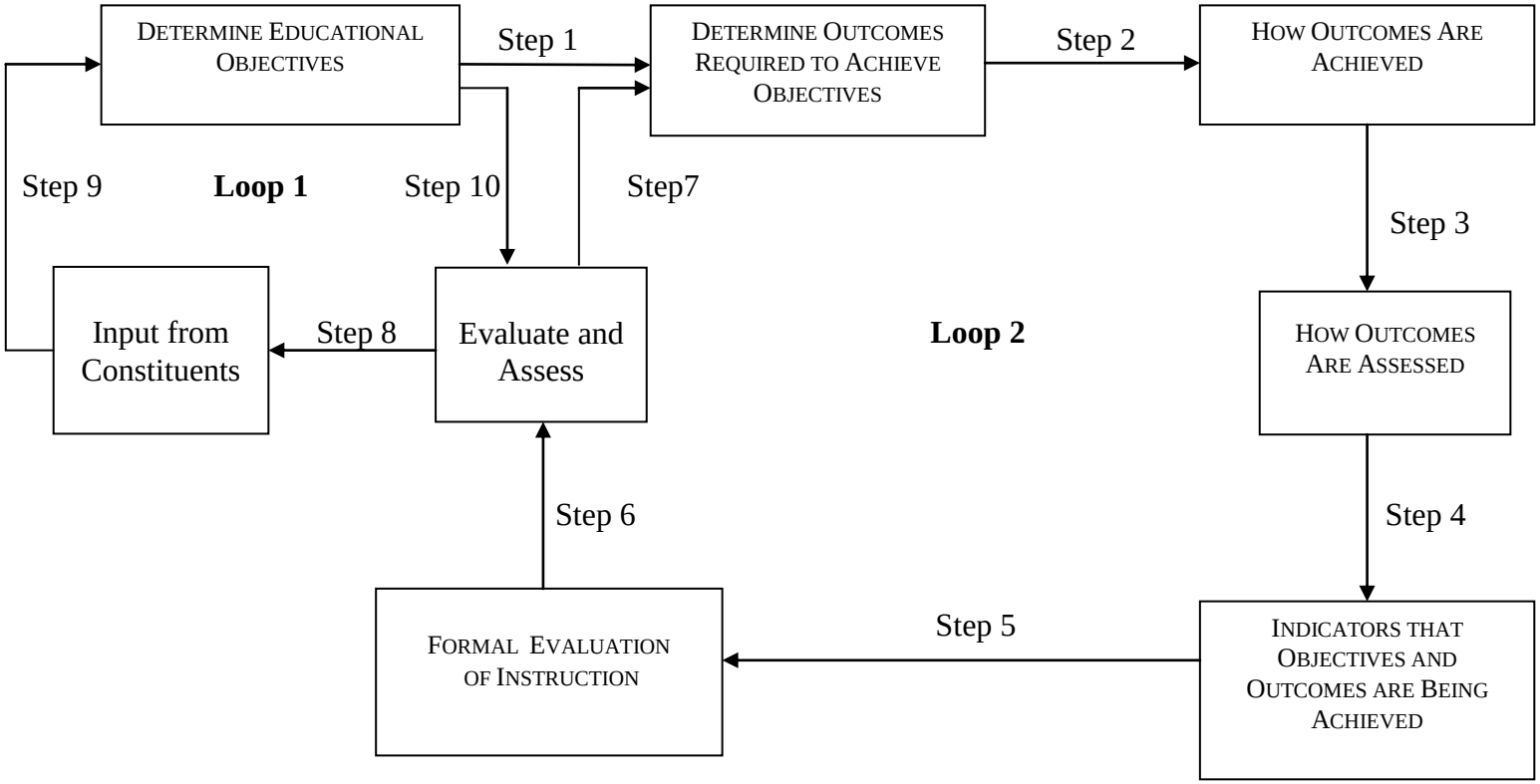


Table 4.1

Assessment Tools Used to Assess Where Outcomes (a through l) are Achieved

Assessment Tool	a	b	c	d	e	f	g	h	I	J	k	l
Projects (Individual or Group)	X	X	X	X	X	X	X	X	X	X	X	X
Advisory Board Meetings, and Student Exit Surveys	X	X	X	X	X	X	X	X	X	X	X	X
FE Exam Results (External)	X	X	X		X	X						X
Post Graduate Surveys	X	X	X	X	X		X		X	X		
Course Assessments	X	X	X	X	X	X	X	X	X	X	X	X

The two design courses, CHEE 407 and 408, require two reports, individual and group, which provide measures of team-learned interactive success and individual learning success. These reports include design drawings, selection of equipment, and materials selection. The chemical process simulation software Aspen is used in the design of the assigned process. Each team makes oral presentations in a formal setting. All (a)-(k) outcomes are covered in these courses. The final presentation of designs developed during CHEE 408 are usually attended by external advisory board members, and other industry representatives, who evaluate students more directly on outcomes (c), and (h) as part of their reviews.

A.2.2 Advisory Board (AB) Meetings and Student Exit Surveys

For the past 12 years, graduating seniors have been interviewed before graduation. Each senior has a 30-minute session with the department head to discuss the pros and cons of the department. There is a specific request of each student interviewed to provide their recommendations to improve the program.

The students consistently indicate very strong confidence in the knowledge exhibited by the Chemical Engineering faculty during their formal teaching and during less formal discussions. They like the availability of the faculty, but feel that some faculty could improve the quality of their teaching. They believe the laboratories are being maintained and are appropriately up to date.

The interviews produce a list of items that are reviewed by the faculty and the Advisory Board. Many of the recent changes in the curriculum, faculty course assignments, and faculty mentoring have resulted from this process. The results of these changes have been reviewed by the faculty and the Advisory Board. Table 4.2 shows a list of student exit comments obtained in 2012. The results of these exit interviews since the spring of 2007 are given in Appendix E.

Table 4.2
2012 Senior Exit Surveys (14)

Positive Remarks	# of Students Indicating This
• Good preparation for industry	7
• Glad I chose CHEE	6
• Liked the labs	5
• Like Aspen on PC	4
• Faculty are good and helpful	4
• Liked courses with projects	3
• Liked the faculty	3
• Liked Heat Transfer	3
• Liked Classmates	3
• Liked Emphasis on Excel	2
• Liked Toastmasters	2
• Controls course was good	2
• Dr. Bajpai has high expectations	2

Suggested Changes	# of Students Indicating This
• Problems with Mass Transfer Course (book and teacher)	12
• Process Sim course – MatLab is poorly explained	8
• Controls too theoretical – too much math	5
• Need co-ops and internships	3
• Air-condition computer laboratory after hours	3
• Upgrade Unit Operations Laboratory equipment	3
• MatLab needs step-by-step teaching	3
• Need polymath on more computers	2
• Controls laboratory needs to match lecture	2
• Need more Excel applications	2
• Worried about pending lab fees	2
• Plant design needs better organization	2
• Need environmental course	2
• Teach partial differential course instead of Calc III	2

The Chemical Engineering Department External Advisory Board is one of the most important constituents of obtaining suggestions for change in the department in that they represent an industrial viewpoint and offer an observation from an employer viewpoint of the graduates of the program. A list of the 12 current Board members is presented in Table 4.3. The Advisory Board is invited twice a year (fall and spring) and spends an 8-hour working day in the department. They are first presented information by the department head on the state of the department since their last visit. The Dean of the college will spend 30 minutes or so with them discussing college-level issues and/or concerns. New faculty and faculty that teach new courses are then asked to make presentations. A one-hour discussion with students (juniors and seniors) is then conducted without faculty present. After lunch, they occasionally visit the laboratories and research rooms. The Board then meets privately before an exit briefing with the department head. Note that two formats are used for the two different meetings. The Fall meeting is held on a day when only the Chemical Engineering External Advisory Board members are visiting the department. The Spring meeting is held on a day when all of the external advisory boards from all five engineering departments are meeting at the college on that same day. The major schedule deviation from the fall meeting is that the first activity is a formal state of the college presentation by the dean and that the dean challenges each board to address during their visit some common issue of general interest to the college. Additionally, at the end of the day, a representative from each board presents a brief analysis of their review of the departments. This interaction between the various boards provides a healthy "cross fertilization" of ideas and discussions toward new concepts being piloted by a department, potential solutions to problems of common interest/concern, and generation of common interests and goals held among all of the boards.

Anecdotal and experiential information obtained during AB Meetings and Student Exit Surveys have contributed to better attainment of outcomes over the last six years. The student interviews conducted by the AB on specific courses, projects, and department operation combined with the student exit surveys conducted by the department head, and faculty presentations on specific courses produce data that is used to modify content and delivery of courses, purchase of laboratory equipment and specific software, and invitation of special seminar speakers. These activities have directly contributed to improvements in all outcomes but specially (d), (f), (j) and (l). The AB follows up on past suggestions during AB meetings, which contributes to monitoring progress toward attaining outcomes.

A.2.3 Results of Fundamentals of Engineering Exam

Students are encouraged to take the Fundamentals of Engineering Examination as part of their professional development. An alumni survey showed that approximately one-third of our graduates have their Professional Engineering (PE) license. The chemical and petroleum industries have not traditionally required registration. However, graduates that go into engineering consulting or process design companies find the PE to be very important.

Each spring semester students are encouraged to take the FE examination. The College of Engineering has faculty who volunteer to teach a review of subjects on the exam prior to the test day to assist the student with their test study preparations. Available data since 2008 shows that a total of 29 chemical engineering seniors took the examination and 22 passed thus yielding a

pass rate of 76%. This compares very favorably to the national average of 78% for chemical engineers taking the examination. Additionally, the exam is a direct measurement of improvement and attaining of several outcomes. For example, our graduates have demonstrated an increase in the proficiency of using computers in engineering over time, scoring 66% average correct answers in this area in 2009, and 73% (2011), and 80% (2012). This is a direct measurement of attaining outcome (k) and (l), and a result of suggestions offered during AB meetings. Another important statistic related to attaining outcome (a) is the fact that our graduates have performed within six points of the National Average in Thermodynamics, Fluids Mechanics, Mathematics, and Chemistry in 2009 and 2012, two years with equal % of students passing the exam (75%). Our graduates often exceed the National Average in Strength of Materials and Material Properties. Most likely a result associated with the materials expertise of the faculty and the course offerings in these areas.

Discussion within the AB and the previous ABET visit indicated the need to increase the extent of inclusion of ethics [outcome (c)] in the curriculum. Improvement in this area can be clearly measured by the performance of our graduates in the FE last year, scoring 95% correct answers in the Ethics and Business Practices section.

Table 4.3

Current UL Lafayette Engineering Advisory Board Members

Name	**Company**	**e-mail**
Mr. Karthik Annadorai	Gate, LLC Houston, TX	karthik@gatellc.com
Mr. Bryant Chapman	BP America Headquarters Houston, TX	Bryant.Chapman@bp.com
Mr. Pat Dooley	Cabot Corporation Franklin, LA	patrick_dooley@Cabot_Corp.com
Mr. Chris Dupuis	Exterran Broussard, LA	chris.dupuis@exterran.com
Mr. David Fishburn	Dow Chemical Plaquemine, LA	dbfishburn@Dow.com
Mr. Robert Gobert	Motiva Enterprises Port Arthur, TX	robert.gobert@Shell.com
Ms. Kisha Ingalls*	Chevron Oronite Co. Belle Chasse, LA	kkmw@chevron.com
Mr. Justin Landry	Shell Int'l Exploration & Prod. Houston, TX	Justin.Landry@Shell.com
Ms. Bridget Meaux	Halliburton GOM Cementing Lafayette, LA	Bridget.Meaux@halliburton.com
Mr. Bill Portwood	BASF Geismar, LA	william.portwood@basf.com
Mr. Dan Vollmer	BJ Services Lafayette, LA	dvollmer@bjservices.com
Ms. Bach Williams	Fluor Sugar Land, TX	Bach.Williams@fluor.com

* Chairman

A.2.4 Post Graduate Statistics

In a previous alumni survey, it was found that 51% of our graduates had attained formal education beyond the BS level. This shows strength in Outcome (i) which requires life-long learning. Communications with our students in graduate school have helped current BS graduates to better prepare for graduate work by suggesting enrollment in specific courses at UL Lafayette, or providing information about specific graduate programs.

A.2.5 Student Course Assessment

Our most fruitful method of evaluating outcomes was initiated in 2003 and involves getting student-derived assessments of the outcomes in each chemical engineering and general engineering class taught by the department. The students provide an assessment of their courses taken each year. Evaluations were done at the end of each spring semester for the sophomore, junior, and senior students. This information has given the faculty and Advisory Board an insight into the strengths and weaknesses of each class. Table 4.4 gives the output of our most recent graduating class, 2013, which was conducted over a period of three years. These course assessments, combined with the syllabus for each course, and other evaluation tools, such as projects, exams, and homework are an indication that students getting C or better in senior courses just prior to graduation attained all outcomes. Also, shown is the class evaluation for the upcoming 2014 and 2015 senior classes in Tables 4.5 and 4.6. One can quickly survey, by looking horizontally, the curriculum's ability to satisfy each outcome and by looking vertically, how effective each course is at meeting all outcomes. Section A.4 shows changes and improvements which have occurred due to student course assessments. Results of these surveys since 2007 are in Appendix F. In addition to the Chemical Engineering courses, courses in math, science, English, humanities, philosophy, and general engineering are listed in Table 4.7. As can be seen a number of our outcomes are covered by these courses. These courses raise the level of achievement of our outcomes.

A.3 Expected Level of Attainment of Outcomes

The outcomes believed necessary for our graduates to achieve the educational objectives of the program have been defined and the faculty has indicated in Table 4.8 where they believe outcomes are achieved in our major engineering courses. This table lists all of the courses that the Chemical Engineering faculty teaches. By looking horizontally along each program outcome, it appears that the various faculty members believe they are covering all our outcomes. As expected, the design courses and the laboratory courses cover the majority of the outcomes.

Another way that the department can easily assess if a particular course is achieving targeted outcomes is to look vertically at the sum of the numbers in Table 4.4. In this fashion, the courses with the lowest accumulative number is doing the best job of achieving the objective of satisfying the outcomes (a blank is given a value of 4 as a default). Comparing these numbers with the numbers in Table 4.8 will show the successful accomplishment of the faculty member.

In this manner, each course can be viewed by other faculty members, the department head, as well as the advisory board. Since each course has been evaluated in this manner since 2000, this history provides an expectation of outcomes and a level of achievement.

TABLE 4.4

SENIORS (SPRING 2013 GRADUATES)
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

		FALL CHEE COURSES									**SPRING** CHEE COURSES						**OTHER** APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
	Outcomes	CHEE 101	CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	ENGR 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	1.4	1.0	1.7	1.1	1.2	1.4	1.0	1.5	1.1	1.1	1.0	1.3	1.3	1.2	1.8	1.6	1.2	1.0
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	1.2	2.3	2.4	1.8	2.4	1.2	1.3	2.0	2.3	2.3	2.1	1.3	2.2	1.8		2.1	2.9	2.6
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2.8	2.4	2.6	2.0	1.9	1.9	1.2	1.5	2.1	2.5	2.2	1.9	1.5	2.1		2.4	2.5	2.5
d.	Experience working in multi-disciplinary teams	1.5	3.0	2.9		1.6	1.9	1.7	2.1	2.8		2.8	1.9	2.0	2.6	2.9	1.8		
e.	Ability to identify, formulate solutions and solve engineering problems	1.7	1.0	2.3	1.5	1.4	1.4	1.2	1.4	1.3	1.4	1.1	1.3	1.3	1.5	2.8	1.8	1.4	1.3
f.	Understanding of professionalism and ethics	1.9	2.3	2.7	2.8	2.9	2.5	2.6	2.0	2.8	2.5	2.2	2.1	1.8	2.6		2.6	2.8	2.7
g.	Proficiency in oral and written communication skills	1.5	2.8	2.6	2.6	2.8	1.2	1.9	1.8	2.8	2.5	2.1	1.3	1.7	2.1	2.9	2.1	2.9	2.7
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	1.9	2.1	2.2	2.1	2.2	1.8	1.9	1.8	1.9	2.4	1.8	1.9	1.7	2.1	2.3	2.2	2.2	2.4
i.	Appreciation of the concept of life-long learning	2.0	1.9	2.0	1.9	2.0	2.0	1.8	2.0	2.1	2.9	1.3	1.8	1.7	2.0	2.2	2.0	2.0	1.9
j.	Awareness of contemporary issues in the profession	1.6	2.1	2.0	2.0	2.2	2.4	1.9	1.9	2.1	2.3	2.2	2.2	1.8	2.0	2.6	2.3	2.2	2.3
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	1.7	1.2	2.0	1.4	1.3	1.5	1.1	1.5	1.6	1.2	1.4	1.3	1.4	1.5	2.0	1.7	2.0	1.6
l.	Computer utilization skills	2.1		2.5	1.2	1.9	1.4	1.1	1.6	2.3	1.7	1.8	1.3	1.1	1.9	2.6	1.1		
	Total Points	21.3	26.1	27.9	24.4	23.8	20.6	18.7	21.1	25.2	26.8	22.0	19.6	19.5	23.4	34.1	23.7	30.1	29.0

TABLE 4.5

JUNIORS (SPRING 2014 GRADUATES)
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

		FALL CHEE COURSES									**SPRING** CHEE COURSES						**OTHER** APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
	Outcomes	CHEE 101	CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	ENGR 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	1.7	1.0	1.6				1.2			1.1	1.4				1.8	1.8	1.2	1.6
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	1.3	2.2	1.9				1.3			1.3	2.2				1.6	1.9	2.4	2.5
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2.8	1.9	2.4				1.1			1.2	2.2				2.2	2.0	2.2	2.4
d.	Experience working in multi-disciplinary teams	1.3	2.9	1.8				1.6			2.1	2.5				1.8	1.8	2.1	2.0
e.	Ability to identify, formulate solutions and solve engineering problems	1.9	1.1	1.8				1.2			1.0	1.6				2.3	1.6	1.3	1.6
f.	Understanding of professionalism and ethics	1.7	2.2	2.1				1.9			1.7	2.5				2.1	1.8	2.7	2.8
g.	Proficiency in oral and written communication skills	1.5	1.5	1.8				1.9			1.8	2.6				1.4	2.0	2.6	2.5
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	1.7	1.6	1.8				1.8			1.4	2.6				1.7	2.1	1.7	2.1
i.	Appreciation of the concept of life-long learning	1.8	1.4	1.6				1.4			1.1	2.2				2.0	1.8	1.8	2.1
j.	Awareness of contemporary issues in the profession	1.7	1.7	1.9				1.9			1.5	2.5				1.8	2.1	2.0	2.3
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	1.7	1.5	1.7				1.3			1.3	1.7				1.8	1.6	1.7	2.0
l.	Computer utilization skills	2.1						1.3			1.2	1.7				2.6	1.0		2.4
	Total Points	21.2	24.0	24.4				17.9			16.7	25.7				23.1	21.5	25.7	26.3

TABLE 4.6

SOPHOMORES (SPRING 2015 GRADUATES)
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

		FALL CHEE COURSES									**SPRING** CHEE COURSES						**OTHER** APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
	Outcomes	CHEE 101	CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	CHEE 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	2.2	1.3														1.7	1.0	
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	2.2	2.3														2.1	2.2	
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2.7	2.2														2.2	2.2	
d.	Experience working in multi-disciplinary teams	2.4															2.4	2.4	
e.	Ability to identify, formulate solutions and solve engineering problems	2.3	1.3														1.8	1.2	
f.	Understanding of professionalism and ethics	1.2	2.8														2.5	2.2	
g.	Proficiency in oral and written communication skills	2.3	2.7														2.6	2.3	
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	1.6	2.5														2.3	1.5	
i.	Appreciation of the concept of life-long learning	1.7	2.3														2.1	1.6	
j.	Awareness of contemporary issues in the profession	1.5	2.4														2.3	1.9	
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	2.1	1.9														1.6	1.5	
l.	Computer utilization skills	2.5	2.5														1.2		
	Total Points	24.7	24.2														24.8	20	

Table 4.7
Program Outcomes (a-l) Matrix of Courses Not Taught by CHEE Professors

Course		a	B	c	d	e	f	g	h	i	j	k	l
ENGL	101							P					
	102							P					
	Lit							P		S			
CMCN	310							P		S			
ECON	430	P		S		S	S						S
BHSC	(El)								S	S	P		
HIST	(El)								S	S	S		
ARTS	(El)								S	S	S		
PHIL	Ethics						P	S	S	S			
MATH	270	P				S						P	P
	301	P				S						S	S
	302	P				S						S	S
	350	P				S						S	
CHEM	107	P				S						S	
	108	P				S						S	
	115(Lab)	P	P	S	S	S						P	
	221	P	P	S		S						S	
	231	P				S						S	
	233(Lab)	P	P	S	S	S						P	
	302	P	S			S						S	
	402	P	S			S						S	
PHYS	201	P	S	S		P						S	S
BIOL	(El)	P							S			S	
ENGR	201	P	S	S		P						S	
	218	P	S	S		P						S	

Where: P is primary emphasis and S is secondary emphasis

Program Outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments and to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multi-disciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context
i. a recognition of the need for and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
l. an ability to utilize computers to solve engineering problems

TABLE 4.8

FACULTY OUTCOMES CHART – SPRING 2013
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

		FALL CHEE COURSES									**SPRING** CHEE COURSES						**OTHER** APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
	Outcomes	Chee 101	Chee 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	Chee 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	Engr 210	Engr 301	Engr 305
a.	Ability to apply math, science and engineering principles	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
b.	Ability to design and conduct experiments and to analyze and interpret resultant data		1	2.5	3	3	1	3	3	1	3	1	1	3	1	2			3
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2	2	3		2	2	1.5	1	1	2	2	2	1	2	1	1		1
d.	Experience working in multi-disciplinary teams		3	1.5	1	3	2	2	3		3		2	3		2			1
e.	Ability to identify, formulate solutions and solve engineering problems		1	1.5	1	1	1	1	2	1	1	1	1	1	1	1	1		1
f.	Understanding of professionalism and ethics	1	3	3	3	2.5	2	3	1		2.5		2	1			3		1
g.	Proficiency in oral and written communication skills			1.5	1	2.5	1	2	1		2.5		1	1		2	2		1
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	1		1	1	2	2	2	1		3		2	1		1	2		1
i.	Appreciation of the concept of life-long learning		3	3	3	2	2	3	3	3	2.5	2	2	2	2		2		1
j.	Awareness of contemporary issues in the profession	1	3	2	1	2	2.5	3	1	3	2	3	2.5	1	3	3	1		1
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice		2	1.5	1	1.5	1.5	1	1	2	1.5	2	1.5	1	2	1	1		1
l.	Computer utilization skills		2	3	1	1.5	1.5	2	1	2	1.5	1	1.5	1	1	3	1		1
	Total Points	8	21	24.5	17	24	19.5	24.5	19	14	25.5	13	19.5	17	13	17	15		14

B. Continuous Improvement

Since the 2007 ABET Report, a number of curriculum changes have been made as a result of the assessments described in Table 4.1. All of these tools have provided data for the constituents to consider. This section of the report presents these changes and departmental improvements made. Some of the changes were course changes as well as the reassignment of teachers.

The new curriculum, shown in Section 5, shows changes that have occurred within the traditional program and the biology-emphasis program since 2007.

(1) Added CMCN 310. Our senior students continued to provide the opinion that ENGL 365 (Technical Writing) was a course of minimal value to them. The students reported that they basically worked on their resumes and the writing experience was significantly less than that required in our Unit Operations reports. A survey of our recent graduates pointed to a deficiency in their oral communications (Outcome g). Students do speak in a number of classes, but a more structured course appeared to be important. The Advisory Board agreed and the change was made by dropping ENGL 365 and adding CMCN 310. This course offers a more structured approach to writing and preparing technical presentations.

(2) Replaced Instructor in CHEE 400. Based on student evaluation of instruction, the sum of the outcomes in the course, and input from the Advisory Board after talking to students, it was decided to change the instructor for CHEE 400, from Dr. Dufreche to Dr. Chirdon. Dr. Chirdon taught the course last fall 2012 and the results were excellent. Dr. Dufreche was assigned a Unit Ops laboratory and his performance was very good. This was a win-win move that benefited all parties involved while better capitalizing on the strengths of each faculty member.

(3) Teach ENGR 305 Transport Phenomena in the Fall and Spring Semesters. Last year, it was decided to begin teaching transport in the fall and spring semesters instead of only in the fall. This second offering was made due to increased enrollment and to better facilitate the students wanting to be better able to take advantage of CO-OP opportunities during the fall semester. The advisory board suggested the move to provide students more opportunities to attain outcomes (d)-(l) by working in industry as CO-OP or intern program participants. ENGR 305 is a course taken by petroleum and chemical engineering majors, and thus, the students have opportunities to work in multidisciplinary teams prior to COOP experiences. This allows students to take the fall semester of the junior year to do a CO-OP, and they could still graduate in four years. Monsanto is one company who wanted fall COOP students who have taken the Material Balance, Thermodynamics, and Transport Phenomena courses.

(4) Biochemistry for the Biology Emphasis. During Senior Exit Interviews, students interested in the bioprocessing aspect of chemical engineering requested that Biochemistry I be considered as an option to the Chemistry of Materials course in their curriculum. The faculty favorably viewed this course option in that it allowed for a stronger supporting chemistry education component to better support students interested in targeted areas of the chemical engineering field. The Advisory Board agreed with the faculty and the change was made.

(5) Additional Elective for Students Interested in Bioprocessing Senior students interested in bioprocessing asked to have a CHEE elective in the processing area instead of having to take the Advanced Materials course, CHEE 427. This offering would allow them to take the bioprocessing course already offered in chemical engineering as an elective or some other CHEE elective including Advanced Materials. This was agreed to by the faculty and approved by the Advisory Board. The objective was to provide students with a broader science background and better attain outcome (a).

(6) Safety Demonstration. It was noted in the last survey of our educational objectives that safety preparation was not improving. As a result, during the last two years, the Unit Operations Laboratory in the fall and spring semesters viewed safety films every other week. Classroom discussions followed each film. In addition, the course teacher, Dr. Bajpai, required that the senior students take AIChE safety courses online and provide the certificates before they can graduate. Also, industry representatives well-versed with safety considerations during design and/or operations presented lectures on safety considerations. For example, recently, Mr. Don Brocksmith, a PE who works for a large chemicals manufacturing company, gave three lectures on safety valves and incorporating safety into design. .

(7) ENGR 210 became CHEE 210. Since the Visual Basic Course, ENGR 210, was only being taken mostly by Chemical Engineers, the administration requested that it become a CHEE course with the department taking full responsibility for its content. This was done in 2012. Now the course provides opportunities for interdisciplinary interactions between several engineering fields.

(8) Statics and Dynamics became Statics and Mechanics. ENGR 218 was a combined Statics and Dynamics course, and it was proposed by Petroleum Engineering that it be changed to Statics and Mechanics of Materials course to provide course content of increased value to both petroleum and chemical engineers. The faculty agreed and the Advisory Board was very much in favor of this change based on their industrial experience.

(9) UNIV 100 First-Year Seminar and UNIV 200 Information Literacy were added to the curriculum. The university implemented a change in the freshmen year that affected all departments. This action came as a result of the Quality Enhancement Program a component of the most recent SACS Reaffirmation accreditation process. To enhance student learning four course hours were added resulting in two hours being removed from our existing curriculum. To accommodate the new course loads, working in consultation with the Advisory Board and students, the faculty decided to quit offering CHEE 101 and made a one-hour reduction in the second Unit Operations laboratory. Another option considered was to reduce Chemical Engineering Calculations from four hours to three hours, but neither the students, faculty, nor Advisory Board thought that was a good idea.

(10) Changed CHEE 404 (Unit Operations Laboratory II) from two- to one-credit hour. One credit hour had to be taken from the curriculum to satisfy the above change (9). It was decided by the faculty and Advisory Board that CHEE 404 would be the source. The CHEE 403 laboratory which is a two-credit hour course has one hour of seminars and a three-hour laboratory. Therefore, it was believed that reducing CHEE 404 to one credit hour and a three-

hour laboratory instead of a four-hour laboratory would cause minimum impact to the curriculum.

(11) Chemical Engineering/Chemistry Dual Degree Option. Chemical Engineering students who also want to major in Chemistry now have the benefit of getting both BS degrees by taking one additional semester of course work. A dual major curriculum sheet was developed with assistance from the Chemistry Department. This has been a good recruiting tool for those students wanting to gain special insight into science and how it can be well-coupled into engineering. Currently, about 10-15% of our graduates have opted for this option with them typically earning both degrees in 4 ½ years.

The above described 11 changes that have been listed are mainly the result of using our outcome assessment tools and talking to our students. Once these ideas are identified, the constituents are contacted, and a collaborative decision is made. The outcomes, student evaluation of instruction, senior exit interviews, and Advisory Board interviews are the primary mechanisms by which change is initiated and outcomes are further improved.

C. Additional Information

It is clear that early sophomore chemical engineering courses emphasized outcomes (a), (b), and (e). As the students progress through the curriculum, they get thoroughly exposed to and tested on outcomes (a)-(l): design systems, preparation of technical presentations, ethics, safety, sustainability, lifelong learning, contemporary issues, and process simulation software. Each chemical engineering course along the curriculum increasingly reiterates attainment of outcomes through well-tested and revised assessment metrics (e.g., exams, presentations, and reports). The curriculum includes general engineering courses in fluids (ENGR 305), thermodynamics (ENGR 301), and materials (CHEE 317), which provides opportunities for different engineering majors to work together on the solution of engineering problems and develop the ability to function on multi-disciplinary teams [Outcome (d)]. Folders will be available during the ABET visit to provide examples of assessment metrics for each course. Faculty and advisory board meetings serve as check points to revise and maintain the courses relevant with respective outcomes. The faculty establishes the degree of coverage of outcomes (Table 4.8) in each course, and implement adjustments following suggestions by the advisory board and students, especially the seniors, as they progress through the curriculum (Table 4.4-4.6). Even though these faculty assessments are less quantitative compared to a specific assessment instrument in a particular course, they provide a method for continuous improvement to maintain the quality of the program and achieve ABET standards.

It is clear from the Table 4.9 that more than one course is used to assess attainment of each outcome. The faculty and the advisory board determined that courses included in the table directly examined and ensure proficiency of the outcomes for students obtaining grades of C or better. As mentioned above, folders will be available during the ABET visit to provide examples of assessment metrics for each chemical engineering course. The table also shows that a combination of qualitative and quantitative instruments is applied as metrics to maintain and improve attainment. Specific courses and activities have been implemented to attain specific outcomes. PHIL 316 (Ethics Course) and the CACHE Certificate (safety) were specifically

introduced in the curriculum to ensure recognition and consideration of ethics (outcome (f)), and safety (outcome (c)), respectively, in chemical engineering practice. A course in public speaking (CMCN 310) was established to better-attain Outcome (g). Special seminars by graduate students and industry professionals provide students a view of contemporary issues related with industrial processes and developing research initiatives within the field of chemical engineering.

Table 4.9 shows the instruments used to assess attainment of outcomes.

	Assessment Instruments						
Outcomes	**Courses**	**FE Exam**	**Surveys**	**AB Meetings**	**Faculty Meetings**	**CACHE Certificate**	**Plant Design Presentation and Final Report**
(a)	CHEE 310,317, 400, 401, 402, 403, 404, 405, 407,408, 413, 416, 420, 427	√	√	√	√		√
(b)	CHEE 310, 402, 403, 404, 413, 420,		√	√	√		√
(c)	CHEE 405, 407, 408, 420		√	√	√	√	√
(d)	CHEE 210, 317, 400, ENGR 305		√	√	√		
(e)	CHEE 310,317, 400, 401, 402, 403, 404, 405, 407,408, 413, 416, 420, 427	√	√	√	√		√
(f)	CHEE 403, 404, PHIL 316	√	√	√	√		√
(g)	CHE 403, 404, 407, 408, CMCN 310		√	√	√		√
(h)	CHEE 403, 404, 407, 408		√	√	√		√
(i)	CHEE 403, 404, 407, 408		√	√	√		√
(j)	Graduate Seminar, UNIV 100, 200, CHEE 407		√	√	√		√
(k)	CHEE 210, 302, 400, 405, 407, 408	√	√	√	√		√
(l)	CHEE 210, 302, 400, 405, 407, 408	√	√	√	√		√

Program Outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments and to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multi-disciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context
i. a recognition of the need for and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
l. an ability to utilize computers to solve engineering problems

CRITERION 5: CURRICULUM

The Chemical Engineering Curriculum, shown in Table 5.1, reflects the curriculum developed by the faculty to achieve the Program Outcomes and Educational Objectives of the department. Table 5.2 shows the guidelines for those wanting to pursue the Biology emphasis. These are highly structured programs with only one CHEE elective which prevents the bypassing of significant courses. All courses are on the semester basis.

A.1 Program Curriculum

The Chemical Engineering Program seen in Table 5.1 has a total of 43 hours of math and science, which is significantly above the 32 required hours. These include 21 hours of chemistry, which clearly distinguishes the graduates of chemical engineering from other engineers. There are 57 hours of engineering courses compared to the 48 hours that are required. Included in this are 12 hours of general engineering courses. In addition to the engineering education component, there are a total of 31 hours of general education courses. The hours and percentages meet the ABET requirements.

The Department also has a Biology emphasis seen in Table 5.2 which attracts students with its stronger emphasis in bioprocessing-related study topics. This program has a total of 51 hours of math and science which includes eight hours of biology and 21 hours of chemistry. This program also has 51 hours of engineering courses, which includes nine hours of general engineering courses. There are again 31 hours of general education courses. The ABET hours and percentages are also met by this curriculum.

A.2 Alignment of Courses with Educational Objectives

The various courses in the curriculum are designed to allow the students to achieve our five Educational Objectives.

Educational Objective #1. Apply scientific and engineering knowledge to solve engineering problems.

This objective implies that there must be knowledge of science and engineering courses to solve engineering problems. A total of 43 hours of math and science as well as 57 hours of engineering are believed to be sufficient to handle this first Educational Objective.

Educational Objective #2. Perform and communicate, both in teams and individually.

This is a real strength of the program. Almost all of the CHEE courses end with an assigned project in which students work on teams and have to make team oral and written presentations, especially in the unit operations laboratory and plant design courses. A formal course CMCN 310 Public Speaking, and the first unit operations laboratory course, which includes Toastmaster presentations, prepare the students for oral presentations.

Table 5.1 Curriculum (2013-2015)

Chemical Engineering Program

Course (Department, Number, Title) List all courses in the program by term starting with the first term of the first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE.[1]	*Subject Area (Credit Hours)*				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Maximum Section Enrollment for the Last Two Terms the Course was Offered[2]
		Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (√)	General Education	Other		
UNIV 100 – First Year Seminar	R			2			
CHEM 107 – General Chemistry I*	R	3					
ENGL 101 – Intro to Academic Writing*	R			3			
MATH 270 – Calculus I*	R	4					
Elective (Biology)	SE	3					
UNIV 200 – Information Literacy	R			2			
CHEM 108 – General Chemistry II*	R	3					
CHEM 115 – General Chemistry Lab	R	2					
ENGL 102 – Writing & Research*	R			3			
MATH 301 – Calculus II*	R	4					
PHYS 201 – General Physics I	R	4					
CHEE 201 – Chemical Engineering Calc.*	R		4			*Fa11, Fa12*	*55,53*
CHEM 221 – Analytical Chemistry	R	3					
ENGR 218 – Statics & Strength of Materials	R		3				
MATH 302 – Calculus III	R	4					
Elective (Lit.)	SE			3			
CHEM 231 – Organic Chemistry I	R	3					
CHEE 210 – Engineering Analysis **ENGR 210	R		2 √			*Sp12***, Sp13*	*27(2), 21(2)*

ENGR 301 – Thermodynamics*	R		3				
ENGR 305 – Transport Phenomena*	R		3 √				
MATH 350 – Differential Equations	R	3					
Elective (History)	SE			3			
CHEE 317 – Materials of Engineering	R		3			*Fa12, Sp13*	*37(2), 33(2)*
CHEM 233 – Organic Chem Lab	R	1					
CMCN 310 – Public Speaking	R			3			
ECON 430 – Ind. Economics & Finance	R			3			
ENGR 201 – Electrical Current	R		3				
Elective (BHSC)	SE			3			
CHEE 302 – Transfer Operations	R		3 √			*Sp12, Sp13*	*26, 38*
CHEE 310 – Chemical Engineering Thermodynamics	R		3			*Sp12, Sp13*	*30, 39*
CHEM 302 – Physical Chemistry II	R	3					
CHEE 405 – Process Heat Transfer	R		3 √			*Sp12, Sp13*	*31, 37*
CHEE 427 – Advanced Materials	R		3			*Sp12, Sp13*	*24, 40*
CHEE 400 – Process Simulations	R		3 √			*Fa11, Fa12*	*28, 27*
CHEE 401 – Stage Operations Design	R		3 √			*Fa11, Fa12*	*28, 29*
CHEE 403 – Chemical Engineering Lab.	R		2 √			*Fa11, Fa12*	*15(2), 14(2)*
CHEE 407 – Chemical Engineering Plant Design	R		3 √			*Fa11, Fa12*	*29, 29*
CHEE 420 – Chemical Reaction Engineering	R		3 √			*Fa11, Fa12*	*30, 31*
Elective (Arts)	SE			3			
CHEE 404 – Chemical Engineering Lab. II	R		1 √			*Sp12, Sp13*	*14(2), 14(2)*
CHEE 408 – Computer Aided Process Design	R		3 √			*Sp12, Sp13*	*26, 28*
CHEE 413 – Process Control in CHEE	R		3 √			*Sp12, Sp13*	*29, 31*
CHEM 402 – Materials of Chemistry	R	3					
PHIL 316 – Professional Ethics	R			3			
Elective (CHEE)	SE		3				

TOTALS-ABET BASIC-LEVEL REQUIREMENTS		43	57	31			
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM	131						
PERCENT OF TOTAL		32.8	43.5	23.7			
Total must satisfy either credit hours or percentage	Minimum Semester Credit Hours	32 Hours	48 Hours				
	Minimum Percentage	25%	37.5 %				

1. **Required** courses are required of all students in the program, **elective** courses (often referred to as open or free electives) are optional for students, and **selected elective** courses are those for which students must take one or more courses from a specified group.
2. For courses that include multiple elements (lecture, laboratory, recitation, etc.), indicate the maximum enrollment in each element. For selected elective courses, indicate the maximum enrollment for each option.

Instructional materials and student work verifying compliance with ABET criteria for the categories indicated above will be required during the campus visit.

Table 5.2 Curriculum (2013-2015)

Chemical Engineering Program – Biology Emphasis

Course (Department, Number, Title) List all courses in the program by term starting with the first term of the first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE.[1]	*Subject Area (Credit Hours)*				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Maximum Section Enrollment for the Last Two Terms the Course was Offered[2]
		Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (√)	General Education	Other		
UNIV 100 – First Year Seminar	R			2			
BIOL 110 – Prin. Of Biology I	R	3					
BIOL 112 – Prin. Of Biology I Lab	R	1					
CHEM 107 – General Chemistry I*	R	3					
ENGL 101 – Intro to Academic Writing*	R			3			
MATH 270 – Calculus I*	R	4					
UNIV 200 – Information Literacy	R			2			
CHEM 108 – General Chemistry II*	R	3					
CHEM 115 – General Chemistry Lab	R	2					
ENGL 102 – Writing & Research*	R			3			
MATH 301 – Calculus II*	R	4					
PHYS 201 – General Physics I	R	4					
CHEE 201 – Chemical Engineering Calc.*	R		4			*Fa11, Fa12*	*55,53*
CHEM 231 – Organic Chemistry I	R	3					
ENGR 218 – Statics & Strength of Materials	R		3				
MATH 302 – Calculus III	R	4					
Elective (Lit.)	SE			3			
CHEE 210 – Engineering Analysis **ENGR 210	R		2 √			*Sp12***, Sp13*	*27(2), 21(2)*

CHEM 232 – Organic Chemistry II	R	3					
ENGR 301 – Thermodynamics*	R		3				
ENGR 305 – Transport Phenomena*	R		3 √				
MATH 350 – Differential Equations	R	3					
PHYS 215 – Physics Lab I	R	1					
Elective (History)	SE			3			
BIOL 111 – Prin. Of Biology II	R	3					
BIOL 113 – Prin. Of Biology II Lab	R	1					
CHEE 317 – Materials of Engineering	R		3			*Fa12, Sp13*	*37(2), 33(2)*
CHEM 233 – Organic Chem Lab	R	1					
CMCN 310 – Public Speaking	R			3			
ECON 430 – Ind. Economics & Finance	R			3			
Elective (BHSC)	SE			3			
CHEE 302 – Transfer Operations	R		3 √			*Sp12, Sp13*	*26, 38*
CHEE 310 – Chemical Engineering Thermodynamics	R		3			*Sp12, Sp13*	*30, 39*
CHEE 405 – Process Heat Transfer	R		3 √			*Sp12, Sp13*	*31, 37*
CHEM 302 – Physical Chemistry II	R	3					
Elective (Arts)	SE			3			
CHEE 400 – Process Simulations	R		3 √			*Fa11, Fa12*	*28, 27*
CHEE 401 – Stage Operations Design	R		3 √			*Fa11, Fa12*	*28, 29*
CHEE 403 – Chemical Engineering Lab.	R		2 √			*Fa11, Fa12*	*15(2), 14(2)*
CHEE 407 – Chemical Engineering Plant Design	R		3 √			*Fa11, Fa12*	*29, 29*
CHEE 420 – Chemical Reaction Engineering	R		3 √			*Fa11, Fa12*	*30, 31*
CHEM 317 – Biochemistry	R	3					
CHEE 404 – Chemical Engineering Lab. II	R		1 √			*Sp12, Sp13*	*14(2), 14(2)*
CHEE 408 – Computer Aided Process Design	R		3 √			*Sp12, Sp13*	*26, 28*
CHEE 413 – Process Control in CHEE	R		3 √			*Sp12, Sp13*	*29, 31*

CHEM 234 – Organic Chem Lab II		R	2					
PHIL 316 – Professional Ethics		R			3			
Elective (CHEE)		SE		3				
TOTALS-ABET BASIC-LEVEL REQUIREMENTS			51	51	31			
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM		133						
PERCENT OF TOTAL			38.3	38.3	23.3			
Total must satisfy either credit hours or percentage	Minimum Semester Credit Hours		32 Hours	48 Hours				
	Minimum Percentage		25%	37.5 %				

3. **Required** courses are required of all students in the program, **elective** courses (often referred to as open or free electives) are optional for students, and **selected elective** courses are those for which students must take one or more courses from a specified group.
4. For courses that include multiple elements (lecture, laboratory, recitation, etc.), indicate the maximum enrollment in each element. For selected elective courses, indicate the maximum enrollment for each option.

Instructional materials and student work verifying compliance with ABET criteria for the categories indicated above will be required during the campus visit.

Educational Objective #3. Effectively apply modern software tools in the solution of scientific and engineering problems.

To prepare students for this objective the curriculum begins with Word and Excel work in our first CHEE course. This is followed by a Visual Basic course where programming is taught. Starting in the next year, the students are introduced to Aspen. This is the major software package for solving chemical engineering problems. The senior year uses Aspen in both plant design courses. The process simulation course, CHEE 400, is a modeling course that uses MatLab, Polymath, and Excel with Visual Basic programming.

Educational Objective #4. Consider the economic, environmental, safety, and ethical issues in solution of scientific and engineering problems.

This Educational Objective is specifically achieved in the two senior plant design courses. All Chemical Engineering courses, which precede plant design contribute to this effort. The four specific topics of economics, environment, safety, and ethics are covered throughout our major courses. The senior laboratories represent courses where they are heavily emphasized. In the junior year, the curriculum has an ECON 430 Industrial Economics and Finance, as well as a senior ethics course PHIL 316 Professional Ethics. In the plant-design course, practicing chemical engineers make presentations on design of safety systems and methods for incorporating safety in design.

Educational Objective #5. Understand the need for lifelong learning to continue to meet the current needs of local, state, and global industries, and adapt to engineering challenges of the future.

This Educational Objective is not one that comes from a specific course but instead is instilled in the thought process of a student throughout their educational experience via constant illustration of how their field is dynamic and the requirement to "look up" data and information pertaining to new developments. It is clear that developing students who are strongly encouraged and motivated to often search for answers and solve problems on their own is a strength they will carry with them throughout their lives. This is achieved in the program in a variety of ways. For example, in our three CHEE laboratories, the student team is given a unit operation or control system and asked to develop a procedure to achieve the results needed. This process of having to think for themselves is the goal. In a number of courses, for example in the Materials course, they are given a topic to research on the internet and write a report. In Plant Design, cost information for chemicals and process options must be researched in databases and the best option from both economic and technical perspectives found. In Transport Phenomena, the textbook contains lifelong learning problems that are assigned to students and discussed in class.

A.3 Alignment of Courses with Program Outcomes

The program's 12 outcomes are listed in Criteria 3. These are skills that our students are believed to possess at the time of graduation. The only way this can be accomplished is through their college experience in the department. A brief accounting of where these skills are acquired is listed below.

a. An ability to apply knowledge of mathematics, science, and engineering

The engineering courses in our curriculum all use math and science to solve complex engineering problems. The large amount of chemistry that is learned is applied in courses from Material Balance to Plant Design.

b. An ability to design and conduct experiments and to analyze and interpret data

The laboratories in Chemical Engineering, CHEE 403, 404, and 413 allow for the development of this skill.

c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

The two senior plant design courses are specific courses that formally require the design of processes. To get to this point, there are numerous courses in which individual components are also designed such as CHEE 302 or 405, where in these example courses, distillation systems and heat exchanger units are designed, respectively.

d. An ability to function on multi-disciplinary teams

The Chemical Engineering students do have an opportunity to work on teams with students in other departments and among themselves. In Materials of Engineering, CHEE 317, the chemical and mechanical engineering students are teamed up to work on a materials selection problem. In Transport Phenomena, ENGR 305, the chemical and petroleum engineering students are teamed up in groups to work on a transport design project. In addition, in CHEE 210, 400, 403, 404, 407, and 408, CHEE teams are selected to work on projects.

e. An ability to identify, formulate, and solve engineering problems

This outcome is covered in every Chemical Engineering course in the curriculum. All of our courses solve problems and follow a systematic approach.

f. An understanding of professional and ethical responsibility

Professionalism is a behavior pattern in which a person does not react immediately, analyzes the situation, and responds in an appropriately measured manner. The preparation and organization of faculty members to teach the courses, and the interaction of faculty members with other faculty members and students provide a testament of professionalism in the department. This is one way the students are impacted, by example. The code of ethics of Chemical Engineering is prominently posted throughout the department. The code emphasizes professionalism and ethical responsibility and the importance of integrating these in decisions associated with the chemical engineering practice to protect the public. The students take an ethics course, PHIL 316, and are encouraged to become professional engineers by taking the FE Exam while they are still in college.

g. An ability to communicate effectively

The department curriculum has three required English courses and one course in Public Speaking. In addition, the three Chemical Engineering laboratory courses require that laboratory reports be written and two PowerPoint presentations be made. The first hour of CHEE 403 is a Toastmasters course in which the seniors speak in front of their peers each week and give two formal presentations and practice impromptu speaking. In Plant Design, the final design project is a formal report and group presentation in front of faculty, peers and External Advisory Board members.

h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context

The senior plant design courses, CHEE 407 and 408, are the courses where global, economic, environmental, and societal considerations are incorporated into student design experiences. The concept of an effective plant design means that all these factors are discussed and evaluated. This concept of an "effective" design that incorporates all of these considerations is taught to the students during these courses and emphasized throughout the curriculum.

i. A recognition of the need for and an ability to engage in life-long learning

This objective is not specifically covered in any single course but is a philosophy that becomes incorporated in the thought process of our students over the course of their education experience within the department through discussions and assignments designed to illustrate how technically dynamic the field of chemical engineering is and how they will be required to maintain a continual education process throughout their careers. In our junior and senior courses students are assigned projects to work independently or in teams searching solutions to open-ended problems, and write a report. In our laboratories, they must develop their own operational procedure to achieve an objective with minimal direction. Students are encouraged to take the FE examination and to strive for professional registration.

j. A knowledge of contemporary issues

In our first materials course, CHEE 317, and in the Transport Phenomena Course ENGR 305, the faculty assigns projects to individual students to obtain information on a specific topic. This has expanded the students' knowledge of materials and fluids. In the senior class, students are required to attend two graduate seminars in the spring semester to expand their knowledge of the profession. Plant Design opens the students' eyes to options that are available when designing a process.

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

The students in chemical engineering are taught formal computer programming, Visual Basic, in the sophomore year to give them the experience of working with logical-based programming methods. They also used ASPEN process simulation package during various courses. They are

formally introduced to the package in the Material Balance Course and again in the junior year in the Unit Operations and Heat Transfer Courses to ensure that they remain proficient with this simulation software program. In the senior year, the Process Simulation Course introduces MatLab, Polymath, and programming in Excel. All of these tools are integrated in plant design and process design projects during the senior year. Knowledge of these tools is important to the development of a well-prepared engineer. This outcome is directly linked to Educational Objective #3.

l. An ability to utilize computers to solve engineering problems

The department believes that placing an emphasis on the use of computers and technology in Chemical Engineering will better prepare our students for the work place. This outcome is linked to Outcome (k) since the computer is a tool. Our students are becoming very comfortable using various software packages made available to them. Efforts are made by the faculty to integrate computer programs and simulation tools into the learning experience. For example, Dr. Bill Chirdon during the Process Simulation educational components has dramatically increased the use of Excel for use in problem solving. This continual introduction and usage focus on computers has been maintained as a means of ensuring that the program's graduates have strong compute skills that are directly usable for use within the chemical engineering field.

At a recent Southeastern Department Head's Meeting, seven of the CHEE heads commented that they had put programming back in their curriculum after industry representatives said that their students lacked those skills. After a summer job in industry, a number of our seniors told stories of how they had developed programs which were useful for their work. We believe the amount of computer work required is a strong point of the department.

A.4 Flowchart that is Used for Advising

Figure 5.1 shows the flowchart used by faculty advisors and students in designing their schedule for the upcoming semester. The department also has a Biology Emphasis Option (Table 5.2). Students interested in medical school or bioprocessing applications are attracted to the Biology emphasis. It provides students with opportunities to obtain additional laboratory experiences compared to the main Option. In the Biology Emphasis students are required to take BIOL 110 (Principles of Biology I), BIOL 112 (Principles of Biology I Lab), and Organic II as electives. BIOL 111 (Principles of Biology II) and BIOL 113 (Principles of Biology II Lab) are substitutes for ENGR 201 (Electrical Circuits). CHEM 221 (Analytical Chemistry) is substituted for PHYS 215 (Physics Lab I) and CHEM 234 (Organic II Lab). Students also take CHEM 232-Organic II for CHEE 427-Advanced Materials. The department has been successful in advising our students.

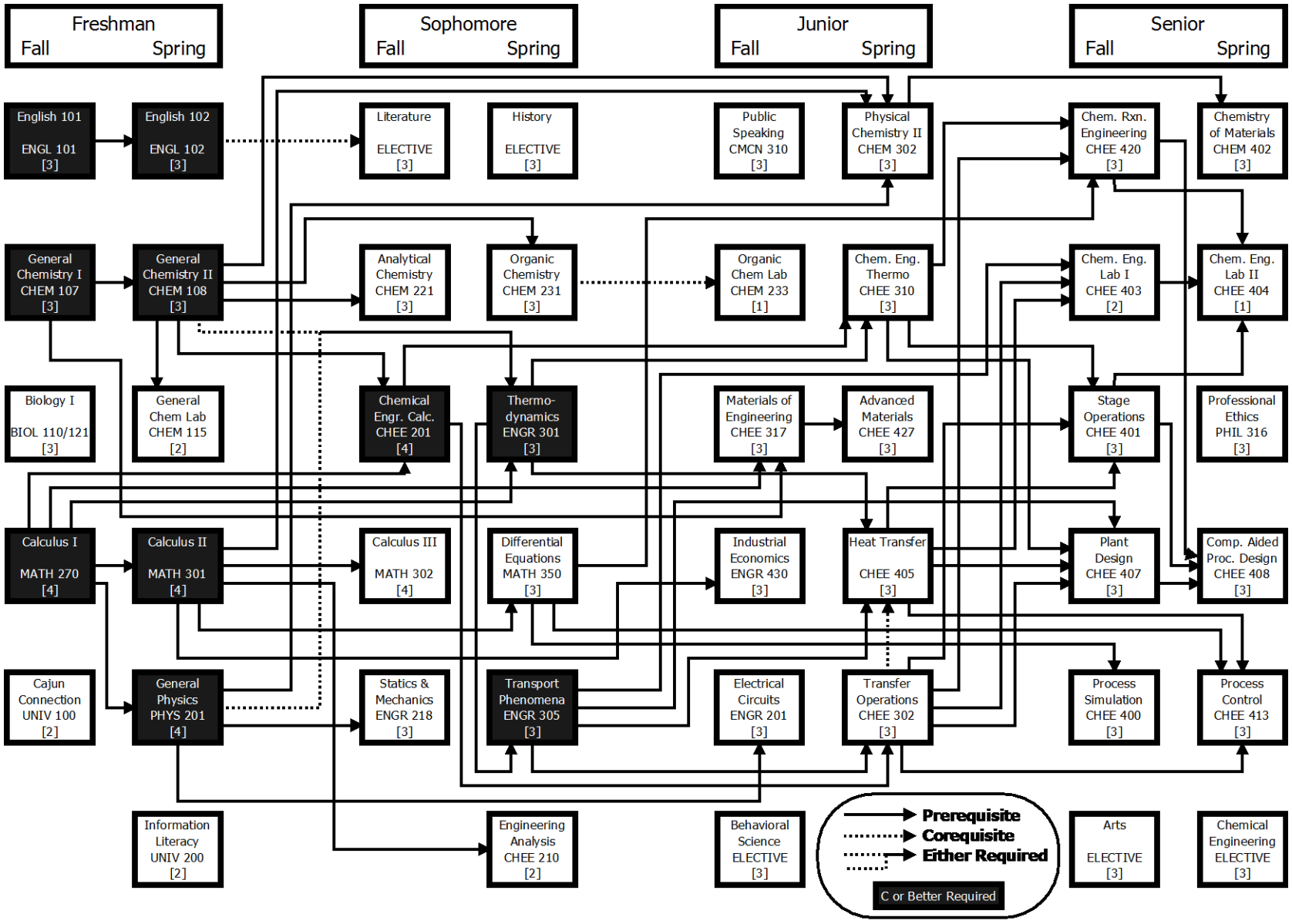


Figure 5.1 Flow Chart for Chemical Engineering Curriculum 2013-2015

A.5 How does program meet the requirements of each subject area specifically addressed by either the general criteria or program criteria?

The curriculum sheets shown in Table 5.1 and Table 5.2 (Biology Emphasis) meet the math and science minimum of 32.7 hours and minimum of 25% of the total hours as required by ABET. 15 hours of math courses are taken in both curriculums. In the basic program 21 hours of chemistry are required which includes two experimental laboratories. This includes an advanced materials chemistry course. The biology emphasis has 23 hours of chemistry which includes three experimental laboratories. It includes a biochemistry course which is appropriate for this option.

The engineering topics of both the main program and biology emphasis program have been shown to meet the minimum of 48 hours and 37.5% of the total hours. The engineering courses are a combination of engineering science and engineering design. Of the 20 engineering courses, the basic curriculum of 57 hours shows that 12 courses are believed to have design content. The biology emphasis program has 18 engineering courses for a total of 51 hours. Of these courses, the same 12 are believed to have design content. The two senior design courses, CHEE 407 and 408, are designed to satisfy the general criteria of a senior design experience. A controls course, CHEE 413, contributes to the program criteria requirement of controlling processes. The two Unit operations Laboratories, CHEE 403 and 404, assists in emphasizing analysis of data and report writing. Safety is incorporated in senior design and in the Unit Operations laboratories. Students must pass the AIChE safety certification to pass Plant Design. Safety films are shown biweekly in the Unit Operations laboratory and discussed. Our laboratory technician, Mr. James Dooley, was a safety engineer in industry before joining the university. He contributes to these discussions.

The general component of both curriculum sheets is identical and contains 31 hours. This number of hours is the minimum amount required to graduate. They match the UL Lafayette required core and the University of Louisiana System core. Recently, the technical writing course was changed to the Public Speaking course, CMCN 310, as a result of our Educational Objectives survey.

A.6 Describe the major design experience that prepares students for engineering practice. How does earlier coursework contribute to this experience?

The major design experience is contained in two senior courses, CHEE 407 and 408. The courses are taught differently with the basics of plant design, including economics, presented in the first semester of the senior year. The design assignments use Aspen which was introduced to students in the junior year. Aspen use expands over the first semester until students become well versed with its capabilities. Everything is being developed to prepare students for the final capstone design project in the spring semester, which is typically a former AIChE Plant Design problem that is assigned to the various groups. It begins in the spring semester and culminates with the senior Plant Design presentations during the last week of the semester. The faculty and advisory board members attend this presentation and ask questions of each group.

Many of the engineering courses that were taken before these Plant Design courses contained design projects that used Aspen and served as an introduction to design. Two specific junior courses are CHEE 302, Transfer Operations, where students work on distillation column design and CHEE 405, Process Heat Transfer, in which student groups design heat exchangers using Aspen. Specific requirements are given and materials specifications are requested. Tables 5.1 and 5.2 list all the courses believed to have design content.

A.7 The program does not allow cooperative education to satisfy curricular requirements

A.8 Describe the materials that will be available for review during the ABET visit.

The material available for the ABET visit will be located in a private setting. These would include at a minimum for each class:

(1) Textbook
(2) Course Syllabus
(3) Sample student homework or laboratory reports
(4) Sample tests from the course
(5) Student final course projects
(6) Survey results from the past two surveys
(7) FE examination results
(8) Student course assessments

This material will give a comprehensive view of each CHEE or ENGR course and provides insight into the outcomes that each course provides.

CRITERION 6: FACULTY

A. Faculty Qualifications

The Chemical Engineering faculty has undergone significant changes with the retirement of various faculty members. Two new faculty members have recently been hired (Fall 2012) and both have PhD degrees in Chemical Engineering. All seven faculty members actively engaged in teaching have PhD degrees and represent a wealth of diverse knowledge on contemporary areas of chemical engineering. Dean Mark Zappi is also a chemical engineering faculty. The faculty represents a strong mix of experience levels with three full professors (Drs. Misra, Bajpai, Hernandez, and Zappi); associate professor (Dr. Chirdon); and assistant professors (Drs. Dufreche, McIntyre, and Ramalingam). Most of this industry and/or design experience enriches the learning experience in the classroom. All are research active, which allows incorporation of innovative, developing concepts into the classroom experience and fortifies the need to the students for lifelong learning. Dean Mark Zappi contributes to curriculum development and is very active with research. Recently, the department hired its first "Professor of Practice", Dr. John Prindle (currently an instructor within the Chemical Engineering Department at Tulane University), who will start in August 2013. Note with the current teaching-active faculty, there is sufficient faculty to teach the Chemical Engineering courses as well as the specialty courses offered within the department via the CHEE electives. Table 6.1 reveals the qualifications of the faculty.

B. Faculty Workload

Table 6.2 shows a workload summary of the faculty members currently in the department as of Spring 2013. With the retirement of two senior faculty members last May 2012, the two new faculty members had to each take on two new courses while other faculty took three courses on a temporary basis. This will change during the Fall 2013 semester with the addition of Dr. Prindle, professor of practice, who will pick up a strong teaching load and allow faculty to return to the targeted norm for the department of one to three courses per semester – depending on the research and service loads of the faculty member. As faculty remain in the department, their teaching versus research loads are assessed each year and an appropriate teaching load assigned based on departmental needs.

C. Faculty Size

The faculty in this department is adequate for the current academic needs of the department. All of the current faculty members participate in student advising and counseling of students. University service is a component of the annual evaluation form and all faculty members are assigned to department, college, or university committees. Professional development usually involves attendance at national or regional meetings in their areas of expertise. Interaction with industrial and professional practitioners is strongly encouraged and greatly facilitated through planned numerous industry visits to the department.

Table 6.1 Faculty Qualifications
Chemical Engineering

Faculty Name	Highest Degree Earned- Field and Year	Rank [1]	Type of Academic Appointment [2] T, TT, NTT	FT or PT [3]	Years of Experience			Professional Registration/ Certification	Level of Activity [4] H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Rakesh Bajpai	PhD 1976 Chemical Engineering	P	T	FT		34	6.5		H	H	
William Chirdon	PhD 2004 Macromolecular Science and Engineering	ASC	T	FT		7	7	EIT, AIChE	M	L	L
Stephen Dufreche	PhD 2003 Chemical Engineering	AST	TT	FT		5	5	EI	M	M	L
James Garber, *Emeritus	PhD Chemical Engineering	O*				37	37	PE			
Rafael Hernandez	PhD 2002 Engineering	P	T	FT	3	13	0	EIT	H	H	M
Carl McIntyre	PhD 2008 Macromolecular Science and Engineering	AST	TT	FT		1	1		L	L	L
Devesh Misra	PhD 1984 Materials Science and Engineering	P	T	FT	16	12	12	C.Eng.	H	H	M
Ramalingam Subramaniam	PhD 2005 Chemical Engineering	AST	TT	FT		8	1	AIChE	M	L	L
Mark Zappi	PhD 1995 Chemical Engineering	P	T	FT				PE			

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other
2. Code: T = Tenured TT = Tenure Track NTT = Non Tenure Track
3. Code: FT = Full-time PT = Part-time Appointment at the institution.
4. The level of activity (high, medium or low) should reflect an average over the year prior to the visit plus the two previous years.

Table 6-2. Faculty Workload Summary

Chemical Engineering

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2]	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
Rakesh Bajpai *Interim Dept. Head (2012-2013)	FT	CHEE 408 (3) Sp2013 CHEE 416 (3) Sp2013 CHEE 514 (1) Sp2013 CHEE 408 (3) Fa2012 CHEE 420 (3) Fa2012	40	40	20*	100
William Chirdon *AIChE Advisor Graduate Coordinator (beginning Summer 2013)	FT	CHEE 317 (3) Su2013 CHEE 405 (3) Sp2013 CHEE 317 (3) Sp2013 CHEE 317 (3) Fa2012 CHEE 400 (3) Fa2012	50	30	20*	100
Stephen Dufreche *LES Advisor Departmental Co-op & Internship Coordinator	FT	CHEE 302 (3) Sp2013 CHEE 404 001 (2) Sp2013 CHEE 404 002 (2) Sp2013 CHEE 401 (3) Fa2012 CHEE 403 001 (2) Fa2012 CHEE 403 002 (2) Fa2012	40	40	20*	100
James Garber, Emeritus		CHEE 402 (3) Sp2013				
Rafael Hernandez *Department Head (beginning Fall 2013)	FT		25	30	45*	100

Carl McIntyre	FT	CHEE 210 (2) Sp2013 ENGR 305 (3) Sp2013 CHEE 101 (1) Fa2012 ENGR 305 (3) Fa2012	50	50		100
Devesh Misra *Graduate Coordinator (until Spring 2013)	FT	CHEE 317 (3) Fa2012 CHEE 527 (3) Fa2012 CHEE 317 (3) Sp2013 CHEE 427 (3) Sp2013	50	45	5*	100
Ramalingam Subramaniam	FT	CHEE 201 (4) Fa2012 CHEE 501 (3) Fa2012 CHEE 310 (3) Sp2013 CHEE 413 (3) Sp2013	50	50		100
Mark Zappi, Dean		No teaching assignment				

1. FT = Full Time Faculty or PT = Part Time Faculty, at the institution
2. For the academic year for which the self-study is being prepared.
3. Program activity distribution should be in percent of effort in the program and should total 100%.
4. Indicate sabbatical leave, etc., under "Other."
5. Out of the total time employed at the institution.

D. Professional Development

Since the department receives a small travel budget from the university, most travel for professional development comes from faculty research grants. Dr. William Chirdon, the AIChE Faculty Advisor, has been supported by the department to go to the ChemE Car Competition at regional and national meetings. New faculty members who currently have no support grants can appeal to the Department Head and/or the Dean of Engineering for travel funding. For example, the Dean of Engineering is covering the costs to send two College of Engineering faculty members, including Dr. Carl McIntyre to attend the 2013 Teaching Academy sponsored by the American Society of Engineering Education. These faculty members will receive training on techniques to better deliver engineering concepts to students.

The Department Head has attended the Southeast Department Head meeting every year for the past 20 years. About 15-20 department heads meet and discuss various problems they face and ABET is always part of their discussion. The chemical engineering department head at UL Lafayette will meet with faculty members to discuss teaching, research, and service goals for the year, and provide faculty with clear expectations from the perspective of the department and College of Engineering. The idea is to facilitate the success of the faculty members, and consequently training of students. Finding opportunities for professional society awards and recognition for the faculty, elevation to highest grades of membership in societies, and engagement in highly visible national professional activities are some of the additional avenues for professional development that are being explored.

E. Authority and Responsibility

The faculty participates in guiding the program through regular department meetings and participation in the Advisory Board meetings. It is in these meetings that each faculty member can make suggestions to the Department Head or to the Advisory Board about improvements in the program. The various surveys completed on faculty such as, (1) Student Exit Surveys, and (2) Student Evaluation of Instruction, are reviewed by the Department Head and Advisory Board. The one-hour meeting of the Advisory Board with students has also been a great source of information about the quality of the program. All of these provide insight as to changes that should be made to improve the program.

Perhaps the course survey of outcomes is the best way that faculty can see if they are achieving their projected outcomes shown in Table 4.4. They can guide the program by comparing the student survey results with their outcomes expectations. The surveys of all faculty members are seen and they are challenged to cover as many outcomes in each of their courses as possible. This is assessed by looking vertically in Table 4.4 where a summary of all the outcomes is shown for each course.

CRITERION 7: FACILITIES

This section provides information which describes classroom, laboratory facilities, equipment, and infrastructure and how these are able to help the department accomplish its Program Outcomes. Information is included on how the facilities provide opportunities for the students to use modern engineering tools.

Madison Hall on the UL Lafayette campus is the facility, which provides space for the departments of Chemical, Civil, Electrical, and Petroleum Engineering. The space for Chemical Engineering includes classrooms, undergraduate laboratories, and research laboratories for each faculty member.

A.1 Faculty Space

All eight full time faculty members (inclusive of Dr. Prindle) plus two emeritus faculty in the Chemical Engineering Department as well as the two staff members, an administrative assistant and a technician, have offices located on the second floor, west wing of Madison Hall. The main office area is in Room 217 with some faculty also located in Rooms 216 and 218. Each office has a minimum of one computer with internet access. All faculty and staff have access to departmental copiers, scanners, fax machines, and printers. The department has a shared network drive to provide access to all faculty members to important policies and documents. The offices are in close proximity so that students can be in immediate contact with faculty that are teaching them. It is not unusual to find students and faculty members in the hallway discussing issues of the day. One non-teaching faculty member is the Dean of Engineering, Dr. Mark Zappi, with his own office space on the first floor, Room 106, of Madison Hall.

In addition to office space, each faculty member has an assigned research space and offices for graduate students. The rooms are equipped with desks for students as well as computer terminals. The faculty and room locations are listed below.

Faculty	Room	Area of Research
Dr. R. Bajpai	Madison 156, 204, 208	Bioprocessing/Process Optimization
Dr. W. Chirdon	Madison 112, 212A	Composite Modeling
Dr. S. Dufreche	Madison 156, 204, 207	Catalytic Processing
Dr. R. Hernandez	Madison 217D	Bioprocessing/Environmental/ Catalysis
Dr. C. McIntyre	Madison 212	Rheology Studies
Dr. D. Misra	Madison 203, 212B/C Rougeou 317 (Polymer Lab)	Materials Research
Dr. R. Subramaniam	Madison 204, 208	Bioprocessing/Process Modeling
Dr. M. Zappi	Madison 106	Bioprocessing

Some faculty members share space due to their mutual interests.

A.2 Classroom Space

The rooms in Madison Hall that are used for undergraduate student activities are listed in Table 7.1. The rooms listed include three classrooms, two computer rooms, a conference room, a student study room, three laboratory rooms, a tool room and the AIChE room. Each room has one or more computer terminal drops with computer network capabilities. There is an Engineering Auditorium, located in Madison Hall room 101, which is available for larger classes and a special smart classroom in Madison Hall room 105 for technical presentations.

The computer design laboratory has been enhanced to provide our students maximum exposure to our design packages, Aspen Plus and ICARUS. In addition to the Design software, these Pentium computers in rooms 205 and 214 provide the students access to Microsoft Office and printers. Madison Hall has wireless access for laptop use. A plotter for process flow charts is located in Room 205. These facilities allow students an opportunity to develop professional reports.

Table 7.1

Chemical Engineering Rooms Available to Students

Student Rooms (1) Second Floor	**Description**	**Capacity**
MDSN 216	Department Conference Room and Student Study Room	15
MDSN 214	Computer Design Laboratory	13
MDSN 206	Classroom	32
MDSN 202	Classroom	28
MDSN 201	Classroom	56
MDSN 205	Computer Room	18
MDSN 209	AIChE Student Room	20
(2) First Floor		
MDSN 110	Unit Operations Laboratory	
MDSN 112	Unit Operations Laboratory	
MDSN 114	Departmental Tool Room	
MDSN 210	Controls Laboratory and Unit Operations	

A.3 Laboratory Facilities

There are four laboratories listed in Table 7.1 that are used primarily for undergraduates. These laboratories are maintained and new equipment is purchased primarily using STEP Grants that are available through the University (see Appendix D for more information). Some research dollars have been used to help in equipment acquisitions. A designated faculty member has the responsibility for each of these laboratories. This faculty member keeps the department head aware of equipment needs and of any problems that may arise. There is a tool room available and a full time technician whose primary responsibility is to assist in equipment maintenance, general safety and inventory.

A.3.1 Unit Operations Laboratory (CHEE 403 and 404)

The major equipment in the department is located in room 110, which has a physical area of 2,076 ft^2. There is additional equipment on the second floor of Room 210 with 680 ft^2.

There are approximately 20 unit operations in Room 110, which can be used by the students. It has a 30-60 psi boiler along with running water, compressed air and vacuum capabilities. The Reynolds Number apparatus, portable fuel cell with load test unit, a refrigeration unit and an Armfield ion exchange unit are some examples of available equipment

A.3.2 Controls and Simulation Laboratory (CHEE 413)

This laboratory includes some interaction with the Unit Operations laboratory. In Room 210 there is a newly acquired DeltaV control system connected to a single-effect evaporator. There are also four table top control units in room 210, which are used to illustrate controls in a real time application.

The laboratory has been enhanced by acquiring nine dynamic simulator packages from Simtronics Corporation for distillation and boiler modules and a series of tapes on process control.

A.3.3 Analytical and Chemical Storage (CHEE 403 and 404)

Room 112, has two Bakelite benches for mixing chemicals and a hood available for this operation. It has cabinets for chemical storage, an oven used for drying filtered samples, and a refrigerator for storing experimental samples.

A.3.4 Process Design Laboratory (CHEE 407 and 408)

This laboratory has been the focus of improvement over the past several years. The department has steadily updated the computers and design software. Presently there are 31 Pentium IV computers in Madison 205 and 214 which are capable of running the following software: our Plant Design software, Aspen, the controls software, as well as Microsoft Office. The instructor of these courses has a computer for classroom instruction and a server to network the computers in the Process Design laboratory. A computer projection system was obtained to assist in the

lecturing of Plant Design. All computers in the laboratory are on the departmental network. The area available in room 214 is 320 ft^2 and accommodates 13 students while Madison 205 is 400 ft^2 and will handle 18 students.

B. Computing Resources

The computer usage by students in the department has continued to increase each year with the addition of new faculty members. The number of available computers in the department is 31 Pentium V in two different rooms, Madison 205 and 214. During the last two years all of the computers were replaced using STEP Grants written by the department head and laboratory technician. The total award from the university was $33,200. The best part about this grant is that these computers are automatically replaced "free of charge" by the University STEP Grant program every four years.

The software used in the various courses has been provided by Microsoft Alliance. The Dean of Engineering provides funding each year for the purchase of the Aspen software that is used in our senior design course. The Aspen software can be installed on the students' personal computers by our technician, Mr. Dooley. The Aspen package has a key which is checked by our department mainframe before the program will run. The Visual Basic program used in CHEE 210 is another software package which is given to the students to load on their personal computers.

Since the computer rooms in Madison each have a key lock, students have 24 hour 7 day access to the computers and software. Therefore, although there are computers in the library, they are not often used by our students. There have never been any complaints about our computers. Madison Hall has WIFI connectivity so that students can access the internet in the classroom and in laboratories.

C. Guidance

The freshmen students have been taking CHEE 101 (now changed to UNIV 100 First-Year Seminar and UNIV 200 Visual Literacy), "Introduction to Chemical Engineering" where they participated in five laboratory experiments and wrote a group laboratory report using Microsoft Office. In one afternoon session, each of the five experiments were described and students were taken into the Unit Operations lab and shown the equipment and explained the safety aspects. They came to the laboratory the next week with their data sheet and operational plan. All five groups were performing experiments at the same time. The laboratory report was done using Microsoft Office and they were given instructions on how to create tables and graphs for their report in Excel. Each student wore safety glasses and a hard hat.

The 2013-2015 UL Lafayette Catalog requires that all freshmen take UNIV 100, First-Year Seminar: Cajun Connection. This course is designed to familiarize new students with the college experience and offer knowledge and skills that improve academic success and facilitate lifelong achievement. It is restricted to freshmen with only 24 or fewer hours.

As they moved to the three senior laboratories the experiments were more complex and so was the preparation. In the Unit Operations Laboratory, there is a planning session the week before the experiment is conducted. During that time there is a safety film shown and discussed. The students then go to the laboratory to plan how to run the experiment and then discuss the proposal with the faculty member who may question or approve their plan. The plan is eventually signed, dated, and included in the report that was submitted two weeks after the experiment.

The departmental technician, Mr. Dooley, spends time talking to each group while they are running the experiment about the limitations of the equipment, parameters to be measured, and necessary instrumentation. The faculty member will question the safety of the experiment and how many runs must be made for statistical analysis to be performed.

In the computer room, if a faculty member is introducing a new software package, he/she will demonstrate it to the students before making assignments.

D. Maintenance and Upgrade of Facilities

Since the time of the last ABET visit in 2007, there have been reductions in funding to to higher education from the State of Louisiana which has minimized funds available for capital outlay. The department and college have developed strategies to enhance the existing equipment and to purchase new equipment. The best example is that a total of four STEP Grants were obtained from the university. The source of these grants is from student fees. They are competitive grants written by faculty. These grants were used to upgrade our computers and add two new Unit Operations to our laboratory. Table 7.2 shows the equipment and software that was brought into the department between 2007 and fall 2012. The department has received four out of four submitted STEP Grants. A summary of the total expenditures from 2007 to fall 2012 was $190,305 or $31,717/yr. over six years as seen in Table 7.3. This exceeds by $5,500 the annual equipment expenditures between 2002 and 2007.

In the area of maintenance, the department has a full time technician, Mr. Dooley. He has a BS in Electrical Engineering and many years of industrial experience. His duties include maintaining the computers and laboratory equipment. He has a budget of $7,578 of supply funds allocated each year by the department. He has accounts set up at several businesses in town where he can walk in and charge items. He has a LaCarte charge card that allows him freedom to go to other stores or online to get specific items to repair equipment or purchase supplies to run the laboratories.

There are two UL Lafayette Foundation accounts that contain over $12,000 of unendowed funds to handle emergency purchases as needed. These are the Chemical Engineering Department account and the Garber Family account.

E. Library Services

The University library has been proven to be very adequate for the needs of our students. The seating capacity is 2,700. There is open access to 60 microcomputers including CD-ROM

readers, scanners, and printers. Every student is given an account credit of $25.00 per semester from their University fees. At a cost of 10 cents per page, this gives each user the ability to print 250 pages. If they need to print more than 250 pages a semester, they can add money to their account. The facility is open to engineering students during the 93.5 hours per week that it is open. The library's online catalog can be accessed 24 hours, 6 days a week by all faculty from their offices through a campus-wide fiber optics network or from off-campus. The library provides students and faculty: ASTM Standards online, Math SCI Net, Applied Science and Technology Index, Web of Science (including Sciences Citation Index), and Journal Citation Reports. Reference librarians can conduct searches of various online databases available through vendors such as Chemical Abstracts.

The inter-library loan service supports the research and educational needs of the Lafayette community (students, faculty, and community. The actual length of time depends upon the location of the lending library and delivery method.

Table 7.2

Undergraduate Equipment and Software
Since Last ABET Visit

Date	Equipment/Software	Cost	Funding Source	Faculty
Fall 2009	Fermentation System	4,000	University STEP Grant	Dr. Stephen Dufreche
Fall 2010	Upgrade Computer Lab* 13 Pentium V	$13,200	University STEP Grant	Dr. James Garber Mr. Jim Dooley
Fall 2011	Upgrade Computer Lab* Step II – 15 Pentium V	20,000	University STEP Grant	Dr. James Garber Mr. Jim Dooley
Fall 2011	Boiler Offgas Analyzer	1,200	Chevron	Mr. Jim Dooley
Fall 2012	Solid-Liquid Extractor	64,000	University STEP Grant	Dr. Stephen Dufreche
Every Fall	ASPEN Software	2,000/yr.	College of Engineering	Dean Mark Zappi
*The STEP Grant allows for a 4-year replacement of all computers without resubmission of a new grant.				

Table 7.3

Total Equipment Expenditures
2007 – Fall 2012

Year	Expenditure
2007-2008	$74,305
2008-2009	3,900
2009-2010	6,400
2010-2011	17,700
2011-2012	22,000
Fall 2012	66,000
6 Years Total	**$190,305**
Average	**$31,717/yr.**

F. Overall Comments on Facilities

Comments about our facilities obtained from student exit interviews, in Appendix E, are listed below. They give a picture of how the students feel about the laboratories.

1) Spring 2012
   - Students liked the labs (5)
   - Air condition computer lab after hours (3)
   - Upgrade unit operations equipment (3)
   - Worried about pending lab fees (2)

2) Spring 2011
   - Good software packages (2)
   - Enjoyed the labs (2)
   - Controls lab is good, but ahead of lecture (2)
   - Computer laboratory is hot after 5:00 p.m. (3)

3) Spring 2010
   - Liked laboratory course (5)
   - Liked Controls Lab (4)
   - Liked safety videos (2)
   - Would like a materials lab (2)

4) Spring 2009
   - CHEE lab helps me to learn (4)
   - Controls lab was good (2)
   - PowerPoint in lab is good (1)

5) Spring 2008
   - Controls lab brings reality (8)
   - Computer running better this year (2)
   - CHEE labs are good courses (2)

6) Spring 2007
   - Mr. Dooley is awesome on Controls Lab (4)
   - DCS control system was fun to run (3)
   - Liked Unit Operations laboratory (3)

- The number in parenthesis indicates the number of students who made these comments.

The overall view of our senior students exiting the program is that they like the CHEE laboratories and they find them helpful in understanding theory. There were a lot of positive comments about the Controls Laboratory which is being greatly improved. There was only one comment over the six year-period which suggested that the lab needs to be upgraded. Others seem to be very content with the laboratory.

Appendix – Table of Contents

APPENDIX A

Course Syllabi

MATHEMATICS AND

BASIC SCIENCE COURSES

Course Syllabus BIOL Elective (SP 2013)

1. *Course number and name* **BIOL Elective**
   Students may select any course from the approved list below:
   BIOL 110, 111, 121, 122, 300, 303, 304
   (recommended: BIOL 121 300, 303, 304)
2. *Credits and contact hours* 3 Credits, 3 Contact Hours

3. *Instructor's or course coordinator's name*
   Varies depending on elective selected

4. *Text book, title, author, and year*
   Varies depending on elective selected

   a. *other supplemental materials*
   Varies depending on elective selected

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
   BIOL Elective – fulfills the General Education requirement for a BIOL elective.
   b. *prerequisites or co-requisites*
   There are no pre-requisites
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
   Selected elective
6. *Specific goals for the course*
   a. *specific outcomes of instruction*
   Varies depending on elective selected

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a - 1	h - 1
b -	i -
c -	j -
d -	k -
e -	
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Brief list of topics to be covered*
   Varies depending on elective selected

Course Syllabus CHEM 107 SPRING 2013

1. *Course number and name* **CHEM 107 GENERAL CHEMISTRY I**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Jennifer M. De Guzman, PhD

4. *Text book, title, author, and year*

   General Chemistry: The Essential Concepts
   Chang, Raymond and Overby, Jason
   6th edition

   a. *other supplemental materials*
      Calculator

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Principles and problems of chemistry
   b. *prerequisites or co-requisites*
      MATH 100 or MATH 105
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*

   Students should demonstrate their expertise of the following by the end of semester:

   1. Nomenclature
   2. Basic thermodynamics
   3. Knowledge of the periodic table
   4. Basic concepts of structure and bonding

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a - (1)	h - (2)
b - (3)	i - (1)
c -	j - (2)
d - (1)	k - (3)
e - (3)	l - (3)
f - (3)	
g - (1)	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Nomenclature
2. Properties of the elements
3. Properties of chemical compounds
4. Structure and bonding
5. Basic concepts of thermodynamics
6. Role of chemistry in daily life

Course Syllabus CHEM 108 SPRING 2013

1. *Course number and name* **CHEM 108 GENERAL CHEMISTRY II**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Daniel Wellman, MS

4. *Text book, title, author, and year*

   General Chemistry: The Essential Concepts
   Chang, Raymond and Overby, Jason
   6th edition

   a. *other supplemental materials*
      Calculator

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Continuation of principles and problems of chemistry

   b. *prerequisites or co-requisites*
      CHEM 105 or 107, MATH 105 or 140

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*

   Students should demonstrate their expertise of the following by the end of semester:

   1. Problem solving in chemistry
   2. Basic kinetics, thermodynamics
   3. Acid-base reactions
   4. Equilibria
   5. Electrochemistry
   6. Nuclear chemistry

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (3)
c - (2)
d - (1)
e - (2)
f - (2)
g - (2)
h - (1)
i - (1)
j - (2)
k - (3)
l - (3)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Thermodynamics
2. Kinetics
3. Electrochemistry
4. Redox reactions
5. Nuclear chemistry
6. Acid-base chemistry

Course Syllabus CHEM 115 SPRING 2013

1. *Course number and name* **CHEM 115 GENERAL CHEMISTRY LAB**

2. *Credits and contact hours* 2 credits, 6 contact hours per week (labs)

3. *Instructor's or course coordinator's name*

   Jennifer M. De Guzman, PhD

4. *Text book, title, author, and year*

   Laboratory Manual for General Chemistry, Chemistry 115
   Created collaboratively by UL Chemistry Department, available at
   UL bookstore

   a. *other supplemental materials*
      Calculator

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Entry level general chemistry laboratory

   b. *prerequisites or co-requisites*
      CHEM 106 or 108

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*
   Students should demonstrate their expertise of the following by the end of semester:

   1. Understanding of measurements
   2. Basic concepts of structure and bonding
   3. Colligative properties
   4. Spectrophotometry
   5. Calorimetry
   6. Titration
   7. Chromatography

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (1)
c - (2)
d - (2)
e - (2)
f - (1)
g - (1)
h - (3)
i - (2)
j - (3)
k - (1)
l - (1)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Scientific measurements
2. Molar mass
3. Melting point depression
4. UV-Vis Spectrophotometry
5. Thermochemistry
6. Titration
7. Paper chromatography

Course Syllabus CHEM 221 FALL 2012

1. *Course number and name* **CHEM 221 ANALYTICAL CHEMISTRY**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Febee Louka, PhD

4. *Text book, title, author, and year*

   Quantitative Chemical Analysis
   Daniel C. Harris
   Eighth Edition, W. H., Freeman and Company, New York, NY, 2010

   a. *other supplemental materials*
      Calculator

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Instrumental analysis

   b. *prerequisites or co-requisites*
      CHEM 106 or 108

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*

   Students should demonstrate their expertise of the following by the end of semester:

   1. Principles of common instrumental analysis methods
   2. Separation methods
   3. GC
   4. HPLC
   5. Electrochemistry
   6. Data reporting

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (1)
c - (2)
d - (3)
e - (1)
f - (3)
g - (1)
h - (2)
i - (2)
j - (2)
k - (1)
l - (1)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Statistics
2. Equilibria
3. Electrochemistry
4. Spectrophotometry
5. Analytical separations

Course Syllabus CHEM 231 Fall 2012

1. *Course number and name* **CHEM 231 ORGANIC CHEMISTRY I**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Thomas Junk, PhD

4. *Text book, title, author, and year*

   Organic Chemistry
   T.W. Graham Solomons & Craig B. Fryhle,
   10th Ed John Wiley & Sons, Inc

   a. *other supplemental materials*
      Turningpoint clickers (ISBN 978-1-934931-39-4)

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Structure, nomenclature, preparation, reactions, stereochemistry

   b. *prerequisites or co-requisites*
      CHEM 106 or 108

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*
   Students should demonstrate their expertise of the following by the end of semester:

   1. Theory of structure and bonding
   2. Representation of organic reaction mechanisms
   3. Understanding of synthetic strategies
   4. Knowledge of chemical properties of important functional groups
   5. Analytical techniques
   6. Chemical nomenclature

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (2)	h - (2)
b - (1)	i - (2)
c	j - (2)
d - (1)	k - (1)
e - (3)	l - (2)
f - (3)	
g - (1)	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

Chapters 1-10 in the text book, including:

1. Structure
2. Nomenclature
3. Organic synthesis
4. Functional group interconversion
5. Instrumental analysis
6. Reaction mechanisms
7. Synthetic strategies

Course Syllabus CHEM 232 SPRING 2013

1. *Course number and name* **CHEM 231 ORGANIC CHEMISTRY II**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Thomas Junk, PhD

4. *Text book, title, author, and year*

   Organic Chemistry
   T.W. Graham Solomons & Craig B. Fryhle,
   10th Ed John Wiley & Sons, Inc

   a. *other supplemental materials*
      Turningpoint clickers (ISBN 978-1-934931-39-4)

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Continuation of structure, nomenclature, preparation, reactions, stereochemistry

   b. *prerequisites or co-requisites*
      CHEM 231

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*
   Students should demonstrate their expertise of the following by the end of semester:

   1. Functional group interconversion
   2. Knowledge of organic reaction mechanisms
   3. Development of synthetic strategies
   4. Knowledge of analytical methods
   5. Problem solving skills in organic synthesis
   6. Advanced chemical nomenclature

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (2)
b - (1)
c - (3)
d - (1)
e - (3)
f - (3)
g - (1)
h - (2)
i - (1)
j - (1)
k - (1)
l - (2)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

Chapters 11-23 in the text book, including:

1. Spectroscopy
2. Radical reactions
3. Polar reactions
4. Functional group interconversion
5. Multistep synthesis
6. Retrosynthetic analysis
7. Synthetic strategies

Course Syllabus CHEM 233 FALL 2012

1. *Course number and name* **CHEM 233 ORGANIC CHEMISTRY LAB 1**

2. *Credits and contact hours* 1 credits, 3 contact hours per week (labs)

3. *Instructor's or course coordinator's name*

   Thomas Junk, PhD

4. *Text book, title, author, and year*

   Experiments in Organic Chemistry
   R.K. Hill & J. Barbaro,
   3rd edition, Contemporary Publishing Co.

   a. *other supplemental materials*
      Safety glasses, carbon copy lab notebooks

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Completion of 10 experiments in organic chemistry, illustrating the principles covered in organic chemistry I lectures

   b. *prerequisites or co-requisites*
      CHEM 106 or 108, CHEM 115, CHEM 231 or 240.

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*
   Students should demonstrate their expertise of the following by the end of semester:

   1. Basic laboratory techniques
   2. Laboratory safety
   3. Entry level organic synthesis
   4. IR spectroscopy
   5. Understanding of applied synthetic methods
   6. Product characterization

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (1)
c - (2)
d - (2)
e - (2)
f - (1)
g - (1)
h - (2)
i - (2)
j - (3)
k - (1)
l - (2)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Physical properties
2. Purification methods
3. Product analysis
4. Functional group interconversion
5. Experiment design
6. Proper scientific reporting techniques

Course Syllabus CHEM 234 SPRING 2013

1. *Course number and name* **CHEM 234 ORGANIC CHEMISTRY LAB II**

2. *Credits and contact hours* 2 credits, 4 contact hours per week (labs)

3. *Instructor's or course coordinator's name*

   Thomas Junk, PhD

4. *Text book, title, author, and year*

   Experiments in Organic Chemistry
   R.K. Hill & J. Barbaro,
   3rd edition, Contemporary Publishing Co.

   a. *other supplemental materials*
      Safety glasses, carbon copy lab notebooks

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Completion of 10 experiments in organic chemistry, illustrating the principles covered in organic chemistry II lectures

   b. *prerequisites or co-requisites*
      CHEM 233

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*

   Students should demonstrate their expertise of the following by the end of semester:

   1. Ability to work in chemistry lab with minimal supervision
   2. Safety awareness
   3. Proficiency in routine organic synthesis
   4. Knowledge of common analytical techniques

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)	h - (2)
b - (1)	i - (2)
c - (2)	j - (3)
d - (2)	k - (1)
e - (2)	l - (2)
f - (1)	
g - (1)	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Product characterization with chemical tests
2. Product characterization with spectroscopy
3. Multistep synthesis
4. Product purification
5. Experiment design and implementation
6. Proper scientific reporting techniques

Course Syllabus CHEM 302 SPRING 2013

1. *Course number and name* **CHEM 302 PHYSICAL CHEMISTRY II**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Kathleen Knierim, PhD

4. *Text book, title, author, and year*

   Physical Chemistry
   Ira N. Levine
   Sixth Edition

   a. *other supplemental materials*
      Calculator

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Law and theories relating to energy changes, structure and physical changes of matter

   b. *prerequisites or co-requisites*
      CHEM 108, PHYS 201, MATH 301

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*

Students should demonstrate their expertise of the following by the end of semester:

1. Thermodynamics
2. Kinetics
3. Chemical transformations
4. Electrochemistry
5. Problem solving in physical chemistry

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)	h - (2)
b - (1)	i - (2)
c - (2)	j - (3)
d -	k - (2)
e - (1)	l - (1)
f - (3)	
g - (2)	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Study of multicomponent phase equilibria
2. Chemical equilibrium in non-ideal solutions
3. Thermodynamics of electrochemical cells.
4. Kinetic theory
5. Transport properties
6. General chemical kinetics

Course Syllabus CHEM 317 FALL 2012

1. *Course number and name* **CHEM 317 BIOCHEMISTRY I**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Wu Xu, PhD

4. *Text book, title, author, and year*

   Biochemistry
   Jeremy M Berg, John L Tymoczko and Lubert Stryer
   Seventh Edition 2011. Published by W. H. FREEMAN & COMPANY

   a. *other supplemental materials*
      None

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Chemistry of carbohydrates, lipids, proteins, enzymes

   b. *prerequisites or co-requisites*
      CHEM 232

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*

Students should demonstrate their expertise of the following by the end of semester:

1. Protein chemistry
2. Lipid chemistry
3. Carbohydrate chemistry
4. Role of enzymes
5. Basic knowledge of metabolic pathways

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (2)
b - (2)
c - (2)
d - (2)
e - (2)
f - (3)
g - (1)
h - (1)
i - (1)
j - (2)
k - (1)
l - (2)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Proteins and proteomes
2. DNA, RNA, genetics
3. Genes
4. Bioinformatics
5. Enzymes
6. Carbohydrates
7. Lipids
8. Membrane channels
9. Signal Transduction

Course Syllabus CHEM 402 SPRING 2013

1. *Course number and name* **CHEM 402 CHEMISTRY OF MATERIALS**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Richard S. Perkins, PhD

4. *Text book, title, author, and year*

   Understanding Solids: The Science of Materials
   Richard Tilley
   Second Edition 2011. Publisher: Wiley, John & Sons, Incorporated

   a. *other supplemental materials*
      Calculator

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Properties of solids based on their fundamental structure

   b. *prerequisites or co-requisites*
      CHEM 302

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      ELECTIVE

6. *Specific goals for the course*

   a. *specific outcomes of instruction*

   Students should demonstrate their expertise of the following by the end of semester:

   1. Chemical Bonding.
   2. States of Aggregation.
   3. Phase Diagrams.
   4. Crystallography and Crystal Structures
   5. Diffusion.
   6. Reactions and Transformations.
   7. Physical properties of solids

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)	h - (2)
b - (1)	i - (1)
c - (1)	j - (2)
d - (2)	k - (1)
e - (2)	l - (2)
f - (3)	
g - (1)	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Structures and Microstructures
2. Classes of Materials
3. Reactions and Transformations
4. Physical Properties
5. Mechanical Properties of Solids.

Course Syllabus MATH 270 Spring 2013

1. *Course number and name* **MATH 270 Calculus I**

2. *Credits and contact hours* 4 Credits, 4 Contact Hours

3. *Instructor's or course coordinator's name*

4. *Text book, title, author, and year*
   Calculus, 5th edition, Hughes-Hallett, McKallum, and Gleason, Wiley, 2009

a. *other supplemental materials*
   Graphing calculator

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Definitions, properties, and applications of derivatives and integrals

   b. *prerequisites or co-requisites*
      Math 140 or Math 143 with a grade of "C" or better, (b) transfer credit in equivalent courses from another university, or (c) a high score on one of the departmental
   . placement exams.

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Required

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      to learn the most important topics of calculus (limits, derivatives, integrals, etc.), but with emphasis on the graphical
      and numerical representation of functions and other relations as well as the traditional use of symbolic formulas.

b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a -	h -
b -	i -
c -	j -
d -	k -
e -	l -
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Functions and Change
2. Exponential Functions
3. New Functions from Old
4. Logarithmic Functions
5. Trigonometric Functions
6. Powers, Polynomials, and Rational Functions
7. Introduction To Continuity
8. Limits
9. How Do We Measure Speed?
10. The Derivative At A Point
11. The Derivative Function
12. The Derivative Function
13. Interpretations of the Derivative
14. The Second Derivative
15. Differentiability
16. Powers and Polynomials
17. The Exponential Function
18. The Product and Quotient Rules
19. The Chain Rule
20. The Trigonometric Functions
21. The Chain Rule and Inverse Functions
22. Implicit Functions

Course Syllabus **MATH 301**

1. *Course number and name* MATH 301 Calculus Ц

2. *Credits and contact hours* 3 Credits, 3Contact Hours

3. *Instructor's or course coordinator's name*

4. *Text book, title, author, and year*

   Calculus: Single Variable, 5th edition, Hughes-Hallett, Gleason, McCallum, et. al., Wiley, 2009.

   a. *other supplemental materials*
      Graphing calculator

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Integration, applications and modeling, infinite series.
   b. *prerequisites or co-requisites*
      MATH 270 with grade of C or better.
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Required
6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      to learn the most important topics of calculus (limits, derivatives, integrals, etc.), but with emphasis on the graphical
      and numerical representation of functions and other relations as well as the traditional use of symbolic formulas.

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a	-	h	-
b	-	i	-
c	-	j	-
d	-	k	-
e	-	l	-
f	-		
g	-		

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Brief list of topics to be covered*
    1. Antiderivatives Graphically and Numerically
    2. Constructing Antiderivatives Analytically
    3. Differential Equations
    4. Second Fundamental Theorem of Calculus
    5. The Equations of Motion
    6. Integration by Substitution
    7. Integration by Parts
    8. Tables of Integrals
    9. Algebraic Identities and Trig. Substitutions
    10. Approximating Definite Integrals
    11. Simpson's Rule
    12. Improper Integrals
    13. Comparison of Improper Integrals
    14. Areas and Volumes
    15. Applications to Geometry
    16. Area and Arc Length in Polar Coordinates
    17. Density and Center of Mass

Course Syllabus **MATH 302**

1. *Course number and name* MATH 302 CALCULUS III

2. *Credits and contact hours* 3 Credits, 3 Contact Hours

3. *Instructor's or course coordinator's name*

4. *Text book, title, author, and year*
   Multivariable Calculus, 5th edition, McKallum, Hughes-Hallett, and Gleason, Wiley, 2009

   a. *other supplemental materials*
      Graphing calculator

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Partial derivatives, multiple integrals, vector fields in the plane and in space.
   b. *prerequisites or co-requisites*
      Math 301 with a grade of C or better, or transfer credit in an equivalent course from another university.
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Required
6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      To apply the most important topics of calculus (limits, derivatives, integrals, etc.), but with emphasis on the graphical and numerical representation of functions and other relations as well as the traditional use of symbolic formulas.

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a	-	h	-
b	-	i	-
c	-	j	-
d	-	k	-
e	-	l	-
f	-		
g	-		

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Brief list of topics to be covered*
    1. Functions of Two Variables
    2. Graphs of Functions of Two Variables
    3. Contour Diagrams
    4. Linear Functions
    5. Functions of Three Variables
    6. Limits and Continuity
    7. Displacement Vectors
    8. Vectors in General
    9. The Dot Product
    10. The Cross Product
    11. The Partial Derivative
    12. Computing Partial Derivatives Algebraically
    13. Local Linearity and The Differential
    14. Gradients and Directional Derivatives in the Plane
    15. Gradients and Directional Derivatives in Space
    16. The Chain Rule
    17. Second-Order Partial Derivatives
    18. Local Extrema

Course Syllabus **MATH 350 Spring 2013**

1. *Course number and name* MATH 350 Differential Equations

2. *Credits and contact hours* 3 Credits, 3 Contact Hours

3. *Instructor's or course coordinator's name*
   Dr. Ross Chiquet

4. *Text book, title, author, and year*
   Elementary Differential Equations , by Boyce and DiPrima, 9th edition
   a. *other supplemental materials*
      1. Graphing calculator (TI-84 or below), 6 blue books
      2. http://edugen.wileyplus.com/edugen/class/cls315713

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      First and second order equations, higher order equations, series solutions of second order equations, the Laplace transform, first order systems.
   b. *prerequisites or co-requisites*
      MATH 301 with grade of C or better.
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Required

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      To perform applications of First and second order equations, higher order equations, series solutions of second order equations, the Laplace transform, first order systems.

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a -	h -
b -	i -
c -	j -
d -	k -
e -	l -
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. First Order Differential Equations
2. Second Order Differential Equations
3. Higher Order Linear Equations
4. Series Solutions of Second Order Linear Equations
5. The Laplace Transform

Course Syllabus **PHYS 201** **Spring 2013**

1. *Course number and name* PHYS 201 General Physics I

2. *Credits and contact hours* 4 Credits, 4 Contact Hour

3. *Instructor's or course coordinator's name*

Dr. Andy Hollerman

4. *Text book, title, author, and year*

Halliday, Resnick, and Walker (HRW), *Fundamentals of Physics, 8th Edition, Special Volume 1 Edition for the Department of Physics, University of Louisiana at Lafayette*, Wiley and Sons, 2008.

   a. *other supplemental materials*
      WebAssign

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Classical and relativistic mechanics, heat, mechanical waves.
   b. *prerequisites or co-requisites*
      Prereq: MATH 270 or 272 with grade of "C" or better. Coreq: MATH 301.

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Required
6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      Students will understand and be able to solve problems in the areas of classical and relativistic mechanics, heat, mechanical waves.

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a - 1	h -
b -	i -
c -	j -
d -	k - 2
e - 1	
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Classical Mechanics
2. Relativistic Mechanics
3. Heat
4. Mechanical Waves

Course Syllabus **PHYS 215** **Spring 2013**

1. *Course number and name* PHYS 215 General Physics Laboratory I

2. *Credits and contact hours* 1 Credit, 1 Contact Hour

3. *Instructor's or course coordinator's name*
   Dr. Gina Sorci

4. *Text book, title, author, and year*
   William A. Hollerman and John R. Meriwether, Physics 215 Laboratory I,
   Department of Physics, University of Louisiana at Lafayette, Spring 2010.

   a. *other supplemental materials*
      A printed manual will be needed to complete each lab exercise
      WebAssign

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Experiments illustrating principles in electricity, magnetism,
      optics, and atomic physics
   b. *prerequisites or co-requisites*
      PHYS 202 or 208

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Required
6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      Physics Experiments illustrating principles in electricity, magnetism,
      optics, and atomic physics

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a - 1	h -
b - 1	i -
c -	j -
d -	k - 2
e - 2	
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Electricity
2. Magnetism
3. Optic
4. Atomic physics

CHEMICAL ENGINEERING COURSES

Course Syllabus CHEE101 Fall 2012

1. *Course number and name* **CHEE 101 Introduction to Chemical Engineering**

2. *Credits and contact hours* 1 credits, 3 contact hours per week (lectures/presentations)

3. *Instructor's or course coordinator's name*

   Carl McIntyre, PhD
   Mark E. Zappi, PhD

4. *Text book, title, author, and year*
   None

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Introduction to the profession of chemical engineering. Opportunities in chemical engineering and professional schools. Professionalism and ethics, basic chemical processes, guest speakers from faculty and industry, perform experiments in unit operations laboratory, safety issues, oral and written communications.

   b. *prerequisites or co-requisites*
      None

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      Students should demonstrate their expertise of the following by the end of semester:
      1. Know what chemical engineering is and what being a chemical engineer entails.
      2. Know ways in which chemical engineers design and improve processes in manufacturing of materials and utilization of alternative energy sources.
      3. Know about professional and ethical standards required of engineers as well as practicing chemical engineers
      4. Give examples of challenges that are faced within the field of chemical engineering.
      5. Be able to examine a process flow diagram and fundamentally interpret the unit operations involved.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (3)
b - (3)
c - (3)
d - ( )
e - ( )
f - (2)
g - ( )
h - (1)
i - (1)
j - (2)
k - (3)
l - ( )

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Introduction to Chemical Engineering
2. Introduction to Materials Engineering
3. Introduction to Engineering Projects and Process Components
4. Introduction to Environmental Engineering
5. Research and Development in Chemical Engineering (Catalysis, Petroleum Refining)
6. Ethics in Chemical Engineering and Becoming a Licensed P.E.
7. Developing Biodiesel as an Alternative Fuel in Chemical Refining.
8. Manufacturing Plastics and Polymer Processing for Chemical Engineers
9. Biogas, Activated Sludge and Alternative Energy for Chemical Engineers

Course Syllabus **CHEE 201 Fall 2012**

1. *Course number and name* **CHEE 201 Chemical Engineering Calculations**

2. *Credits and contact hours* 4 credits, 4 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Ramalingam Subramaniam, PhD

4. *Text book, title, author, and year*

   Elementary Principles of Chemical Process
   Richard M.Felder and Ronald W.Rousseau
   2005, 3rd Edition with integrated media and study tools, John Wiley & Sons.

   a. *other supplemental materials*

      Basic Principles and Calculations in Chemical Engineering,
      David M Himmelblau and James B Riggs
      5th Ed. Printice – Hall International series in the physical and Chemical Engineering sciences,
      Perry's Chemical Engineers' Handbook
      Don Green, and Robert H. Perry
      2007 7th Ed. McGraw- Hill's Chemical Engineering Series
      Microsoft Excel

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Introduction to chemical engineering principles, Application different units systems, and different approaches to solve material and energy balances.

   b. *prerequisites or co-requisites*
      CHEE CHEM 108 and MATH 270

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*
      Students should demonstrate their expertise of the following by the end of semester:
      1. Use of Microsoft excel for chemical engineering calculation
      2. Different units systems and its conversion factors
      3. Processes and process variables
      4. Introduction to different operation and processes of chemical engineering
      5. Different approaches such as mole balance, atomic balance and extent of reactions to solve the material balances

6. Properties estimation for ideal and non-ideal gases
7. Use of handbooks and literature data to estimate the physical properties

b. explicitly indicate which of the program outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)	h - ( )
b - (1)	i - (3)
c - (2)	j - (3)
d - ( )	k - (2)
e - (1)	l - (2)
f - ( )	
g - ( )	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Units and dimensions, conversion of units
2. Use of Microsoft excel for calibration curves, statistical analysis required for this course
3. Process variables such as mass, volume, flow rate, composition, temperature, pressure and its conversion from one units system to another unit system
4. Process classification, Molecule balances, atomic balances, material balance for single unit process, material balance for multiple unit processes, material balance calculation for the processes with recycle and bypass
5. Introduction to reaction stoichiometry, extent of reaction and material balance calculation for reactive processes
6. Combustion reactions
7. Ideal gases and ideal gas equations
8. Non ideal gases, critical, reduced properties and equations of state for non-ideal gases

Course Syllabus CHEE 210 Spring 2013

1. *Course number and name* **CHEE 210 Engineering Analysis**

2. *Credits and Contact Hours* 2 Credit Hours
   2 contact hours
   1 contact hour per class
   ~15 minutes spent in brief lecture
   ~45 minutes in computer lab hands on programming experience

3. *Instructor's or Course Coordinator's Name*
   Dr. Carl McIntyre

4. *Textbook, Author, Year, Title*
   Professor James Garber Textbook on Visual Basic (No Cost)

5. *Specific course information*

a. Catalog Description: Engineering problems analyzed and solutions achieved using VISUAL BASIC. Discussion of the physical problem leads to a mathematical model, from which a computer simulation is developed. Basic numerical methods are used to solve problems.
b. No Prerequisites
c. This Class is Required for Chemical Engineering

6. *Specific Goals in the Course*

a. Outcomes
   - Students will be able to Write Code in Visual Basic Program
   - Students will be able to Develop Algorithms to Solve Complex Problems
   - Students will be able to Design Programs to Solve Simple Calculations
   - Students will be able to explain and use subroutines and procedures to design their programs
   - Students will use loops in programming to solve for optimization problems.
   - Students will design programs to solve chemical engineering calculations

b. Chemical Engineering Department Outcomes Addressed
   1. Apply scientific and engineering knowledge to solve engineering problems.
   Addressed. Students learned how to create algorithms for solving problems. This outcome was also addressed in using Visual Basic to solve chemical engineering calculations.
   2. Perform and communicate, both in teams and individually.
   Addressed. The students were required to participate on teams for their final Visual Basic Project. This project was assessed as a team.
   3. Effectively apply modern software tools in the solution of scientific and engineering problems.

Addressed. This outcome was also addressed in this course by teaching the students to program and how they can use modern software packages (VB, Excel) to solve engineering problems and design code to execute programs on any (windows) computer.

4. Consider the economic, environmental, safety, and ethical issues in solution of scientific and engineering problems.

Not Addressed. Did not address specifically. However, one class was used for discussion on the implications of intelligent manufacturing and programming machines for chemical processes.

5. Understand the need for lifelong learning to continue to meet the current needs of local, state, and global industries, and adapt to engineering challenges of the future.

Not Addressed.

7. *Brief List of Topics Addressed*
   1. Declaring, Defining, Variables
   2. Looping in Programing (If Then, For Next, Do While)
   3. Datatypes in Programming: Numeric (Long, Double, Short) NonNumeric (Strings)
   4. Form Design in Visual Basic
   - Textboxes, Label Boxes, Command Buttons (Code)
   5. Algorithm Design (Modular Program Design, Pseudocode, FlowCharts)
   6. Input Boxes and Message Boxes to Inform Users (Ok/Cancel, Yes/No, etc.)
   7. Using Data Arrays (Lists, Matrices, 3D Arrays, Control Arrays in Forms)
   8. Using Subroutines and Procedures in Programming
   9. Designing Functions, Modules and Procedures
   10. Creating Menus to Improve Programs
   11. Inputting and Outputing External File Data for calculations (Read, Write, Shell Commands)
   12. Working with Graphics in Visual Basic Programs (Displaying Equations)
   13. Designing Programs with Multiple Windows and Multiple Forms
   14. Numerical Methods that can be utilized in Chemical Engineering

Course Syllabus: CHEE 302 Spring 2013

1. *Course Number and Name* **CHEE 302 Transfer Operations**

2. *Credits and Contact Hours* 3 Credits
   3 Contact hours per week

3. *Instructor's Name* **Stephen Dufreche, PhD, EI**

4. *Course Text* **Mass Transfer: Fundamentals and Applications**
   Hines, Maddox (1985)
   ISBN-13: 978-0135596098

   Partial Differential Equations for Scientists and Engineers
   Farlow, Stanley (1993)
   ISBN-13: 978-0486676203

5. *Specific course information*
   a. Brief Description of Course:
      Application of heat and mass transport fundamentals to chemical engineering processes with emphasis on the mathematical model. Various unit operations in chemical engineering are studied.
   b. Prerequisites: ENGR 305
   c. Required Course: Core

6. *Specific goals for the course*
   a. Apply the fundamentals of heat and mass transport to chemical engineering processes.
   b. Develop tools to model and predict physical and chemical phenomenon in a system goal *a*.
   c. Development of skills in the identification and safe design of processes.
   d. Student Outcomes covered: *1 – Strongly Covered, 3 – Briefly Covered*

a – 1	g – 2.5
b – 3	h – 3
c – 2	i – 2.5
d – 3	j – 2
e – 1	k – 1.5
f – 2.5	l – 1.5

7. *Brief list of topics to be covered*
    - Binary and Multicomponent Distillation
    - Absorption
    - Chromatography
    - Evaporation
    - Liquid-Liquid Extraction
    - Leaching
    - Adsorption
    - Solids Handling
    - Drying and Filtration
    - Membrane Separation
    - Crystallization

Course Syllabus **CHEE 310 Spring 2013**

1. *Course number and name* **CHEE 310 Chemical Engineering Thermodynamics**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Ramalingam Subramaniam, PhD

4. *Text book, title, author, and year*

   Introduction to Chemical Engineering Thermodynamics
   J.M. Smith, H.C. Van Ness and M.M. Abbott
   2005, 7th Edition, McGraw-Hill's Chemical Engineering series.

   a. *other supplemental materials*

      Fundamentals of Chemical Engineering Thermodynamics (with applications to Chemical Processes)
      Themis Matsoukas
      Prentice Hall International series in the physical and Chemical Engineering sciences,
      Perry's Chemical Engineers' Handbook
      Don Green, and Robert H. Perry
      2007 7th Ed. McGraw- Hill's Chemical Engineering Series
      Microsoft Excel

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*

      Introduction to chemical engineering thermodynamics, calculation of thermodynamic properties (such as Enthalpy, Entropy, Internal energy, Gibbs free energy, fugacity, fugacity coefficient, activity, and activity coefficients) of different systems associated with different processes.

   b. *prerequisites or co-requisites*

      CHEE 201 and ENGR 301

   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*

      Students should demonstrate their expertise of the following by the end of semester:
      1. Use of Microsoft excel for chemical engineering calculation
      2. Use of Aspen properties simulation to estimate the thermodynamics properties
      3. Calculation of volumetric properties of fluids

4. Calculations of Internal energy, Standard heat of Reaction, Formation, and Combustion and its temperature dependency
5. Thermodynamic Properties of Fluids such as residual properties, Thermodynamic Diagrams, Tables and correlations
6. Calculations of Chemical Potential, Fugacity and fugacity coefficient for pure species and species in solution, Correlations for fugacity coefficient, excess properties.
7. Chemical Reactions, Gibbs Energy, Equilibrium Constant, Temperature effects, Chemical Composition and Phase Rule.
8. Dew point, Bubble point and Flash Calculations

b. explicitly indicate which of the program outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (1)
c - (2)
d - ( )
e - (1)
f - ( )
g - ( )
h - ( )
i - (2)
j - (3)
k - (2)
l - (1)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. PVT Behavior, Virial Equations and its application, Equation of State, Gases and Liquids, Corrections, Molecular Theory and second Virial Coefficients, *Introduction to Microsoft excel to estimate thermodynamic properties of pure gases; Introduction to Aspen plus to estimate thermodynamic properties of pure gases*
2. Internal energy of Ideal Gases, Standard heat of Reaction, Formation, and Combustion, Temperature dependence of Enthalpy and heat effects of industrial reactions
3. Residual properties, Two Phase Systems. Thermodynamic Diagrams, Tables and correlations
4. Chemical Potential, Fugacity and fugacity coefficient for pure species and species in solution, Correlations for fugacity coefficient, excess properties
5. Equilibrium, Phase Rule, VLE behavior, Gamma/Phi Formulation of VLE, Dew point, Bubble point and Flash Calculations
6. Application to Chemical Reactions, Gibbs Energy, Equilibrium Constant, Temperature effects, Chemical Composition and Phase Rule

Course Syllabus CHEE 317 Fall 2012

1. *Course number and name* **CHEE 317 Materials of Engineering**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   William M. Chirdon, Ph.D.

4. *Text book, title, author, and year*

   Foundations of Materials Science and Engineering. 5th edition
   W. F. Smith and J. Hashemi
   January 2010, 5th Edition, McGraw-Hill

   a. other supplemental materials

5. *Specific course information*
   a. brief description of the content of the course (catalog description)

   An overview of engineering materials such as ferrous and non-ferrous metals, alloys, plastics, rubber and ceramics, their structures, properties, behavior, heat treatment, and phase diagrams.

   b. prerequisites or co-requisites

   Prereq: CHEM 107; MATH 270

   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

   REQUIRED

6. *Specific goals for the course*
   a. specific outcomes of instruction

   Students should demonstrate their expertise of the following by the end of semester:

   1. Fundamental knowledge of chemistry
   2. Draw and perform basic calculations on crystal structures
   3. Quantitative and qualitative understanding of nucleation and growth
   4. Engineering calculations of thermally activated processes
   5. Ability to work in interdisciplinary teams on a research project and presentation
   6. Calculation of basic material properties and their interpretation
   7. Use phase diagrams to determine % of each phase and composition of alloys
   8. Interpret time-temperature-transition diagrams for carbon steel.

   b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (3)
c - ()
d - (1)
e - (1)
f - (3)
g - (1)
h - (1)
i - (3)
j - (1)
k - (1)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Atomic Structure and Bonding
2. Crystalline Structures
3. Solidification and Crystallization
4. Thermally Activated Processes, including Diffusion
5. Mechanical Properties of Materials
6. Phase Diagrams
7. Engineering Alloys
8. Polymers

Course Syllabus **CHEE 317 Spring 2013**

1. *Course number and name* **CHEE 317 Materials of Engineering**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   William M. Chirdon, Ph.D.

4. *Text book, title, author, and year*

   Foundations of Materials Science and Engineering. 5th edition
   W. F. Smith and J. Hashemi
   January 2010, 5th Edition, McGraw-Hill

   a. *other supplemental materials*

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      An overview of engineering materials such as ferrous and non-ferrous metals, alloys, plastics, rubber and ceramics, their structures, properties, behavior, heat treatment, and phase diagrams.

   b. *prerequisites or co-requisites*
      Prereq: CHEM 107; MATH 270

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      Students should demonstrate their expertise of the following by the end of semester:
      1. Fundamental knowledge of chemistry
      2. Draw and perform basic calculations on crystal structures
      3. Quantitative and qualitative understanding of nucleation and growth
      4. Engineering calculations of thermally activated processes
      5. Ability to work in interdisciplinary teams on a research project and presentation
      6. Calculation of basic material properties and their interpretation
      7. Use phase diagrams to determine % of each phase and composition of alloys
      8. Interpret time-temperature-transition diagrams for carbon steel.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (3)
c - ()
d - (1)
e - (1)
f - (3)
g - (1)
h - (1)
i - (3)
j - (1)
k - (1)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Atomic Structure and Bonding
2. Crystalline Structures
3. Solidification and Crystallization
4. Thermally Activated Processes, including Diffusion
5. Mechanical Properties of Materials
6. Phase Diagrams
7. Engineering Alloys
8. Polymers

Course Syllabus CHEE 400 Fall 2012

1. *Course number and name* **CHEE 400 Process Simulation**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   William M. Chirdon, Ph.D.

4. *Text book, title, author, and year*

   Problem solving in chemical and biochemical engineering with POLYMATH, Excel, and MATLAB. 2nd edition
   M.B. Cutlip and M. Shacham
   January 2008, Prentice Hall

   a. *other supplemental materials*

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Practice in mathematical modeling and computer simulation of chemical process systems. Emphasis on solutions of differential equations as well as optimization. Preparation and execution of computer programs on digital computers.

   b. *prerequisites or co-requisites*
      Prereq: MATH 350

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      Students should demonstrate their expertise of the following by the end of semester:
      1. Model engineering phenomena and quantify into equations
      2. Make good assumptions to solve problems
      3. Use numerical methods to solve differential equations
      4. Linear and non-linear regression
      5. Use of Excel
      6. Use of Matlab
      7. Use of Polymath
      8. Use finite difference methods and matrix algebra to solve engineering problems

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (3)
c - ()
d - (1)
e - (1)
f - (3)
g - (1)
h - (1)
i - (3)
j - (1)
k - (1)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Formulating engineering problems
2. Excel basics
3. Linear regression
4. Non-linear regression
5. Euler's method
6. Runge-Kutta Method
7. Finite Difference method
8. Modeling of heat transfer, mass transfer, and chemical reactions

Course Syllabus — CHEE 401 FA12

1. *Course Number and Name* — **CHEE 401 Stage Operations Design**

2. *Credits and Contact Hours* — 3 Credits
   4 Contact hours per week

3. *Instructor's Name* — **Stephen Dufreche, PhD, EI**

4. *Course Text* — **Unit Operations of Chemical Engineering**, 7th ed.
   McCabe, Smith, and Harriott
   ISBN-13: 978-0072848236

5. *Specific course information*
   a. Brief Description of Course:
      Applications of the fundamentals of transport processes to chemical engineering computations in stage operations, with particular emphasis on design. Problems illustrate the design of such unit operations as distillation, gas absorption and extraction.
   b. Prerequisites: CHEE 302, 310, 405
   c. Required Course: Core

6. *Specific goals for the course*
   a. The ability to model physical and chemical processes commonly found in industrial settings.
   b. Development of skills in the identification and safe design of unit operations.
   c. Student Outcomes covered: *1 – Strongly Covered, 3 – Briefly Covered*

a – 1	g – 2.5
b – 3	h – 3
c – 2	i – 2.5
d – 3	j – 2
e – 1	k – 1.5
f – 2.5	l – 1.5

7. *Brief list of topics to be covered*
    - Binary and Multicomponent Distillation
    - Absorption
    - Chromatography
    - Evaporation
    - Liquid-Liquid Extraction
    - Leaching
    - Adsorption
    - Solids Handling
    - Drying and Filtration
    - Membrane Separation
    - Crystallization

CHEE 402(G) Spring 2013

1. Course number and name **CHEE 402(G) CORROSION ENGINEERING**

2. Credits and contact hours **3 credits, 3 contact hours per week (lecture)**

3. Instructor of course **James D. Garber, PhD, NACE Fellow**

4. Textbook, title, author and year **Corrosion Engineering, James D. Garber, 1988.**

5. Specific course information

a. brief description of the content of the course (catalog description)

This course is designed to cover all important aspects of corrosion engineering and corrosion science, including corrosion principles of 8 forms of corrosion, noble metals, "exotic" metals, non-metallics, coatings, mechanical properties, corrosion testing, and modern corrosion theory.

b. prerequisites or co-requisites

Upper division and permission of instructor

c. indicate whether a required, elective or selected elective (as per Table 5-1) course in the program.

Selected elective

6. Specific goals for the course

a. specific outcomes of instruction

Students should demonstrate their expertise at the end of the semester:

1. By performing a real failure analysis provided by industry.
2. They will determine the form of corrosion in a team setting.
3. Evaluate physical and chemical data provided to perform the analysis
4. Provide conclusions as to the mechanism of the corrosion failure
5. Make recommendations as to how the problem can be prevented.
6. Write a failure analysis report which will provide all these facts.

b. explicitly indicate which of the student outcomes listed in Criterion 3 are addressed by the courses.

a – (1)	h – (3)
b – (1)	i – (3)
c – (2)	j – (3)
d – (2)	k – ( )
e – (1)	l - ( )
f - (3)	
g – (2)	

1- strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Briefly list topics to be covered*
    1. General Corrosion
    2. Oilfield Corrosion Principles
    3. Electrochemistry of Corrosion
    4. Oilfield Materials
    5. Coatings
    6. Cathodic and Anodic Protection
    7. Inhibitors
    8. Corrosion Monitoring
    9. Laboratory Testing
    10. Caused of Pipeline Corrosion
    11. Failure Analysis

Course Syllabus CHEE 403 FA12

1. *Course Number and Name* **CHEE 403 Chemical Engineering Laboratory I**

2. *Credits and Contact Hours* 2 Credits
   4 Contact hours per week

3. *Instructor's Name* **Stephen Dufreche, PhD, EI**

4. *Course Text* **Instructor Lab Manual**

5. Specific course information

a. Brief Description of Course:
   Practical experience in the calibration of flow and measurement devices. Experiments in filtration, fluidization, and heat transfer. Open-ended problem solving with emphasis on safety and environmental practices in a chemical plant.
b. Prerequisites: CHEE 302
c. Required Course: Core

6. Specific goals for the course

a. Design and implement a procedure to accomplish a stated goal within the bounds of safety and efficiency.
b. Development of hands-on skills in chemical processing, data collection, procedure adjustment, and teamwork.
c. Student Outcomes covered: *1 – Strongly Covered, 3 – Briefly Covered*

a – 1	g – 1
b – 1	h – 2
c – 2	i – 2
d – 2	j – 2.5
e – 1	k – 1.5
f – 2	l – 1.5

7. Brief list of topics to be covered

- Single and Multi-effect evaporation
- Heat Exchanger operation
- Combustion reactions and boiler operation
- Pressure drop in process equipment
- HVAC and Thermal cycles
- Pump curves and fluid response

Course Syllabus — CHEE 404 Spring 2013

1. *Course Number and Name* — **CHEE 404 Chemical Engineering Laboratory II**

2. *Credits and Contact Hours* — 2 Credits
4 Contact hours per week

3. *Instructor's Name* — **Stephen Dufreche, PhD, EI**

4. *Course Text* — **Instructor Lab Manual**

5. Specific course information

a. Brief Description of Course:
Practical experience of various types of unit operations, such as distillation, evaporation, heat exchangers, gas absorption, extraction, and reactors. Open-ended problem solving with emphasis on safety and environmental practice.

b. Prerequisites: CHEE 401, 403, 420

c. Required Course: Core

6. Specific goals for the course

a. Design and implement a procedure to accomplish a stated goal within the bounds of safety and efficiency.

b. Development of hands-on skills in chemical processing, data collection, procedure adjustment, and teamwork.

c. Student Outcomes covered: *1 – Strongly Covered, 3 – Briefly Covered*

a – 1	g – 1
b – 1	h – 2
c – 2	i – 2
d – 2	j – 2.5
e – 1	k – 1.5
f – 2	l – 1.5

7. Brief list of topics to be covered

- Distillation
- Pressure Filtration
- Gas Absorption
- Liquid-Solid Extraction
- Fermentation
- Evaporative Cooling

Course Syllabus **CHEE 405 Spring 2013**

1. *Course number and name* **CHEE 405: Process Heat Transfer**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   William M. Chirdon, Ph.D.

4. *Text book, title, author, and year*

   Holman, J.P., **Heat Transfer**, 10th ed., McGraw-Hill, 2010.

   a. other supplemental materials

   n/a

5. *Specific course information*

   a. brief description of the content of the course (catalog description)

   This course covers the fundamental theories and designs of heat transfer processes used in chemical process industries, including the design and rating of heat transfer equipment, heat generation and energy management systems.

   b. prerequisites or co-requisites

   Prereq: ENGR 301, 305. Coreq: CHEE 302

   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

   REQUIRED

6. *Specific goals for the course*

   a. specific outcomes of instruction

Students should demonstrate their expertise of the following by the end of semester:

1. Calculate heat transfer rates for conductive, convective, and radiation heat transfer
2. Solve steady-state heat transfer problems
3. Solve elementary transient heat transfer problems
4. Solve systems with conduction, convection and internal heat generation
5. Design heat exchanger for an industrial application by hand
6. Computer design of heat exchangers, computer assignment using BJack and Aspen

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (3)
c - (1.5)
d - (2)
e - (1)
f - (3)
g - (2)
h - (2)
i - (3)
j - (3)
k - (1)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Basic modes of heat transfer: conduction, convection, and radiation
2. One-dimensional heat conduction, steady-state
3. Unsteady-state one-dimensional heat conduction
4. Systems with heat generation
5. Combined conductive-convective heat transfer
6. Theory and design of heat exchangers
7. Computer design of heat exchangers, computer assignment using BJack and Aspen
8. Condensation and condenser design

Course Syllabus CHEE407 Fall 2012

1. *Course number and name* **CHEE 407 Plant Design and Economics for Chemical Engineers**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Rakesh Bajpai, PhD

4. *Text book, title, author, and year*

   Product and Process Design Principles - Synthesis, Analysis, and Evaluation
   W. D. Seider, J. D. Seader, D. R. Lewin, and S. Widagdo
   January 2009, 3rd Edition, John Wiley & Sons.

   a. *other supplemental materials*
   Plant Design and Economics for Chemical Engineers, 5th Ed. By Max Peters, Klaus Timmerhaus, and Ronald West, McGraw Hill, 2003
   Kirk Othmer Encyclopedia of Chemical Technology
   Perry's Chemical Engineers' Handbook
   Aspen Plus Getting Started and Running a Process Model
   More Aspen Modules as needed

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
   Introduction to chemical plant design based on the principles of unit operations and process studies and their interrelationships

   b. *prerequisites or co-requisites*
   CHEE 302, 310, 405, ENGR 305

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
   REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
   Students should demonstrate their expertise of the following by the end of semester:
   1. Basics of flow sheet development
   2. General heuristic ideas in process design
   3. Process flow diagram
   4. Major equipment design
   5. Use of computer simulation software
   6. HAZOP and environmental impact analysis
   7. Societal and global issues in plant design

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (3)
c - (1)
d - (3)
e - (2)
f - (1)
g - (1)
h - (1)
i - (3)
j - (1)
k - (2)
l - (2)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. The design process, environmental issues, safety, HAZOP, ethics
2. Process creation
3. Simulation to assist in process creation
4. Heuristics in process synthesis
5. Reactor design and reactor network synthesis
6. Synthesis of reactor trains
7. Reactor-separator-recycle networks
8. Heat-exchanger networks

Course Syllabus CHEE408 Spring 2013

1. *Course number and name* **CHEE 408 COMPUTER-AIDED PROCESS DESIGN**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Rakesh Bajpai, PhD

4. *Text book, title, author, and year*

   Product and Process Design Principles - Synthesis, Analysis, and Evaluation
   W. D. Seider, J. D. Seader, D. R. Lewin, and S. Widagdo
   January 2009, 3rd Edition, John Wiley & Sons.

   a. *other supplemental materials*

      Plant Design and Economics for Chemical Engineers, 5th Ed. By Max Peters, Klaus Timmerhaus, and Ronald West, McGraw Hill, 2003
      Kirk Othmer Encyclopedia of Chemical Technology
      Perry's Chemical Engineers' Handbook
      Aspen Plus Getting Started and Running a Process Model
      Aspen Plus Working with Solids
      More Aspen Modules as needed

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*

      Process and plant design, optimization, cost estimation and economic analysis for chemical process industries. Studies include theories, industrial practices and computer-aided design technology. Students are required to make a technical presentation of their work

   b. *prerequisites or co-requisites*

      CHEE 401, 407, 420

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*

      REQUIRED

6. *Specific goals for the course*

   a. *specific outcomes of instruction*

      Students should demonstrate their expertise of the following by the end of semester:

      1. Considerations in estimations of costs associated with chemical plants
      2. Evaluation of profitability of a chemical operation
      3. Presentation and communication skills
      4. Design report writing
      5. Comprehensive plant design report

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (3)
c - (1)
d - (3)
e - (1)
f - (1)
g - (1)
h - (1)
i - (2)
j - (1)
k - (1)
l - (1)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Economic fundamentals related to chemical processes
2. Profitability analysis
3. Aspen Plus for preliminary design of chemical plants
4. Aspen Plus costing
5. Searching for information
6. Plant safety and design of safety systems

Course Syllabus CHEE 413 Spring 2013

1. *Course number and name* **CHEE 413 Chemical Process Control**

2. *Credits and contact hours* 3 credits, 2 contact hours per week (lectures) plus 2 hour 20 minutes per week lab

3. *Instructor's or course coordinator's name* **Ramalingam Subramaniam**, PhD

4. *Text book, title, author, and year* **Process System analysis and Control**
Donald R.Coughanowr and Steven E.LeBlanc
2009, 3rd Ed., McGraw-Hill Chemical Engineering series.

   a. *other supplemental materials*

Chemical and Bio – Process Control.
James B.Riggs and M.Nazmul Karim, Third Edition. Ferret Publishing
Chemical Process Control: An Introduction to Theory and Practice
George Stephanopoulos - Prentice-Hall
Process modeling, simulation & control for chemical engineers
Luyben - McGraw Hill Internationals
Process Control
Peter Harriot - Tata McGraw Hill

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
   Introduction to Laplace Transform, Fundamental concepts of process control and the control system design. The dynamic modeling of chemical and bio processes; P, PI, PID controllers; Measuring Element and Final control element. Introduction to Labview software, application of dynamic models in the control system design and simulation. Stability of control systems. Safety, PID diagram. Hands on experience on Level Control System, PID Controller, Control valve characteristics, Measuring element.
   b. *prerequisites or co-requisites* CHEE 302, 405 and MATH 350
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program* REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
   Students should demonstrate their expertise of the following by the end of semester:
      1. Use of Laplace Transform and its inverse functions in dynamic modeling of Chemical and Bio Processes
      2. Dynamic Modeling of chemical and bio processes (first order, second order systems in addition to first order systems in series); P, PI, PID controllers; Measuring Element and Final control element
      3. Control Valves
      4. PID diagrams
      5. Process control system design and simulation using Labview Software
      6. Stability of Control Systems

7. Experiment 1: Construct the responses of the temperature measuring device (Mercury Thermometer) for a given step input and find the time constant. Estimate how many time constants it requires to reach 60%, 80% and 100% of its ultimate value.
8. Experiment 2: Determine the effective characteristics of a given control valve.
9. Experiment 3: Plot the process behavior of a Heat Exchanger for a given step change in set point (Servo problem) and load variables (Regulator problem).
10. Experiment 4: Study the responses of a liquid level control system with P, PI, and PID modes of controllers for a given step change in set point.

b. explicitly indicate which of the program outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)	e - (1)	i - (2)
b - (1)	f - ( )	j - (3)
c - (2)	g - ( )	k - (2)
d - ( )	h - ( )	l - (1)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Laplace Transform, Inversion of Laplace Transforms and inversions by partial fractions.
2. Dynamic Modeling of chemical and bio processes:
3. First order systems: Flow, Temperature and Liquid level systems, tanks in series, interacting and non-interacting systems;
4. Second order systems: Damped vibrator and U tube manometer
5. Bioprocess: Batch, Fed-batch and Continuous process
6. P, PI, PID controllers; Measuring Element and Final control element
7. Responses for different forcing functions like step, impulse, sinusoidal, exponential and ramp functions
8. Control Valves and types
9. Transfer functions of P, PI, PID controllers; Measuring Element and Final control element
10. PID diagrams
11. Process control system design and simulation using Labview Software
12. Stability of Control Systems Routh array, Routh test and bode diagrams
13. Experiment 1: Construct the responses of the temperature measuring device (Mercury Thermometer) for a given step input and find the time constant. Estimate how many time constants it requires to reach 60%, 80% and 100% of its ultimate value.
14. Experiment 2: Determine the effective characteristics of a given control valve.
15. Experiment 3: Plot the process behavior of a Heat Exchanger for a given step change in set point (Servo problem) and load variables (Regulator problem).
16. Experiment 4: Study the responses of a liquid level control system with P, PI, and PID modes of controllers for a given step change in set point.

Course Syllabus CHEE416 Spring 2013

1. *Course number and name* **CHEE 416 BIOCHEMICAL ENGINEERING**
2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Rakesh Bajpai, PhD

4. *Text book, title, author, and year*
   No Book

   a. *other supplemental materials*
      Notes distributed from time to time

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Chemical engineering principles will be used with biology and chemistry to mathematically describe and model various processes in the human body. The computer will be used as a tool for the modeling.

   b. *prerequisites or co-requisites*
      Instructor permission

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      Students should demonstrate their expertise of the following by the end of semester:

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a - (1)	h - (2)
b - (2)	i - (1)
c - (3)	j - (1)
d - ( )	k - (2)
e - (3)	l - (3)
f - (3)	
g - (1)	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Brief list of topics to be covered*

a. Microorganisms, classifications and characteristics.
b. Nutrient and environmental needs of microbes, formulation of growth media
c. Energetics in microbial systems, yields.
d. Components of microbes – carbohydrates, proteins, lipids, nucleic acids.
e. Metabolic pathways in cells, primary and secondary metabolism.
f. Growth characteristics of microbes, cultivation of cells, bioreactors, and models of growth and product formation.
g. Enzymes, enzyme kinetics, immobilized enzymes.
h. Bioprocesses.

Course Syllabus CHEE420 Fall 2012

1. *Course number and name* **CHEE 420 Chemical Reaction Engineering**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Rakesh Bajpai, PhD

4. *Text book, title, author, and year*

   Essentials of Chemical Reaction Engineering
   H. Scott Fogler
   2011 Pearson Education, Inc.

   a. *other supplemental materials*

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*

      Kinetic behavior of chemical processes, determination and prediction of specific reaction rate and order, catalysis, relationships between chemical and physical variables in heterogeneous systems as these influence the design of chemical reactors.

   b. *prerequisites or co-requisites*

      CHEE 310, CHEM 302, MATH 350

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*

      REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*

   Students should demonstrate their expertise of the following by the end of semester:

   1. Understanding of different types of reactors
   2. Mole balances for batch and flow reactors
   3. Stoichiometric tables and relationships between rates of reactions for different species
   4. Reaction rate expressions
   5. Experimental data and estimation of parameters using differential and integral methods of analysis
   6. Reaction rates for heterogeneous catalysis

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)	h - ( )
b - (1)	i - (3)
c - (1)	j - (3)
d - ( )	k - (2)
e - (1)	l - (2)
f - ( )	
g - ( )	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Mole balances
2. Conversion and reactor sizing
3. Rate laws
4. Stoichiometry
5. Isothermal reactor design: Conversion
6. Isothermal reactor design: Molar flow rates
7. Collection and analysis of rate data
8. Reaction mechanisms, catalysis, and catalytic reactors

Course Syllabus CHEE 427 Fall 2012

1. *Course number and name* **CHEE 427 Advanced Materials and Processes**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Devesh Misra, PhD

4. *Text book, title, author, and year*

Advanced Materials Science and Engineering book compiled by Dr. Devesh Misra

   a. *other supplemental materials*
   Materials Handbook, American Society for Materials International

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
   An in-depth study of advanced alloys, polymers, ceramics and composites with particular focus on processing and its determining role on physical and mechanical properties.

   b. *prerequisites or co-requisites*
   CHEE 317

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
   NOT REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
   Students should demonstrate their expertise of the following by the end of semester:
   1. Basics in the selection of materials for a particular application
   2. Structure-property paradigm in engineering materials (metals, ceramics, polymers and composites
   3. Processing of four difference of classes of engineering materials
   4. Application of different techniques to process engineering materials
   5. Use of different scientific techniques to determine structure-property relationship
   6. Use of computer to analyze the mechanical properties of engineering materials

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)	h - (1)
b - (2)	i - (2)
c - (3)	j - (2)
d - (3)	k - (2)
e - (2)	l - (3)
f - (3)	
g - (3)	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Introduction to evolution and development of materials processing techniques
2. Strengthening of crystalline materials
3. Non-ferrous engineering alloys
4. Structure and properties of ceramics
5. Applications and processing of ceramics
6. Polymeric materials
7. Structure of polymers
8. Processing of polymeric materials
9. Mechanical behavior of polymers
10. Composites materials

Course Syllabus CHEE 427 Spring 2013

1. *Course number and name* **CHEE 427 Advanced Materials and Processes**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name*

   Devesh Misra, PhD

4. *Text book, title, author, and year*
Advanced Materials Science and Engineering book compiled by Dr. Devesh Misra

   a. *other supplemental materials*
   Materials Handbook, American Society for Materials International

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
   An in-depth study of advanced alloys, polymers, ceramics and composites with particular focus on processing and its determining role on physical and mechanical properties.

   b. *prerequisites or co-requisites*
   CHEE 317

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
   NOT REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
   Students should demonstrate their expertise of the following by the end of semester:
   1. Basics in the selection of materials for a particular application
   2. Structure-property paradigm in engineering materials (metals, ceramics, polymers and composites
   3. Processing of four difference of classes of engineering materials
   4. Application of different techniques to process engineering materials
   5. Use of different scientific techniques to determine structure-property relationship
   6. Use of computer to analyze the mechanical properties of engineering materials

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)	h - (1)
b - (2)	i - (2)
c - (3)	j - (2)
d - (3)	k - (2)
e - (2)	l - (3)
f - (3)	
g - (3)	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Introduction to evolution and development of materials processing techniques
2. Strengthening of crystalline materials
3. Non-ferrous engineering alloys
4. Structure and properties of ceramics
5. Applications and processing of ceramics
6. Polymeric materials
7. Structure of polymers
8. Processing of polymeric materials
9. Mechanical behavior of polymers
10. Composites materials

COLLEGE OF ENGINEERING COURSES

Course Syllabus ENGR 201 Spring 2013

1. *Course number and name* **ENGR 201 – Electrical Circuits**

2. *Credits and contact hours* 3 credit hours, 3 contact hours

3. *Instructor's or course coordinator's name* Mohammad Madani

4. *Text book, title, author, and year*
   Electrical Engineering Principles and Applications, Fifth Edition. Author and publisher: Allan R. Hambley, Pearson/Prentice Hall.

a. other supplemental materials

5. *Specific course information*
   a. brief description of the content of the course (catalog description)

   Analysis of DC, and AC electrical circuits using fundamental laws of electricity: study of diodes, and transistors, study of digital techniques including number systems, logic gates, and circuits, microcomputer organization; study of three phase electrical circuits, motors , transformers and generators.

   b. prerequisites or co-requisites
   PHYS 201

   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program
   Required

6. *Specific goals for the course*
   a. specific outcomes of instruction

   Students will be able to analyze and solve engineering problems concerning of DC, and AC electrical circuits using the fundamental laws of electricity, including problems in the areas of diodes, and transistors; digital number systems, logic gates, and circuits; microcomputer organization; three phase electrical circuits, motors , transformers and generators.

   b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - 1	h -
b -	i -
c -	j -
d -	k -
e - 1	
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Introduction to electrical circuits laws
2. Resistive circuits
3. Inductance and Capacitance
4. Transient
5. Steady-State Sinusoidal Analysis
6. Frequency response and Body Plots and filters
7. Logic Circuits
8. Microcomputers
9. Computer-Based Instrumentation System
10. Diodes
11. Amplifiers
12. Field-Effect Transistors
13. Bipolar Junction Transistors
14. Operational Amplifiers
15. Magnetic Circuits and Transforms
16. DC Machines
17. AC Machines

Course Syllabus ENGR 218

1. Course Number & Name: ENGR 218-Statics and Mechanics of Materials

2. Credits & Contact Hours: 3 cr hrs & 3 lecture hrs

3. Instructor's Name: Jasmine Galjour, M.S., P.E.

4. Textbook Title, Author and Year:
Statics and Mechanics of Materials, Hibbler, 2011

a. Other supplemental materials: N/A

5. Specific Course Information

a. Catalog Description: Simplification of force systems, equilibrium of particles and rigid bodies, friction, centroids and moments of inertia. Load classification, normal and shearing stresses and strains, displacements and stresses due to axial, torsional, and flexural, and combined loadings.

b. Course prerequisite:

PHYS 201 C or Better

c. Required Course, Elective, or Selected Elective:

The course is required for the Electrical, Chemical, and Petroleum Engineering undergraduate programs.

6. **Course Specific Goals:** (Letters and numbers in parentheses correspond to specific ABET outcomes covered in this course and the expected levels of attainment)
   a. Students will gain a knowledge and understanding of the fundamentals of statics and mechanics of materials. (outcome a, level 3 application)

7. Brief List of Course Topics:

Ch 2- Force Vectors
Ch 3-Force System Resultants
Ch 4-Equilibrium of a Rigid Body
Ch 5-Structural Analysis
Ch 6-Center of Gravity, Centroid, Moment of Inertia, Distributed Loads
Ch 7-Stress and Strain
Ch 8-Mechanical Properties of Materials-G, E, ν
Ch 9-Axial Load
Ch 10-Torsion
Ch 11-Bending
Ch 12-Transverse Shear
Ch 13 Combined Loadings

Course Syllabus ENGR 301 Spring 2013

1. *Course number and name* **ENGR 301 – Thermodynamics**

2. *Credits and contact hours* 3 credit hours, 3 contact hours

3. *Instructor's or course coordinator's name* **Christopher Dalton**

4. *Text book, title, author, and year* Y.A. Cengel and M.A. Boles, **Thermodynamics: An Engineering Approach** 7th edition, McGraw Hill, 2011.
   a. *other supplemental materials*

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Study of the laws of thermodynamics, available energy, mixtures, thermodynamic properties of matter, and applications to engineering systems.
   b. *prerequisites or co-requisites* CHEM 107, MATH 270
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program* Required

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      Identify and understand basic thermodynamic terms, cycles and laws, and understand their importance in the global aspect of engineering and thermodynamics; Take thermodynamic data to analyze basic processes and cycles; See the importance of thermodynamics in everyday life, as well as future courses; Understand current news and events related to thermodynamics; Be able to locate additional resources on thermodynamics
   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a	-	h	-
b	-	i	-
c	-	j	-
d	-	k	-
e	-	l	-
f	-		
g	-		

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Brief list of topics to be covered*

   1. Basic Concepts of Thermodynamics and Properties
   2. Energy Transfer and First Law of Thermodynamics
   3. Second Law of Thermodynamics and Entropy
   4. Gas and Vapor Power Cycles

Course Syllabus ENGR305 Fall 2012

1. *Course number and name* **ENGR 305 Transport Phenomena**

2. *Credits and contact hours* 3 credits, 3 contact hours per week (lectures)

3. *Instructor's or course coordinator's name* **Carl McIntyre**, PhD

4. *Text book, title, author, and year*
   Unit Operations of Chemical Engineering
   W. L. McCabe, J. C. Smith, P. Harriott
   January 2005, 7th Edition, John Wiley & Sons.

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Basic theories of fluid flow; compressible and incompressible fluid flow, rheological equations of Newtonian and non-Newtonian fluids, concepts of laminar and turbulent flows, introductions of two-phase flow and boundary layer theory, flow measurements, hydraulic machinery Coreq: ENGR 301.

   b. *prerequisites or co-requisites*
      Coreq: ENGR 301.

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      REQUIRED

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
   Students should demonstrate their expertise of the following by the end of semester:
      1. Calculate the Pressure Drop in pipe flow and steady flow unit operations.
      2. Derive energy and force balances for hydrostatic and steady incompressible flow fluid dynamic conditions
      3. Characterize fluid flow behavior and friction losses based upon the Reynold's number.
      4. Describe and understand key concepts in laminar and turbulent flow (entrance length, eddy viscosity etc.) and calculate the relevant properties associated with flow behavior.
      5. Use Dimensional Analysis to derive dimensionless groups for flow experiments and to describe flow situations.
      6. Correctly read and interpret a Moody chart.
      7. Calculate drag and drag coefficients on solid objects in flow.
      8. Calculate Pressure Drop, Void Fraction, Height and Pressure Drop across a solid packed bed and a fluidized solid packed bed.
      9. Determine minimum fluidization conditions for a packed/fluidized bed.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a - (1)
b - (3)
c - (3)
d - (2)
e - (2)
f - (3)
g - (3)
h - (3)
i - (3)
j - (2)
k - (3)
l - (3)

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Dimensional Analysis
2. Hydrostatic Equilibrium
3. Laminar and Turbulent Flow
4. Rheological Properties
5. Bernoulli, Continuity, Navier-Stokes Equations
6. Fluid Friction, Moody Charts
7. Settling, Drag and Particle Motion
8. Solid Packed Bed Flow
9. Fluidized Bed Flow
10. Pipes, Valves and Pumps
11. Flow Meters, Agitation
12. Dispersion and Dispersion Operations

GENERAL EDUCATION COURSES

Course Syllabus CMCN 310 Spring 2013

1. *Course number and name* **CMCN 310 Public Speaking**

2. *Credits and contact hours* 3 Credits, 3 Contact Hours

3. *Instructor's or course coordinator's name*
   Ms. Jeanne LeBlanc

4. *Text book, title, author, and year*
   Sellnow, D., Verderber, K., & Verderber, R., *The Challenges of Effective Speaking*, 15th Edition, United States, Thompson Wadsworth.

   a. *other supplemental materials*
      None.

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      Theory and practice for the preparation and delivery of speeches through a variety of formats.

   b. *prerequisites or co-requisites*
      None.

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Elective for CIVE. Required for CHEE and MCHE.

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      To understand and apply theories of effective public communications. Appreciate diversity issues. Create effective, well-organized speech outlines. Acquire presentations skills. Develop ability to critically evaluate speeches of others.

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a -	h - 2
b -	i - 3
c -	j - 3
d -	k -
e -	
f -	
g - 1	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Personal Experience speech.
2. Oral reading.
3. Informative Speech.
4. Persuasive Speech.
5. Impromptu Speech.

Course Syllabus **English 101 Spring 2013**

1. *Course number and name* **English 101 Introduction to Academic Writing**

2. *Credits and contact hours* 3 Credits, 3 Contact Hours

3. *Instructor's or course coordinator's name*
   Julie Clement

4. *Text book, title, author, and year*
   1. **Writing Arguments: A Rhetoric With Readings**, 6th Edition, John D. Ramage
   2. **The Freshman Guide to Writing**, 5th Edition, University of Louisiana, Lafayette

   a. *other supplemental materials*
      Writing materials, a one-subject notebook, and one cardboard pocket folder with metal tabs for turning in final papers and research materials.

5. *Specific course information*
   Introductory course to college level writing

   a. *brief description of the content of the course (catalog description)*
      Instruction in the fundamentals of effective argumentative writing, including critical
. reading and analysis, thesis/claim development and use of evidentiary support

   b. *prerequisites or co-requisites*
      English 90 with a grade of "C" or better or received a minimum score of 18 on the English section of the ACT.

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      N/A

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      1. Learn the ability to think more critically and to participate more fully in academic and public discourse.
      2. Put learned concepts into practice by developing a variety of thesis driven, well-argued essays.
      3. Learn ways of improving your skills in reading, analyzing, and responding to examples of academic writing as a means of improving comprehension, critical thinking, and expression.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a -	h -
b -	i -
c -	j -
d -	k -
e -	l -
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Diagnostic essay
2. Narrative writing
3. Thesis and exposition development
4. Opposition acknowledgment
5. Defining propaganda
6. MLA format and documentation
7. Brainstorming
8. Identifying and incorporating sources
9. Refining thesis
10. Essay writing

Course Syllabus **English 102 Spring 2013**

1. *Course number and name* **English 102 Writing and Research About Culture**

2. *Credits and contact hours* 3 Credits, 3 Contact Hours

3. *Instructor's or course coordinator's name*

   Denise M. Rogers

4. *Text book, title, author, and year*

   1. Gumery, Keith, ed, **International Views: America and the Rest of the World**. New York: Pearson Longman, 2006
   2. Graff, Gerald and Cathy Birkenstein. **They Say, I Say: The Moves That Matter in Academic Writing.**
   3. **Freshman Guide to Writing**, 5th ed. University of Louisiana at Lafayette

   a. *other supplemental materials*

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*

      This course is designed to help students build on the critical reading, writing, and thinking skills essential to academic work.

   b. *prerequisites or co-requisites*

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*

6. *Specific goals for the course*
   a. *specific outcomes of instruction*

      1. To be able to summarize, analyze, and critique the assigned readings and the writings of your classmates.
      2. To be able to write clear, coherent, grammatically and mechanically correct, effective, argumentative essays.
      3. To be able to accurately acknowledge differing points of view and to make connections between source materials, and between your own ideas and those presented in sources.
      4. To be able to document all sources used in your essays according to MLA guidelines.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a -	h -
b -	i -
c -	j -
d -	k -
e -	l -
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Critically read and discuss how different cultures affect each other and how global citizens think about such influences.
2. Writing effective argumentation that integrates the course readings, class discussions, and your own research, while recognizing other points of view, leads to solid, informed conclusions.

Course Syllabus ECON 430G

1. **Course Number & Name**: **ECON430G-Industrial Economics and Finance**

2. **Credits & Contact Hours**: 3 cr hrs & 3 lecture hrs

3. **Instructor's Name: Jasmine Galjour, M.S., P.E.**

4. **Textbook Title, Author and Year:**
   Economic Analysis of Industrial Projects, Ristroph, 2011-2012

   a. Other supplemental materials: N/A

5. **Specific Course Information**

   a. Catalog Description: Economic and financial considerations in the design and selection of industrial projects. Capital growth. Net present value and related analytical procedures. Effects of taxes, inflation, and risk.

   b. Course prerequisite:

   MATH 301 C or Better

   c. Required Course, Elective, or Selected Elective:

   The course is required for all Engineering undergraduate programs.

6. **Course Specific Goals:** (Letters and numbers in parentheses correspond to specific ABET outcomes covered in this course and the expected levels of attainment)

   a. Students will gain a knowledge and understanding of the fundamentals of decision economics as it relates to engineering projects. (outcome m, BOK outcome 1, level 2 comprehension)
   b. Students can explain key concepts and problem solving processes used in decision economics. (outcome m, BOK Outcome 14, level 3)

7. Brief List of Course Topics:

1. Account Balance Equations
2. Single Cash Flows and Equivalence
3. Uniform Series Equivalence
4. Trends
5. Compounding Frequency and Nominal & Effective Interest Rates
6. Economic Criteria
7. Present Worth, Future Worth, Equivalent Annual Worth
8. Rates of Return
9. Benefit to Cost Ratio and Payback Period Analyses
10. Depreciation and Depletion
11. Taxes on Ordinary Project Income
12. Retirement and Replacement
13. Inflation and Deflation

Course Syllabus PHIL 316 Spring 2013

1. *Course number and name* **PHIL 316 Professional Ethics**

2. *Credits and contact hours* 3 Credit, 3 Contact Hours

3. *Instructor's or course coordinator's name*

4. *Text book, title, author, and year*

   a. *other supplemental materials*

5. *Specific course information*

   a. *brief description of the content of the course (catalog description)*
      A study of some of the moral problems encountered in the professions of business, medicine, law, and engineering; different conceptions of the nature and source of moral obligation in the professions.
   b. *prerequisites or co-requisites*

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*

6. *Specific goals for the course*
   a. *specific outcomes of instruction*

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a -	h -
b -	i -
c -	j -
d -	k -
e -	l -
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Brief list of topics to be covered*
   1. History of Ethics- Definition of Ethics-Ethical Dilemmas
   2. Types of Judgments
   3. History of Moral Law
   4. Business Ethics-Ethical Standards
   5. Moral Development-Kohlberg Moral Development Scale-Read Air Force Brake
   6. Kohlberg Continued-Gilligan-Air Force Brake Discussion
   7. Class Discussion of Air Force Brake
   8. Review Kohlberg-Homework-Read Bhopal
   9. Discuss Lesson VIII-Moral Responsibility-Moral Responsibility and Culpability
   10. Review Bhopal-Relativism and Absolutism
   11. Pluralism-Advantages of Changing Mandate for Business
   12. Justifying Ethical Decisions-Religious Based Ethics
   13. Introduction to Utilitarianism-Homework, read Ford Pinto Case
   14. Discussion of Ford Pinto Continued-Introduction to Human Rights Standards
   15. Human Rights Standards Continued-Introduction to Justice as Fairness
   16. John Rawls' Principles-Entrepreneurship Contrasted with Egalitarianism
   17. Donaldson Continued-Cummins' Model for Distinguished Bribes
   18. The Ethics of Advertising
   19. Gender Discrimination in the Workplace A Look at Sexual Harassment
   20. Gender Discrimination-Part II-The Company-How to Protect Itself from S.H
   21. The Ethics of Leadership-Maslow's Hierarchy
   22. The Ethics of Conflict
   23. The Ethical Problems Concerning Legalization of Marijuana
   24. The Case for Permissible Paternalism
   25. Affirmative Action

Course Syllabus ART Elective (SP 2013)

1. *Course number and name* **ART Elective**
   Students may select any course from the approved list below:
   MUS Any course except Voice and Instrumental lessons.
   (recommended: 104, 105, 106, 108, 109, 308, 360, 362, 364)
   VIAR Any course (recommended 120, 121, 122)
   THEA Any course (recommended 161, 261)
   DANC Any course (recommended 101, 102)

2. *Credits and contact hours* 3 Credits, 3 Contact Hours

3. *Instructor's or course coordinator's name*
   Varies depending on elective selected

4. *Text book, title, author, and year*
   Varies depending on elective selected

   a. *other supplemental materials*
   Varies depending on elective selected

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Art Elective – fulfills the General Education requirement for an ART elective.
   b. *prerequisites or co-requisites*
      There are no pre-requisites
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Selected elective
6. *Specific goals for the course*
   a. *specific outcomes of instruction*
   Varies depending on elective selected

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a -	h - 1
b -	i -
c -	j -
d -	k -
e -	
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Brief list of topics to be covered*
   Varies depending on elective selected

Course Syllabus HISTORY Elective (SP 2013)

1. *Course number and name* **HIST Elective**
   Students may select any course from the approved list below:
   HIST All history courses except HIST 390
   (recommended: 101, 102, 103, 104, 221, 222, 223, 224, 321, 322)

2. *Credits and contact hours* 3 Credits, 3 Contact Hours

3. *Instructor's or course coordinator's name*
   Varies depending on elective selected
4. *Text book, title, author, and year*
   Varies depending on elective selected
   a. *other supplemental materials*
   Varies depending on elective selected
5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
   HIST Elective – fulfills the General Education requirement for a HIST elective.
   b. *prerequisites or co-requisites*
   Varies depending on elective selected
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
   Selected elective
6. *Specific goals for the course*
   a. *specific outcomes of instruction*
   Varies depending on elective selected
   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a -	h - 1
b -	i -
c -	j -
d -	k -
e -	
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Brief list of topics to be covered*
   Varies depending on elective selected

Course Syllabus LITERATURE Elective (SP 2013)

1. *Course number and name* **LIT Elective**
   Students may select any course from the approved list below:
   ENGL Any course that focuses on literary texts (recommended: 201, 202, 205, 206, 210, 211, 212, 215, 216, 312, 319, 320, 321, 322, 333, 342, 371, 372, 380, 381)
   FORL 331, 332
   FREN 202, 311, 431(G), 441(G), 471, 472, 481(G), 491(G), 492(G)
   GERM 202, 311, 405(G), 441(G), 442(G), 471, 472
   LATN 301, 302
   SPAN 203, 311, 441(G), 442(G), 480(G)

2. *Credits and contact hours* 3 Credits, 3 Contact Hours

3. *Instructor's or course coordinator's name*
   Varies depending on elective selected
4. *Text book, title, author, and year*
   Varies depending on elective selected
   a. *other supplemental materials*
   Varies depending on elective selected
5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
   LIT Elective – fulfills the General Education requirement for a Humanities/LIT elective.
   b. *prerequisites or co-requisites*
   Varies depending on elective selected
   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
   Selected elective
6. *Specific goals for the course*
   a. *specific outcomes of instruction*
   Varies depending on elective selected
   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

a -	h - 1
b -	i -
c -	j -
d -	k -
e -	
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. *Brief list of topics to be covered*
   Varies depending on elective selected

Course Syllabus UNIV 100 Cajun Connection (SP 2013)

1. *Course number and name* **UNIV 100 Cajun Connection**

2. *Credits and contact hours* 2 Credits, 2 Contact Hours

3. *Instructor's or course coordinator's name*
   Dr. Theresa Wozencraft

4. *Text book, title, author, and year*

   Your Guide to College Success: Strategies for Achieving Your Goals, 7th ed.
   Halonen, J, & Santrock, D (Customized, shrinkwrapped and hole-punched. Includes access code for premium website. ISBN at UL bookstore: 9781285116464

   Shared Reading: From Every End of This Earth by Steven B. Roberts

   a. *other supplemental materials*

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*

      Provides students the opportunity to engage fully in the college experience by increasing knowledge and skills that improve academic success and facilitate lifelong achievement. Restr: Freshmen only.

   b. *prerequisites or co-requisites*
      There are no pre-requisites

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Required

6. *Specific goals for the course*
   a. *specific outcomes of instruction*

   Course Learning Expectations:
   1) To increase awareness about the University of Louisiana at Lafayette and to benefit from its programs, services, and resources.
   2) To maximize success in matriculation though the higher education curriculum.
   3) To create opportunities to build social, support, and professional networks.
   4) To start building the foundation for fulfillment and success in and beyond college.

   Course student interaction expectations: Students will be expected to engage in group work during some classes. Students are also expected to participate in class discussions and treat the instructor and classmates with respect. Repeated failure to show respect can lead to dismissal from the course. This course includes a required service learning assignment that will take place outside of the scheduled class time (probably on a Saturday or Sunday). Be sure to reserve this date on your calendar.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a -	h - 1
b -	i - 2
c -	j - 2
d - 1	k - 2
e -	
f -	
g - 1	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

1. Campus involvement, campus resources, and critical thinking skills
2. Time management
3. Money management
4. Study skills
5. Introduction to the major
6. Service Learning

Course Syllabus UNIV 200 Information Literacy (SP 2013)

1. *Course number and name* **UNIV 200 Information Literacy**

2. *Credits and contact hours* 2 Credits, 2 Contact Hours

3. *Instructor's or course coordinator's name*
   Dr. Mike Totaro

4. *Text book, title, author, and year*

   Cheri Manning, Catherine Manning Swinson, *Microsoft® Office 2010, A Skills Approach*, McGraw Hill Publishing – Triad Interactive, Inc. ISBN Number – 978-0-07-351647-9. (optional)

   a. *other supplemental materials*
      SimNet®/SimGrader® online program

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*

      Introduction to word processing, spreadsheet, database, and presentation software; ethics; and societal impact of information technology. Prereq: Successful completion of SimNet Online basic skill test. Restr: Credit in only one introduction information of computer literacy course applicable toward degree.

   b. *prerequisites or co-requisites*
      There are no pre-requisites

   c. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*
      Required

6. *Specific goals for the course*
   a. *specific outcomes of instruction*
      The student will be able to:
      1. Demonstrate basic electronic communication skills, as measured by the ability to use web-based email and a learning management system (i.e. Moodle).
      2. Search electronic sources for information; collect, evaluate, and utilize retrieved data to advance arguments; and access and use information sources ethically and legally.
      3. Demonstrate proficiency in the use of word processing applications.
      4. Demonstrate the ability to use spreadsheet applications at a basic level.
      5. Demonstrate the ability to use database management at a basic level.
      6. Demonstrate proficiency in the use of presentation applications.
      7. Demonstrate the ability to integrate various applications.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

a -	h - 2
b -	i - 3
c -	j - 3
d -	k - 1
e -	
f -	
g -	

1-strongly covered, 2-covered, 3-briefly covered, and Blank-not covered

7. Brief list of topics to be covered

7. Introduction: Moodle, email, Internet search and source verification
8. Word processing: Formatting, thesaurus, tables, charts, graphics, tracking changes, templates
9. Spreadsheet: Formulas, worksheets, pivot tables, data analysis
10. Database: Views, sorting and filtering, relationships, forms, queries, reports
11. Presentation: Formatting, slide show, charts and action buttons, recording show and audio; publishing

APPENDIX B

Faculty Vitae

Faculty Vitae RAKESH BAJPAI

1. *Name* Rakesh Bajpai

2. *Education*

Degree	*discipline*	*institution*	*year*
B. Sc.	Chemical Engineering	Harcourt Butler Technological Institute, Kanpur, India	1969
M. Tech.	Chemical Engineering	Indian Institute of Technology, Kanpur, India	1972
Ph.D.	Chemical Engineering	Indian Institute of Technology, Kanpur, India	1976

Postgraduate diploma in Industrial Applications of Microbiology, UNESCO Scholar, Institute of Microbiology, Czech Academy of Sciences, Prague, 1973-1974.

3. *Academic experience*

institution	*rank/title*	*Period*	*full/part time*
University of Louisiana at Lafayette	Professor	2007 -	Full time
University of Missouri – Columbia	Professor	1993-2008	Full time
University of Missouri – Columbia	Associate Professor	1986-1993	Full time
University of Missouri – Columbia	Assistant Professor	1982-1986	Full time
Institute fuer Gaerungsgewerbe und Biotechnologie, Berlin, Germany	Post-doc	1979-1982	Full time
Institute of Microbiology, ETH-Zurich	Post-doc	1978	Full time
Indian Institute of Technology, New Delhi	Lecturer	1976-1979	Full time

4. *Non-academic experience*

company or entity	*title*	*description of position*	*Period*	*full/part time*

None

5. *Certifications or professional registrations*

None

6. *Current membership in professional organizations*

Life Member, American Institute of Chemical Engineers

7. *Honors and awards*

Researcher of the Year, College of Engineering, University of Louisiana at Lafayette, 2012
Ranked Professor of Biological Engineering, University of Missouri – Columbia, 1997-2007

8. *Service activities (within and outside of the institution)*

Member, Louisiana Clean Tech Energy Round Table.
Chair, Algal Biorefineries Sessions at Annual AIChE Meetings since 2009.
Organizer, Annual Bioprocessing Symposium of Louisiana since 2008.

Associate Director, Bioprocessing Research Laboratory, UL Lafayette
Director, Environmental Engineering Laboratory, UL Lafayette

9. Briefly list the most important publications and presentations from the past five years – title, co-authors if any, where published and/or presented, date of publication or presentation

- J. Bader, L. Skelac, S. Wewetzer, M. Senz, M. K. Popović, and R. Bajpai. "Effect of Partial Pressure of CO_2 on the Production of Thermostable α-amylase and Neutral Protease by *Bacillus caldolyticus*". **Appl. Biochem. Microbiol.** 48(2):182-187 (2012).
- Ayalasomayajula, Srividya, Subramaniam, Rmalingam, Gallo, August, Dufreche, Stephen; Zappi, Mark; and Bajpai, Rakesh. "Potential of Allogator Fat as Source of Lipids for Biodiesel Production". **I&EC Research.** 51:2166-2169 (2012).
- R. Subramaniam, S. Dufreche, M. Zappi, and R. Bajpai. "Microbial lipids from renewable resources: production and characterization". **J. Ind. Microbiol. Biotechnol.** 37(12): 1271-1287, 2010.
- Y. Liu, A. A. Gallo, R. K. Bajpai, A. Chistoserdov, N. Andrei, L. Segura, W. Xu. "The Diversity and Molecular Modelling Analysis of B_{12}-dependent and B_{12}-independent Glycerol Dehydratases". **Int. J. Bioinformatics Res. Appl.,** 6(5): 484-507, 2010.
- R. Wild, S. Patil, M. Popovic, M. Zappi, S. Dufreche, R. Bajpai. "Lipids from Lipomyces starkeyi". **Food Technol. Biotechnol.**, 48(3): 329-335, 2010.
    - D. D. Gang, R. Bajpai, and S. Banerji. "Wastewater Treatment Processes". **Encl. Agr. Food Biol Eng., 2nd Ed.** 1(1): 1825-1836, 2010.
- R. Bajpai, M. Zappi, J. Kim, and M. Qasim. "Bioremediation". **Encl. Agr. Food Biol. Eng., 2nd Ed.** 1(1):162-172, 2010.
- J. Bader, E. Mast-Gerlach, M. K. Popović, R. Bajpai, and U. Stahl. "Relevance of Microbial Coculture Fermentations in Biotechnology", **J. Appl. Microbiol.**, 109(2):371-387, 2010.
- K. Schwab, J. Bader, C. Brokamp, M. K. Popović, R. Bajpai, and Marin Berovič, "Dual Feeding Strategy for the Production of α-Amylase by *Bacillus caldolyticus* using Complex Media", **New Biotechnology**, 26:68-74, 2009.

10. Briefly list the most recent professional development activities

Faculty Vitae WILLIAM M. CHIRDON

1. *Name* William M. Chirdon

2. *Education –*

Degree	*discipline*	*institution*	*year*
B. ChE.	Chemical Engineering	University of Delaware, Newark.	1998
M. S.	Polymer Sci/Eng	University of Michigan, Ann Arbor	2000
Ph.D.	Polymer Sci/Eng	University of Michigan, Ann Arbor	2004

3. *Academic experience –*

institution *rank/title* *Period* *full/part time*

University of Louisiana at Lafayette
Associate Professor of Chemical Engineering, August 2012 – present
Assistant Professor of Chemical Engineering, August 2006 – July 2012

Cornell University, Ithaca, NY
Post-doctoral Research Associate, June 2005 – August 2006

University of Michigan, Ann Arbor
Graduate Research Assistant, Fall 1999 - Spring 2002

University of Delaware, Newark
Undergraduate Research Assistant, Summer 1996 – Summer 1997

4. *Non-academic experience –*

company or entity *title* *description of position* *Period* *full/part time*

None

5. *Certifications or professional registrations*

None

6. *Current membership in professional organizations*

American Institute of Chemical Engineers
Sigma Xi
Omega Chi Epsilon

7. *Honors and awards*

College of Engineering's Distinguished Achievement Award, Mar 2004
Outstanding Poster in Polymer Engineering, Fall 2003
Award for Research Excellence from Dow Chemical Co., Fall 2002

8. Service activities (within and outside of the institution)

Served as safety judge for AIChE Chemical Car team.
Served as poster judge for Macromolecular Science and Engineering Symposium, Ann Arbor, MI 2009
Invited Speaker during "International Week" at Pole University, Paris, France. March 2009
Served on NSF: Thermal Transport Processes Program review panel. May 2008
AIChE Faculty Advisor, 2007-present.

9. Briefly list the most important publications and presentations from the past five years – title, co-authors if any, where published and/or presented, date of publication or presentation

Khattab, A., Liu, C. Chirdon, W. Hebert, C. "Mechanical and thermal characterization of carbon nanofiber reinforced low-density polyethylene composites." J of Thermoplastic Composite Materials, Jan 2012.

Chirdon, W.M., Patil, A.P. "An Oscillating Boundary Temperature Method for the Determination of Transient Thermal Conductivity and Internal Heat Generation with a Comparison to a Transient Hot-Wire Method" Online First™, DOI: 10.1007/s10765-011-1072-1 27 August 2011.

Chirdon, W. M. "Polymerization Simulator for Introductory Polymer and Material Science Courses" Chemical Engineering Education, 44(3): 222-228, Summer 2010.

Chirdon, W. M., O'Brien, W. J., Robertson, R. E. "Mechanisms of goniochromism: translucent layering, filler alignment, and specular reflection." Dental Materials, 25(6): 802-809, June 2009.

S. W. Phillips, W. Aquino, and W. Chirdon. "Simultaneous Inverse Identification of Transient Thermal Properties and Heat Sources Using Sparse Sensor Information." ASCE-Journal of Engineering Mechanics. v. 133(12): 1341-1351 Dec 2007.

Chirdon, W. M., Aquino, W. A., Hover, K. H. "Measurement of thermal diffusivity of hydrating mortars" submitted to Cement and Concrete Research. v. 37(5): 680-690, 2007.

10. Briefly list the most recent professional development activities

Faculty Vitae — Stephen Dufreche

1. *Name* — Stephen Dufreche

2. *Education –*

Degree	*discipline*	*institution*	*year*
B. Sc.	Chemical Engineering	University of Louisiana, Lafayette, LA	2003
Ph.D.	Chemical Engineering	Mississippi State University, Starkville, MS	2008

3. *Academic experience –*

institution	*rank/title*	*Period*	*full/part time*
University of Louisiana at Lafayette	Assistant Professor	2008 -	Full time

4. *Non-academic experience –*

company or entity	*title*	*description of position*	*Period*	*full/part time*

None

5. *Certifications or professional registrations*

Engineering Intern, Louisiana, USA	EI.0021198	2004 -

6. *Current membership in professional organizations*

Member, American Institute of Chemical Engineers
Member, Louisiana Engineering Society
Member, Omega Chi Epsilon
Member, Tau Beta Pi
Associate Member, Sigma Xi

7. *Honors and awards*

Induction into Sigma Xi	2005

8. *Service activities (within and outside of the institution)*

Internal
- Faculty Advisor, Louisiana Engineering Society (UL Student Chapter)
- Faculty Co-Advisor, Tau Beta Pi (UL Student Chapter)
- Departmental Co-op & Internship Coordinator
- Undergraduate Student Academic Advising

External
- Chair, Algal Biorefineries Sessions at Annual AIChE Meetings since 2009
- Participant in National Lab Day STEM program
- Referee Service
    - Natural Sciences and Engineering Research Council of Canada
    - National Science Foundation - Small Business Innovation Research

- Organic Reactions Catalysis Society
- Industrial & Engineering Chemistry Research

9. *Briefly list the most important publications and presentations from the past five years – title, co-authors if any, where published and/or presented, date of publication or presentation*

Publications

- Dufreche, S., Zappi, M., and Bajpai, R., Benson, B., Guillory, J. " Lipid to Renewable Diesel: A Comparison of Opportunities and Technology" International Journal of Advanced Science and Technology. 39(2) 49-66, 2012.
- Ayalasomayajula, S., Subramaniam, R., Gallo, A., Dufreche, S., Zappi, M., and Bajpai, R. "Potential of Alligator Fat as Source of Lipids for Biodiesel Production" Ind. Eng. Chem. Res.(2011) DOI: 10.1021/ie201000s
- Microbial lipids from renewable resources: production and characterization. Subramaniam, Ramalingam; Dufreche, Stephen; Zappi, Mark; Bajpai, Rakesh. J. Ind. Microbiol. Biotechnol. 37(12): 1271-1287, 2010.
- Wild,R., Patil,S., Popovic,M., Zappi,M., Dufreche,S., Bajpai,R. "Lipids from Lipomyces Starkeyi" Food Technology and Biotechnology, 48, 3, 329-335 2010.
- Dufreche, S., Hernandez R., French, T., Sparks, D., Zappi, M., and Alley, E.,"Extraction of Lipids from Municipal Wastewater Plant Microorganisms for Production of Biodiesel," Journal of the American Oil Chemists' Society, 84, 2, 181-187 2007.

Presentations

- Subramaniam, R., Dufreche, S., Bajpai, R., and Zappi, M. Anaerobic Digestion of Waste Materials for the Production of Biogas. 2012 AIChE Annual Conference. Oral Presentation
- Sovine, S., Dufreche, S., Bajpai, R., and Zappi, M. Catalytic Production of 1,2-MPG From Glycerin. 2011 AIChE Annual Conference. Oral Presentation
- Subramaniam, R., Dufreche, S., Zappi, M., and Bajpai, R. Simulation and Economics of Biodiesel Production From Microbial Lipids. 2011 AIChE Annual Conference. Oral Presentation
- Patil, S., Subramaniam, R., Wang, C., Zappi, M., Dufreche, S., Bajpai, R. Experimental Studies and Reaction Kinetics of Lipid Synthesis From Lipomyces Starkeyi. 2010 AIChE Annual Conference. Oral Presentation
- Kiran, P., Dufreche, S., Bajpai, R., Zappi, M. Catalytic Conversion of Tall Oil to Biodiesel and Renewable Diesel. 2009 AIChE Annual Conference. Oral Presentation
- Graham,A., Dufreche,S., Bajpai,R., Zappi,M. Extraction Methods for Algae-Based Biodiesel. 2009 AIChE Annual Conference. Oral Presentation

JAMES D. GARBER

Faculty Vitae

1. *Name*James D. Garber

2. Education

Degree	Discipline	Institution	Year
B.S.	Chemical Engineering	University of Southwestern Louisiana	1966
M.S.	Chemical Engineering	Georgia Institute of Technology	1968
Ph.D.	Chemical Engineering	Georgia Institute of Technology	1970

3. *Academic Experience*

Institution	Rank	Period	Full/Part Time
University of Louisiana Laf..	Associate Professor	1975-1981	Full
University of Louisiana Laf.	Full Professor	1981-2012	Full
University of Louisiana Laf.	Emeritus Professor	2012-Present	Part Time
Director of UL Lafayette Corrosion Research Center		1984-2012.	Part Time

4. Non-Academic Experience

Company	Title	Description	Period	Full/Part
Mobil Chemical	Research Engineer	Development	1970-1972	Full
Union Camp	Process Engineer Mill Technical	1972-1975	Full	

5. *Certifications or Professional Registrations*

Registered Professional Engineer in Louisiana
Emeritus Member of Louisiana Engineering Board
NACE Fellow

6. *Current Membership in Professional Organizations*

Senior Member of AICHE
Member of Louisiana Engineering Society
Member of National Association of Corrosion Engineers (NACE)
Tau Beta Pi and Phi Kappa Phi

7. *Honors and Awards*

Tau Beta Pi
Omega Chi Epsilon
Phi Kappa Phi
Graduated from USL "With Distinction"
Received an NDEA Scholarship
NACE Fellow
Distinguished Toastmaster (DTM)
Outstanding AIChE Advisor
LES Professionalism Award
Chevron Professorship in CHEE
UL Outstanding Advisor, 2006
Engr. Outstanding Teacher, 2009

8. *Service Activities (within and outside of the institution)*

Advised all junior, senior and transfer students
Provide free consulting to company representatives who have corrosion problems.
Department BAM Club scholarship program coordinator

Louisiana Professional Registration Board transcript evaluator
Director of UL Corrosion Research Center
Omega Chi Epsilon Faculty Advisor

9. Briefly List the most important publications and presentations from the past five years.

- J.D. Garber, K. Knierim, J. Acuna, and K. Doekar, "Theoretical Modeling of Bacteria Corrosion in a CO_2 Environment," NACE Intl., Paper No. 1609, New Orleans, 2008.
- J.D. Garber, F.F Farshad, J.R. Reinhardt, H. Li and K.M. Yap, "A corrosion Predicative Model for Use in Flowline and Pipeline Integrity Management," NACE, Paper No. 8164, New Orleans, 2008.
- J.D. Garber, R. Nallu and K. Doekar, **Engineering Analysis Using Visual Basic,** July 31, 2008.
- J.D. Garber, F.F.Farshad, J.R. Reinhardt, H. Li, K.M. Yap, "Predicting Pipeline Corrosion", **Pipeline and Gas Technology** (Nov.-Dec. 2008) 7 (11) 36-41.
- J.D. Garber, SPE Presentation-Modeling Pitting Corrosion. New Orleans, LA August 8, 2008.
- J.D. Garber, J. Hebert, "Role of Acetates on Pitting Corrosion in a CO_2 Environment", NACE Intl. March 15, 2010, San Antonio, TX.
- J.D. Garber, "Comprehensive View of UL Lafayette Oilfield Corrosion Models", SPE Ntl. Meeting, 2010.
- J.D. Garber, Corrosion Models for the Oilfield, NALCO, Houston, TX, May 2010.
- J.D. Garber, V. Patil, and K. Yap, "CO_2 , H_2S and Bacteria Pitting Corrosion Model", NACE Intl. Meeting, March 13, 2011, Houston, Tx.
- J.D. Garber, "Pipeline Corrosion Model for Pipelines and Flowlines", Pipeline Corrosion Conference, Houston TX. , December 12, 2012.

10. *Briefly list the most recent professional development activities*

NACE National Meetings attended on 2008, 2009, 2010, 2011 and 2013
Attended Southeastern Chemical Engineerng Department Heads meetings in summer of 2008, 2009, 2010 and 2011.
NSCEE Regional Meeting in 2008 and National NSCEE National Meeting in 2008.

Faculty Vitae Rafael Hernandez

1. *Name* Rafael Hernandez

2. *Education*

Degree	*Discipline*	*Institution*	*Year*
BS	Chemical Engineering	University of Puerto Rico	1993
MS	Chemical Engineering	University of Puerto Rico	1996
Ph.D.	Chemical Engineering	Mississippi State University	2002

3. *Academic experience*

5/2013 – Present	Professor and Department Head, J. Madison Nelson/BORSF Professorship, Department of Chemical Engineering, University of Louisiana at Lafayette
8/2009 – 4/2013	Associate Professor, Dave C. Swalm School of Chemical Engineering, Mississippi State University, Box 9595, MSU, MS 39762
1/2010- 4/2013	Texas Olefins Professorship, Dave C. Swalm School of Chemical Engineering, Mississippi State University, Box 9595, MSU, MS 39762
9/2010- 4/2013	Associate Director of the Sustainable Energy Research Center, MSU
1/2010-8/2010	Interim Associate Director of the Sustainable Energy Research Center, MSU
5/2003-8/2009	Assistant Professor, Dave C. Swalm School of Chemical Engineering, Mississippi State University, Box 9595, MSU, MS 39762
1/2002 – 5/2003	Instructor of Chemical Engineering, Dave C. Swalm School of Chemical Engineering, Mississippi State University, Box 9595, MSU, MS 39762
6/97 – 12/98	Instructor of Chemical Engineering, Department of Chemical Engineering, University of Puerto Rico, Box 9046, Mayaguez, PR 00681-9046

4. *Non-academic experience*

4/12-Present	Technical Advisor, BioEnergy LLC.
9/95 – 5/97	Chemical Engineer-Contract Graduate Student, Environmental Engineering Division, Environmental Laboratory, US Army Corps of Engineers – Waterways Experiment Station, Vicksburg, MS

5. *Certifications or professional registrations* - Engineering in Training

6. *Current membership in professional organizations*
   American Institute of Chemical Engineers, American Chemical Society, American Oil Chemists Society

7. *Honors and awards*
   - 2013 Hearin Faculty Excellence
   - 2012 Hearin Faculty Excellence
   - 2011 Hearin Faculty Excellence
   - 2011 State Pride Award
   - 2010 State Pride Award
   - 2010 Texas Olefin Professorship
   - Selected for 2010 SECAC Academic Leadership Program
   - 2009 ECFC Research Award
   - 2005 Ralph E. Powe Junior Faculty Enhancement Award
   - 2004 MSU Initiation Grant

8. *Service activities (within and outside of the institution)*
    - Director of the MSU Biofuels Conference for 7 years (2005-2012)
    - Graduate Coordinator for 4 years (2009-2012)
    - Technical reviewer for *Bioresource Technology, Journal of Environmental Engineering, Environmental Science and Technology, Polymer International, Chemosphere,* US Civilian Research & Development Foundation, World Class University, National Council of Examiners for Engineering and Surveying, and the National Science Foundation.

9. *Briefly list the most important publications and presentations from the past five years – title, co-authors if any, where published and/or presented, date of publication or presentation*

(*Corresponding Author)

1. Schneider, T.*, Graeff-Hönninger, S., French, W.T., Hernandez, R., Merkt, N., Claupein, W., Hetrick, M., Pham, P., "**Lipid and carotenoid production by oleaginous red yeast Rhodotorula glutinis cultivated on brewery effluents,"** (2013) *Energy*, . Article in Press.
2. Emmanuel D. Revellame, William E. Holmes, Tracy J. Benson, Allison L. Forks, W. Todd French, and Rafael Hernandez, "Parametric Study on the Production of Renewable Fuels and Chemicals from Phospholipid-Containing Biomass," *Top Catal* (2012) 55:185–195.
3. Teresa Schneider*, Simone Graeff-Hönninger, William Todd French, Rafael Hernandez, Wilhelm Claupein, William Holmes, and Nikolaus Merkt, "Screening of industrial wastewaters as feedstock for the microbial production of oils for biodiesel production and high-quality pigments", Accepted for publication in *Journal of Combustion*, Volume 2012, Article ID 153410, 9 pages
4. AndroMondala, Rafael Hernandez,* Todd French,∗ Linda McFarland, Darrell Sparks, William Holmes and Monica Haque, "Effect of acetic acid on lipid accumulation by glucose-fed activated sludge cultures,"*J Chem Technol Biotechnol* 2012; 86: 0
5. Gonzalez-Garcia, Y., Hernandez, R., Zhang, G., Escalante, F.M., Holmes, W., French, W.T., "Lipids accumulation in Rhodotorula glutinis and Cryptococcus curvatus growing on distillery wastewater as culture medium," *Environmental Progress and Sustainable Energy*, In-Press
6. Rafael Hernandez*, 2011,"Petroleum Displacement Potential of Next Generation Biofuels Approaching Commercialization," *Current Opinion in Chemical Engineering*, 1 (2011), pp. 43-46.
7. Andro H. Mondala, Rafael Hernandez*, W. Todd French*, Jorge W. Santo Domingo, Mark Meckes, Linda McFarland, Hodon Ryu, and Brandon Iker, 2011, "Enhanced Lipid and Biodiesel Production from Glucose-Fed Activated Sludge: Kinetics and Microbial Community Analysis*"* *AIChE Journal*, Published on-line May 6, 2011.
8. Patrisha J. Pham, Rafael Hernandez*, William T. French, Benjamin G. Estil, and Andro Mondala, 2011, "A Spectrophotometric Method for Quantitative Determination of Xylose in Fermentation Medium," *Biomass and Bioenergy*, Vol. 35, Issue 7, pp. 2814-2821.
9. G. Zhang, *French, WT., Hernandez, R., Alley, E., and Paraschivescu, M., 2011, " Effects of furfural and acetic acid on growth and lipid production from glucose and xylose by Rhodotorula glutinis," *Biomass and Bioenergy*, Vol. 35, p. 734-740.
10. Revellame, E., *Hernandez, R., *French,W. T., Holmes, B., and Alley, E., 2011, "Production of Biodiesel from Wet Activated Sludge", *Journal of Chemical Technology and Biotechnology*, Vol. 86, Issue 1, pp. 61-68.

10. *Briefly list the most recent professional development activities*

Selected for 2010 SECAC Academic Leadership Program, and the 2011/2012 Leadership Program Sponsored by the MSU VP of Research Office.

Faculty Vitae Carl McIntyre

1. *Name* Carl McIntyre

2. *Education* –

Degree	*discipline*	*institution*	*year*
B. Sc.	Chemical Engineering	Georgia Institute of Technology	2003
M. S.	Macromolecular Science and Engineering	University of Michigan, Ann Arbor	2005
Ph.D.	Macromolecular Science and Engineering	University of Michigan Ann Arbor	2008

3. *Academic experience* –

institution	*rank/title*	*Period*	*full/part time*
University of Louisiana at Lafayette	Assistant Professor	2012 -	Full time
University of Michigan – Ann Arbor	Postdoc	2008-2012	Full time

4. *Non-academic experience* –

company or entity	*title*	*description of position*	*Period*	*full/part time*

None

5. *Certifications or professional registrations*

None

6. *Current membership in professional organizations*

7. *Honors and awards*

2011 Michigan Inventor (Recognition Tech Transfer Office) Celebrate Invention 2011
2008 NSF-AGEP Postdoctoral Fellowship
2007 Tsinghua University in China East Asian Pacific and Pacific Summer Institute
2007 University of Michigan Rackham Merit Fellowship Recipient

8. *Service activities (within and outside of the institution)*
None

9. Briefly list the most important publications and presentations from the past five years – title, co-authors if any, where published and/or presented, date of publication or presentation

1. McIntyre, E. C., H. Yang and P. F. Green "Electrorheology of polystyrene filler/polyhedral silsesquioxane suspensions" ACS Applied Materials & Interfaces (2012) Vol 4 pp. 2148-2153
2. McIntyre, E. C., H. J. Oh and P. F. Green "Electrorheological Phenomena in polyhedral silsesquioxane cage structure/PDMS Systems" ACS Applied Materials & Interfaces (2010) Vol 2 pp.965–968 [1]
3. McIntyre, E. C. and F.E. Filisko "Filtration in Electrorheological Suspensions Related to the Peclet Number" Journal of Rheology 2010 Vol 54 pp.591–603 [1]
4. McIntyre, E. C. and F. E. Filisko "Squeeze Flow Rheology of Zeolite Suspensions" Applied Rheology Vol. 19 (2009) pp. 1–8 [1]
5. McIntyre, E.C. and F. E. Filisko "Squeeze Flow of Electrorheological Fluids Under Constant Volume" Journal of Intelligent Material Systems And Structures Vol. 18 (2007) pp. 1217-1220 [3]

10. Briefly list the most recent professional development activities

None

Faculty Vitae Devesh Misra

1. *Name* Devesh Misra

2. *Education –*

Degree	*discipline*	*institution*	*year*
B. Sc.	Metallurgical Engineering	Indian Institute of Technology, Varanasi, India	1980
Ph.D.	Materials Science and Metallurgy, Cambridge, UK		1984

3. *Academic experience –*

Institution	*rank/title*	*Period*	*full/part time*
University of Louisiana at Lafayette	Professor	2001-	Full time
Defense Metallurgical Research Lab, India	Scientist	1984-97	Full time

4. *Non-academic experience –*

company or entity	*title*	*description of position*	*Period*	*full/part time*
LTV Steel – Technology Center, Ohio, USA	Research Engineer		1997-2000	Full time

5. *Certifications or professional registrations*

Chartered Engineering – The Intsitute of Materials, London

6. *Current membership in professional organizations*

Fellow of ASM International, Fellow of The Institute of Materials, UK

7. *Honors and awards*

2009	Distinguished Professor of Chemical Engineering
2009	College of Engineering Researcher Award
2007	*Charles Hatchett Award 2007*. The award is conferred by Institute of Materials, UK.
2007	*Composite Award 2007*. The award is conferred by Institute of Materials, UK.

8. *Service activities (within and outside of the institution)*

Director, Center for Structural and Functional Materials
Graduate Coordinator of Chemical Engineering Department
Editor, Materials Technology: Advanced Performance Materials, UK
Associate Editor, Materials Science and Technology, UK
On the Editorial Board and Reviewer for over 50 scientific journals

9. *Briefly list the most important publications and presentations from the past five years – title, co-authors if any, where published and/or presented, date of publication or presentation*

1. Understanding Mechanical Property Anisotropy in High Strength Niobium-Microalloyed Linepipe Steels

P.K.C. VENKATSURYA, Z. JIA, R.D.K. MISRA, M. MULLOHAND, M. MANOHAR, and J.E. HARTMANN
MATERIALS SCIENCE AND ENGINEERING A, 556 (2012) 194-210.

2. Hybrid Nanostructured Drug Carrier With Tunable and Controlled Drug Release
D. DEPAN AND R.D.K. MISRA
MATERIALS SCIENCE AND ENGINEERING C: BIOMATERIALS AND BIOMEDICAL APPLICATIONS, 32 (2012) pp. 1704-1709.

3. Carbon Nanotube-induced Structure and Phase Evolution in Polymer-based Nanocomposites Crystallized at Elevated Presurres
Z. JIA, F. FENG, Q. YUAN, and R.D.K. MISRA
MATERIALS SCIENCE AND ENGINEERING B: SOLID STATE MATERIALS FOR ADVANCED TECHNOLOGY, B177 (2012) pp. 666-672.

4. Biomechanical Properties and Large Strain Deformation of Artificial Silicone Devices with Different Forms of Nanostructured Carbon
R.D.K. MISRA and Q.YUAN
MATERIALS SCIENCE AND ENGINEERING C: BIOMATERIALS AND BIOMEDICAL APPLICATIONS, 32 (2012) pp. 902-908.

5. Cellular Mechanics of Modulated Osteoblasts Functions in Graphene Oxide Reinforced Elastomers
B. GIRASE, J.S. SHAH, and R.D.K. MISRA
ADVANCED BIOMATERIALS, 14 (2012) B.101-B111.

10. Briefly list the most recent professional development activities

2012-13	On the scientific committee of 7Th International Conference on Physical and Numerical Simulations, Finland (2013)
2011	Panel Reviewer of the Structural Metallics Program of the Office of Naval Research (ONR)
2010	Co-organizer of Next Generation of Biomaterials Symposium, Materials Science and Technology (MST), Houston (2010)
2008-till date	Member of Biomaterials committee of The Minerals, Metals and Materials Society, USA

Faculty Vitae

1. *Name* **Ramalingam Subramaniam**

2. *Education* –

Ph.D. (Chemical Engineering) Anna University, Chennai, India, 2005
M.E. (Chemical Engineering) Annamalai University, Chennai, India, 2000
B.E. (Chemical Engineering) Annamalai University, Chennai, India, 1998

3. *Academic experience* –

Assistant Professor, University of Louisiana, Lafayette	Since August 2012
Research Scientist, University of Louisiana, Lafayette	January 2010 – August 2012
Post Doctoral Research associate, Tulane University	October 2008 – January 2010
Assist. Prof., SSN College of Eng., Chennai, India	April 2005 – October 2008
Teaching Res. Associate, Anna Univ., Chennai, India	July 2001 – April 2005

4. *Non-academic experience* –

company or entity	*title*	*description of position*	*Period*	*full/part time*

None

5. *Certifications or professional registrations*

None

6. *Current membership in professional organizations*

Member, American Institute of Chemical Engineers

7. *Honors and awards*

Outstanding post-doctoral researcher award from American Institute of Chemist Foundation in 2009

8. *Service activities (within and outside of the institution)*

None

9. *Briefly list the most important publications and presentations from the past five years – title, co-authors if any, where published and/or presented, date of publication or presentation*

Jianzhong Liu, Qian Wang, Jiabao Yan, Xiaorong Qin, Lingling Li, Wu Xu, **Ramalingam Subramaniam**, and Rakesh K. Bajpai (2012) Isolation and Characterization of a Novel Phenol Degrading Bacterial Strain WUST-C1 Ind. Eng. Chem. Res. (Available online)

Srividya, A., **Subramaniam, R.,** Gallo, A., Dufreche, S., Zappi, M., Bajpai, R. (2011). Potential of Alligator Fat as Source of Lipids for Biodiesel Production. Ind. Eng. Chem. Res. 2012, 51, 2166–2169.

Senthilkumar, P., **Subramaniam, R.,** Abhinaya, R.V., Kirupha, D.S., Vidhyadevi, T., Sivanesan,S. (2011) Adsorption equilibrium, thermodynamics, kinetics, mechanism and process design of

zinc(II) ions onto cashew nut shell. The Canadian Journal of Chemical Engineering (Accepted for publication).

Senthilkumar, P., **Subramaniam, R.,** Abhinaya, R. V., Kirupha, D.S., Murugesan, A., Sivanesan, S. (2011) Adsorption of metal ions onto the chemically modified agricultural waste, CLEAN – Water, Air, Soil (Accepted for publication).

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10. Briefly list the most recent professional development activities

APPENDIX C

Equipment

Equipment

A. Unit Operations Laboratory

This laboratory contains the equipment listed below, which is fully functional. Experiments are rotated each year to maximize utilization of the equipment.

Quantity	Item
1	Air Compressor
1	30-60 psi Boiler
1	Vacuum Pump
1	Double Pipe Heat Exchanger
1	Reynolds Number Experiment
1	Packed Bed Distillation Column
1	Karr Extraction Column
1	Gas Absorption Unit
1	Fluidized Bed Apparatus
1	Star Liquid Filtration Unit
1	Slurry Tank with Stirrer
1	Multiple Effect Evaporator
1	Two-Phase Flow Apparatus
1	Particle Distribution Apparatus
2	Liquid Piping System for Pressure Drop Measurements
1	Air Blower with Pressure Drop
1	Stirred Tanks in Series
1	ASTM Distillation Apparatus
1	Fisher Scientific Oven
1	Plate and Frame Heat Exchanger
1	Fermenter System
1	Refrigeration Unit
1	Armfield Ion Exchange Unit
1	Portable Fuel Cell
2	Pumps for Pump Curve Experiments (Centrifugal and Diaphram)

B. Controls and Simulation Laboratory

This is an undergraduate laboratory that is part of the process controls course, CHEE 413. The following five experimental units are used and listed below:

1. Simple Loop Temperature Control Unit
2. Double Loop Control System – temperature and flow
3. Level Control System – computer controlled (feedback unit)
4. pH Control System – (feedback unit)

The first three units use only hot and cold water and are low maintenance.

In addition to these, the department has a Digital Control System (DCS) Delta V which allows monitoring and control of our multiple effect evaporator. Students run the unit manually in the fall semester and put it on process control in the spring semester to illustrate process control.

A software package has been acquired to simulate the control of a distillation column and a boiler. The software is located in Madison 214, Computer Room.

APPENDIX D

Institutional Summary

Appendix D - Institutional Summary

1. The Institution

a. Name and address of the institution

University of Louisiana at Lafayette (founded 1898)
Lafayette, Louisiana 70504

URL: http://www.louisiana.edu

b. Name and title of the chief executive officer of the institution

Dr. E. Joseph Savoie
President

c. Name and title of the person submitting the self-study report.

Terrence L. Chambers, Ph.D., P.E.
Associate Dean, College of Engineering

d. Name the organizations by which the institution is now accredited and the dates of the initial and most recent accreditation evaluations.

The University of Louisiana at Lafayette is accredited by the
Commission on Colleges of the Southern Association of Colleges and Schools (SACS)
1866 Southern Lane
Decatur, GA 30033-4097
(404) 679-4501
to award Baccalaureate, Master's, and Doctoral Degrees.

Initial accreditation by SACS occurred in 1925 and the most recent accreditation evaluation occurred in 2010.

The University of Louisiana at Lafayette is also a member of:

Southern University Conference
Association of Collegiate Schools of Architecture
American Assembly of Collegiate Schools of Business
American Association of State Colleges and Universities
Conference of Southern Graduate Schools
Council of Graduate Schools

Accredited Programs

Program	Accrediting Agency
Architecture	National Architectural Accrediting Board (NAAB)
Athletic Training	Commission on Accreditation of Athletic Training Education (CAATE)
Business Administration	International Association to Advance Collegiate Schools of Business (AACSB International)
Chemistry	American Chemical Society[a]
Computer Science	Computing Accreditation Commission of ABET, http://www.abet.org.[a]
Communication	Accrediting Council on Education in Journalism and Mass Communications
Dietetics	Commission on Accreditation for Dietetics Education (CADE)
Education	National Council for Accreditation of Teacher Education
Chemical Engineering	Engineering Accreditation Commission of ABET, http://www.abet.org.[b]
Civil Engineering	Engineering Accreditation Commission of ABET, http://www.abet.org.[b]
Electrical Engineering	Engineering Accreditation Commission of ABET, http://www.abet.org.[b]
Mechanical Engineering	Engineering Accreditation Commission of ABET, http://www.abet.org.[b]
Petroleum Engineering	Engineering Accreditation Commission of ABET, http://www.abet.org.[b]
Health Information Management	Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM)
Industrial Design	National Association of Schools of Art and Design (NASAD) Council for Interior Design Accreditation (CIDA)
Industrial Technology	Association of Technology, Management and Applied Engineering (ATMAE), Association of Technology, Management and Applied Engineering, 3300, Washtenaw Avenue, Suite 220, Ann Arbor, MI 48104, telephone: (734) 677-0720

Music	National Association of Schools of Music (NASM)
Nursing	Commission on Collegiate Nursing Education (CCNE)[c]
Professional Land and Resource Management	Curriculum approved by the American Association of Petroleum Landmen[d]
Speech Pathology and Audiology	Council on Academic Accreditation in Audiology and Speech-Language Pathology[e]
Teacher Education	National Council for Accreditation of Teacher Education
Visual Arts	National Association of Schools of Art and Design (NASAD)
[a]Accredits only undergraduate programs [b]Accredition sought for undergraduate program only [c]Accredits both undergraduate and graduate programs [d]The national professional association; not an official accrediting agency [e]Accredits only graduate programs	

Table D.1 – Accredited Programs

2. Type of Control

Description of the type of managerial control of the institution, e.g., private-non-profit, private-other, denominational, state, federal, public-other, etc.

Public state university

3. Educational Unit

Describe the educational unit in which the program is located including the administrative chain of responsibility from the individual responsible for the program to the chief executive officer of the institution. Include names and titles. An organization chart may be included.

Organizational Chart

Figure D-1below provides an organizational chart showing the position of the Engineering educational unit within the University.

a. Academic Departments

The following five Engineering departments, included in the College of Engineering, teach engineering subjects at the undergraduate and graduate levels leading to the B.S., M.S., and Ph.D. degrees.

Chemical Engineering
Civil Engineering
Electrical & Computer Engineering
Mechanical Engineering
Petroleum Engineering

b. Research Units

The University has approved the creation of several Centers in the College of Engineering (see listing below) to provide a focus for economic development, research, and industrial relations. These units are funded through a University budget and/or funded research projects and industrial grants. These Centers are administered and/or operated using engineering faculty and provide the opportunity for interdisciplinary cooperation for research studies.

Energy Institute
Bioprocessing Research Laboratory
Center for Louisiana Inland Water Studies
Center for Analysis of Spatial & Temporal System
Center for Materials Testing
Center for Telecommunications Studies
Center for Advanced Technology
Center for Corrosion Research
Environmental Engineering Laboratory
Institute for Coastal Engineering and Ecology
Louisiana Immersive Technologies Enterprise
Materials Testing Center

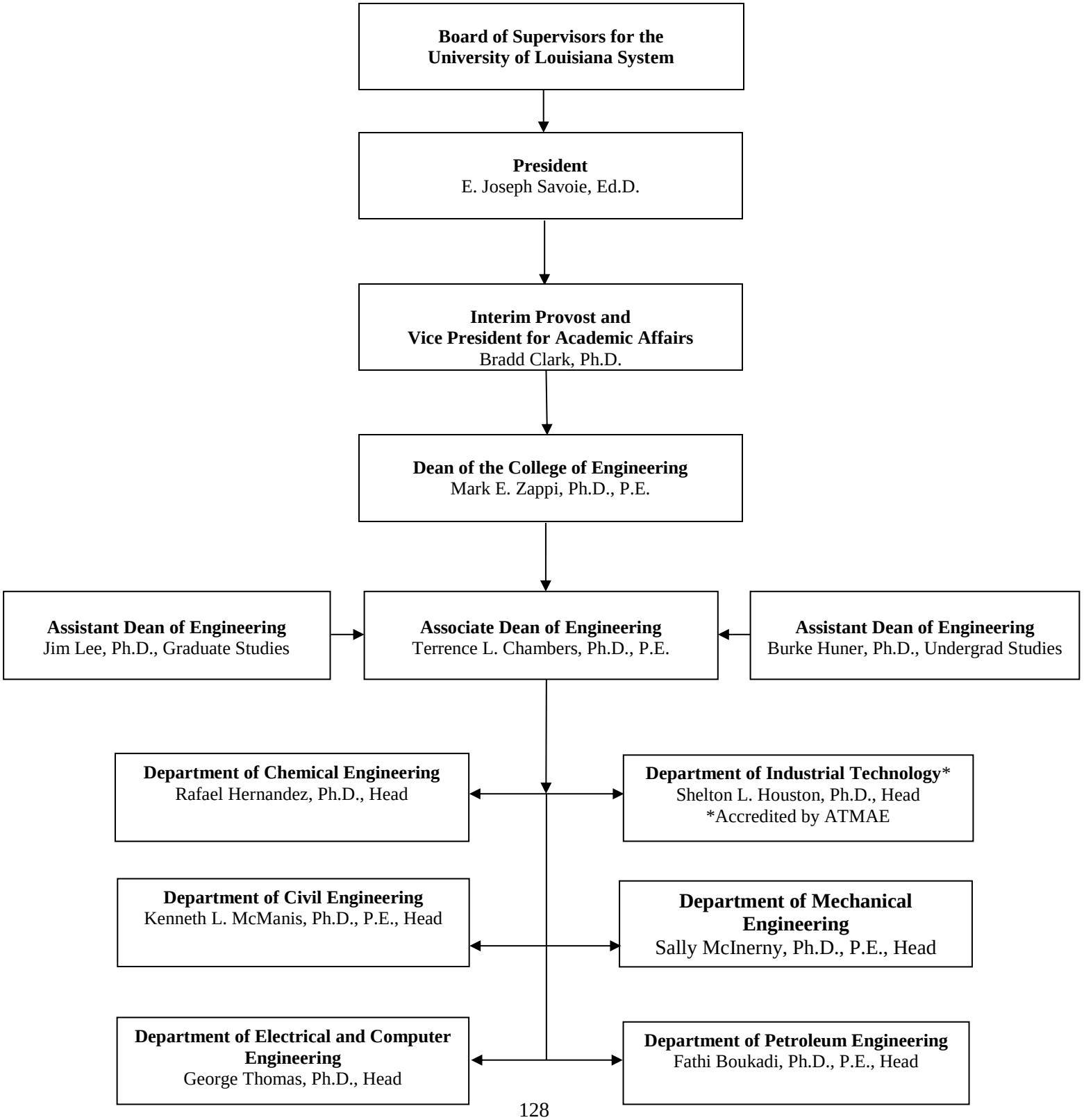
c. Other

The Center for Advanced Computer Studies (CACS) was formed by combining the graduate programs in Computer Science from the College of Sciences and Computer Engineering from the College of Engineering. This unit performs computer engineering and computer science research and teaches courses only at the graduate level leading to the M.S. degree and Ph.D. degree in both Computer Engineering and Computer Science. The Director of this Center, Dr. Magdy Bayoumi, while reporting to the Dean of Science, coordinates planning and activities with the Dean of Engineering.

d. Administrative Heads

The Dean of the College of Engineering is Mark E. Zappi, Ph.D., P.E. Dean Zappi maintains overall supervision and control of the entire College of Engineering and focuses on strategic planning, research production, giving, recruiting, and outreach. The Associate Dean of Engineering is Terrence L. Chambers, who focuses mainly on issues related to Academic Affairs. The Assistant Dean of Engineering for Graduate Studies is Jim Lee, Ph.D., while the Assistant Dean for Undergraduate Studies is Burke Huner, Ph.D. The Department head for Chemical Engineering is Dr. Rafael Hernandez. The Department Head for Chemical Engineering is Dr. Rafael Hernandez. The Department Head for Civil Engineering is Dr. Ken McManis. The Department Head for Electrical and computer Engineering is Dr. George Thomas. The Department Head for Mechanical Engineering is Dr. Sally McInerny. The Department Head for Petroleum Engineering is Dr. Fathi Boukadi, as shown in figure D-1 below:

Figure D-1 Organizational Chart



4. Academic Support Units

List the names and titles of the individuals responsible for each of the units that teach courses required by the program being evaluated, e.g., mathematics, physics, etc.

Department or Unit	Department Head
Mathematics	Dr. Azmy Ackleh
Physics	Dr. Natalia Sidorovskaia
English	Dr. James McDonald
Economics	Dr. Rand Ressler
Communications	Dr. T. Michael Maher
History, Philosophy, & Geography	Dr. Robert Carriker

Table D-2. Supporting Academic Departments **For Academic Year: 2012**

5. Non-Academic Support Units

List the names and titles of the individuals responsible for each of the units that provide non-academic support to the program being evaluated, e.g., library, computing facilities, placement, tutoring, etc.

a. Office of Information Technology (OIT)

The Office of Information Technology is headed by Mr. Gene fields, Chief Information Officer for the University. He oversees four smaller offices, which provide IT services across campus. The offices include the following:

- The IT Security Office

  The purpose of the IT Security Office is to insure the integrity of the university's networks, computing facilities, and sensitive faculty and student data to insure that they are safe from attack from worms, viruses, and hackers. The office provides regular audits, conducts user awareness training, and establishes computing policies to defend the university's computing facilities.

- Information Media Networks Office

  The purpose of the Office of Information Media Networks is to provide support to the university community relative to its phone and other communication equipment.

- Office of Information Systems

  The Office of Information Systems provides the following facilities and services:

  The IBM Mainframe (MVS). ISIS accounts on MVS provide administrative database access. TSO accounts on MVS provide a few academic and administrative applications. This system is accessible from any terminal or personal computer that can connect to the network.

  The ISIS Database. The ISIS database incorporates most of the administrative information in the University. Faculty advisors and administrative staff may obtain accounts to access student records.

  On-line Registration. Students are provided the ability to register for classes on-line via their individual password protected ULink account.

- University Computing Support Services (UCCS)

  University Computing Support Services (UCSS) is a service center for many administrative, instructional, and research computing activities at UL Lafayette. Computing Support Services provides the following facilities and services:

  The UCS Sun facility, which provides email, the primary campus web server, statistical packages and other tools of interest to academic users.

  Automated test scoring via the Tescan facility.

  Network configuration for on-campus PCs.

  The IT Help Desk, which provides consultation, documentation, and other assistance to faculty, staff and students using PCs, Macs, or UNIX.

The Office of Information Technology has several initiatives underway, including the implementation of an integrated administrative information system (or ERP) system, a university-wide network enhancement to replace dated network equipment in order to upgrade the campus network to handle the increased traffic attendant to growth and increased usage, a university wireless initiative to make wireless internet access available in most places on campus, and the renovation of various open computer labs across campus.

Major funding for many of these initiatives has been through the Student Technology Enhancement Program (STEP). The STEP program is funded by a self-assessed student fee of $5.00/Credit Hour up to a maximum of $60.00/semester administered

through the Student Government Association (SGA). The STEP program is intended to upgrade and increase the availability of technology on the UL Lafayette campus. Since its inception in 1997, STEP funding has been used to establish numerous open computer labs across campus, including the following locations: Bourgeois Hall, Cafe Fleur de Lis, Conference Center, Edith Garland Dupre Library, FG Mouton Hall, Griffin Hall, James R. Oliver Hall, Lee Hall, and Stephens Hall. STEP funds have also been used to create "smart classrooms" all across campus, and to upgrade and maintain that portion of the university's technology infrastructure that directly impacts the students.

One of the most important new features of the STEP Plan is that a permanent mechanism has been put in place for the maintenance and support (not simply the initial purchase) of all student funded technologies on campus. On April 15, 2010, the STEP Council approved a STEP Sustainability Plan designed to ensure that laboratories, smart classrooms, and infrastructure funded by STEP can be maintained and continue to provide satisfactory service to students. The Plan allocates one third (33%) of STEP revenues to a fund for the following six primary purposes:

- Hardware Maintenance and replacement
- Software licensing, maintenance, and assurance
- Network infrastructure (core and distribution)
- Wireless data network services on campus
- Managed laboratory printers
- Adequate and uniformly trained lab managers

A complete listing of funded STEP projects since the Fall of 2010 can be found is found on the OIT web site http://cio.ucs.louisiana.edu/stepawards. During the previous evaluation period (2002 – 2007), the College of Engineering received $325,328 in STEP funding for laboratory equipment. During the period from 2008 – 2013, the College of Engineering has received $352,260, representing a slight increase in the amount of funding received during the previous evaluation period. An important difference now, however is that all STEP grants awarded since Spring of 2010 have perpetual maintenance built into them. A listing of STEP grants received by the College of Engineering from the Fall of 2008 until the Spring of 2013 is included in Table D-3 below:

Table D-3 – STEP Funding for the College of Engineering (Fall 2008 – Spring 2013)

Fall 2008	Rougeou Hall Computer labs Projector Upgrade	Mr. Harvey Ozbirn	$19,809
Fall 2008	A/V System for Undergraduate Instruction	Dr. Shelton Houston	$3,337
Fall 2008	Engineering Computer Lab Upgrade	Dr. Terrence Chambers	$21,290
Spring 2009	Engineering Computer Lab Upgrade	Dr. Ahmed Khattab	$24,858.80
Spring 2009	Fermentation Equipment for Student Engineering Labs	Dr. Stephen Dufreche	$3,967.85
Spring 2010	Advanced Visualization and Virtual Reality Lab	Dr. Carolina Cruz-Neira & Dr. Terry Chambers	$32,000
Fall 2010	Chemical Engineering: Computer Lab Upgrade, Madison Hall Room 216	Mr. Jim Dooley	$13,476.50
Fall 2010	Electrical and Electronics Technology Laboratories Upgrade	Dr. G.H. Massiha, Mr. Harvey Ozbirn	$13,153.40
Fall 2011	Chemical Engineering: Computer Lab Upgrade, Madison Hall - Phase II	Mr. Jim Dooley	$19,845.00
Fall 2011	Rougeou Room 324 Projector & Podium Upgrade	Mr. Harvey Ozbirn	$10,000.00
Spring 2011	Civil Engineering Step Lab Upgrade	Mark LeBlanc	$3,000.00
Spring 2011	Document Viewers and Projectors	Dr. William Emblom and Jeff Guidry	$11,350.00
Spring 2011	Electronic Swipe Card Access for Rougeau Hall	Dr. Ted Kozman	$2,500.00

Spring 2011	Wireless Internet, Rougeau Hall	Dr. Sally Anne McInerny	$15,000.00
Spring 2012	Extraction Equipment for Engineering Laboratories	Dr. Stephen Dufreche	$63,400.00
Spring 2012	Enhancement of the Microprocessor control system Technology laboratory	Cherif Aissi	$17,256.50
Spring 2012	Robotics Engineering and Technology Laboratory Upgrade	Dr. G.H. Massiha and Harvey Ozbirn	$22,346.00
Fall 2012	Smart Multimedia Classrooms in Rougeou Hall	Dr. Ahmed Khattab	$30,000.00
Spring 2013	EE Electronics Laboratory	Dr. Mohammad R. Madani and Shelby A. Williams	$11,662.90
Spring 2013	Enhancement of the Integrated Systems Technology Laboratory	Cherif Aissi	$14,007.00
Total			$352,260

Additional institutional support units are described below.

b. Edith Garland Dupré Library**.**

Edith Garland Dupré Library is led by Dean Charles Triche. The library is centrally situated on the main campus of the University of Louisiana at Lafayette at 400 E. St. Mary Blvd. The library is open to students, faculty, staff, and the public. In 2000 two major construction projects were completed: (1) the renovation of the building which had existed since the middle of the 1960s and (2) an addition to the back of that building which resulted in double the amount of previous floor space. The Instructional Materials Center (IMC), a branch library, serves students and faculty from the University by providing materials to be used in classroom instruction on the elementary and secondary levels. It is located in Maxim Doucet Hall, Room 101. Other affiliated libraries include the Enterprise Sugar Library and the Hilliard University Art Museum.

Dupré Library recently added its one millionth bound volume (The Nature of Things at Lake Martin: exploring the Wonder of Cypress Island Preserve in Southern Louisiana by Nancy Camel) and has over 2 million microform units. Some 6,000

serial titles are currently under subscription, and backfiles are being collected in print and non-print format. Special collections include: U.S. government publications, Louisiana government publications, materials pertaining to the history and culture of Acadiana (in the Jefferson Caffery Louisiana Room), the University Archives and Acadiana Manuscripts Collections, the Ernest J. Gaines Center collection and the Rare Book Collection. Funds from a BORSF grant received in 2003 have been used to establish the Cajun and Creole Music Collection, a collection of commercial recordings of Cajun, Creole, Zydeco and swamp pop music.

The library oversees the administration and supervision of several high traffic student computer labs. These include the STEP Lab, consisting of approximately 150 networked computers, printers, servers; the Reference Online Center, consisting of approximately twenty-four networked computers; and the Gloria S. Cline Bibliographic Instruction SMART Classroom, which includes approximately thirty computers, an operator's workstation, telephone conferencing and projection equipment. As a service to the university's graduate students, the library also provides a graduate study room equipped with six computers.

Most of the library's collections are available online through the library's catalog. Patrons may access the catalog over the Internet from home, office, or campus. Educational materials housed in the Instructional Materials Center may be searched separately or in conjunction with a search of Dupré Library's holdings.

A trained professional and civil service staff with interests and talents in many fields provides high quality service to its patrons. Constant effort is being made to improve the University library system. The library is a member of the regional library organization, Lyrasis, which provides nationwide networked cataloging and other professional services. The rapid growth of the collection, the professional competence and interest of its staff, the utilization of the latest technologies in providing efficient library service and the active cooperation of the teaching faculty all work together to assure students and faculty of UL Lafayette the finest in library service available. Additional details, including library hours and other library services not mentioned here, may be found on the library's web site: http://library.louisiana.edu/.

c. Academic Success Center (ASC).

The Academic Success Center is led by Director Bette Harris. The ASC is a department that provides academic support services for all students and helps new students make a successful transition to the University. It reports to the Assistant Vice President for Academic Affairs. Junior Division provides academic support services to all students, regardless of classification. The professional staff provides academic, career, and personal counseling; teaches Academic Skills (ACSK) courses; and supervises the Learning Center which provides tutoring services and individualized instruction in specialized areas, along with academic and video programs. Junior Division spearheads the student retention program for the

University. Services provided by Junior Division include:

Counseling: Professional counselors in the Junior Division counsel and assist students in their adjustment to college. Each student in Junior Division is assigned to a specific counselor on the basis of his/her college major. Counselors provide both individual and group sessions which target adjustment to college, career decision-making, study skills, math anxiety, time management, and other significant areas of concerns for students.

Advising: Junior Division is that unit of the University responsible for providing academic counseling and support services to students from the time they are admitted to the University until they are accepted into the upper division. Upon entry to the University, Junior Division students are assigned to the academic department of their major for advising. During the Orientation-Registration sessions, faculty advisors discuss academic regulations, assist with course selection, and explain scheduling procedures. At other times, they hold individual and group conferences to help freshman understand the requirements of their field of study and to guide students in appropriate course selection for the next semester. Faculty advisors make suggestions about wise budgeting of time, effective study and learning techniques, tutoring assistance, and other matters important for student success.

Career Center: A library of career literature is available to students for help in decisions relating to choice of major curriculum and career. This library can be used for browsing or for serious research regarding career options. ACSK 140, Career Decision Making, is offered each semester and is particularly aimed to meet the needs of students with an undeclared major. Career testing, including interest surveys, personality and ability tests, is also available for the counselors in Junior Division.

Learning Center: The Learning Center provides various academic support services to facilitate learning. These services are offered in coordination with various academic and administrative departments on campus. Free tutoring in freshman, sophomore, and in upper level courses is offered by the Learning Center. Other Learning Center services include assessments of students' learning needs, supplementary instruction, and short courses for study improvement. A library of microcomputer and video-taped instruction, study guides, and background information needed in specific courses is available to supplement classroom instruction, and individual tutoring.

Services For Students With Disabilities: Services which facilitate adjustment to college for students with disabling conditions are available through the SSD Office which is an administrative unit of the University's Counseling and Testing Office. Students receive individual counseling, assistance for scheduling, and needed arrangements in class conditions, housing, parking, and other campus offerings. Auxiliary aides and services as well as information on campus resources for students with disabilities are also coordinated through the Office for Services to Students with

Disabilities.

In addition to the above services, Junior Division sponsors Advisor Workshops for new faculty, or for older faculty, allowing them to stay abreast of new rules and techniques of advising. These workshops are held frequently during each semester.

6. Credit Unit

It is assumed that one semester or quarter credit normally represents one class hour or three laboratory hours per week. One academic year normally represents at least 28 weeks of classes, exclusive of final examinations. If other standards are used for this program, the differences should be indicated.

At UL Lafayette, one semester hour is normally defined as nominal one contact-hour class period or a laboratory period of 2 – 3 contact hours, each week for 15 weeks. Thus one academic year consists of 30 weeks of instruction.

7. Tables

Complete the following tables for the program undergoing evaluation.

Table D-4. Program Enrollment and Degree Data

Chemical Engineering

Academic Year		Enrollment Year					Total Undergrad	Total Grad	Degrees Awarded			
		1st	2nd	3rd	4th	5th			Associates	Bachelors	Masters	Doctorates
2012-2013	FT	86	38	46	49	--	219	12	--	32	9	--
	PT	0	3	0	7	--	10	0				
2011-2012	FT	69	51	20	50	--	190	14	--	18	8	--
	PT	1	2	1	3	--	7	8				
2010-2011	FT	62	30	30	35	--	157	20	--	14	10	--
	PT	3	1	0	4	--	8	11				
2009-2010	FT	56	33	19	37	--	145	19	--	24	8	--
	PT	0	1	0	5	--	6	6				
2008-2009	FT	48	24	17	36	--	125	18	--	14	9	--
	PT	0	0	0	4	--	4	5				

Give official fall term enrollment figures (head count) for the current and preceding four academic years and undergraduate and graduate degrees conferred during each of those years. The "current" year means the academic year preceding the fall visit.

FT--full time
PT--part time

Table D-5. Personnel

Chemical Engineering

Year[1]: Fall 2012

	HEAD COUNT		FTE[2]
	FT	PT	
Administrative[3]	.5	0	.5
Faculty (tenure-track)	5.5	0	5.5
Other Faculty (excluding student Assistants)	0	0	0
Student Teaching Assistants	7.5	0	7.5
Student Research Assistants	1	0	1
Technicians/Specialists	1	0	1
Office/Clerical Employees	1	0	1
Others[4]	0	0	0

Report data for the program being evaluated.

[1] Data on this table should be for the fall term immediately preceding the visit. Updated tables for the fall term when the ABET team is visiting are to be prepared and presented to the team when they arrive.

[2] For student teaching assistants, 1 FTE equals 20 hours per week of work (or service). For undergraduate and graduate students, 1 FTE equals 15 semester credit-hours (or 24 quarter credit-hours) per term of institutional course work, meaning all courses — science, humanities and social sciences, etc. For faculty members, 1 FTE equals what your institution defines as a full-time load.

[3] Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.

[4] Specify any other category considered appropriate, or leave blank.

Signature Attesting to Compliance

By signing below, I attest to the following:

That the Chemical Engineering Department has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Engineering Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual.*

Mark E. Zappi, Ph.D., P.E.
Dean's Name (As indicated on the RFE)

Signature

6-26-2013
Date

APPENDIX E

Senior Exit Interviews Summaries

SPRING 2013 SUMMARY

SENIOR EXIT INTERVIEWS

(POSITIVE REMARKS)

- **CHEE 400 with Chirdon a good course (15)**
- **Liked ASPEN put it earlier in the curriculum (8)**
- **Liked professors and students (6)**
- **Liked Toastmasters course (6)**
- **Liked Laboratory experiments (6)**
- **Dufreche should do first plant design course (5)**
- **Dufreche is improving as a teacher (5)**
- **Like open door policy of faculty (4)**
- **Liked Controls course and lab (4**
- **Liked plant design (4)**
- **Dufreche is great with ASPEN (3)**
- **Glad I came to UL Lafayette (3)**
- **Chirdon is a great teacher (3)**
- **Liked industrial instructor (Brocksmith) in plant design**

SPRING 2013 SUMMARY

SENIOR EXIT INTERVIEWS

(SUGGESTED IMPROVEMENTS)

- **Computer room printers are in bad shape in both rooms (9)**
- **Computer lab needs AC at night and on weekends (8)**
- **Need to bring in more industrial practitioners to senior classes (5)**
- **Student room needs to be improved (4)**
- **Controls lab should be in phase with lecture (3)**
- **More emphasis on Excel in program (2)**
- **Get rid of CHEE 427 (redundant to CHEE 317) (2)**
- **Need a student study room (2)**
- **Controls needs more examples and less derivation of equations (2)**
- **Plant design needs to be more organized (2)**

Spring and Fall 2012
Summary Exit Interviews
(Positive Remarks)

- Good preparation for industry (7)
- Glad I chose CHEE (6)
- Liked the labs (5)
- Like Aspen on PC (4)
- Faculty are good and helpful (4)
- Liked courses with projects (3)
- Liked the faculty (3)
- Liked Heat Transfer (3)
- Liked Classmates (3)
- Liked Emphasis on Excel (2)
- Liked Toastmasters (2)
- Controls course was good (2)
- Dr. Bajpai has high expectations (2)

(#) represents number of students that stated comment

Spring and Fall 2012
Summary Exit Interviews
(Suggested Improvements)

- Problem with Mass Transfer Course. Book and teacher (12)
- Process Sim course – Math Lab is poorly explained (8)
- Controls too theoretical – too much math (5)
- Need Co-ops and internships (3)
- Air condition computer laboratory after hours (3)
- Upgrade Unit Operations Laboratory equipment (3)
- Math Lab needs step by step teaching (3)
- Need polymath on more computers (2)
- Controls laboratory needs to match lecture (2)
- Need more excel applications (2)
- Worried about pending lab fees (2)
- Plant design needs better organization (2)
- Need environmental course (2)
- Teach partial differential course instead of Calc III (2)

(#) represents number of students that stated comment

Summary Exit Interviews, Spring 2011
(Positive Remarks)

- Dr. Chirdon is very good teacher (7)
- Enjoyed Aspen and Tutorials (6)
- Happy with degree (6)
- Enjoyed classmates (6)
- Plant design was ok (3)
- Enjoyed being in AIChE (3)
- Controls is a good course (3)
- Liked accessibility to faculty (2)
- Reinhardt gives best lectures (2)
- Hard working students (2)
- Good software packages (2)
- Liked ChemE Calculations (2)
- Liked Toastmasters (2)
- Enjoyed the labs (2)
- Like Choice of Electives (2)
- Like the dual Chemistry/CHEE degree (2)

Summary Exit Interviews, Spring 2011
(Suggested Improvements)

- Problem with Mass Transfer Course (5)
    - Blue book is hard to follow (3)
    - Needs more application (2)
- Controls course needs more organization (3)
    - Lab is good, but ahead of lecture (2)
    - Slow down, too much power point (2)
- Computer room is hot after 5:00 p.m. (3)
- Need more outside speakers for Plant Design (3)
- Need P&ID work – No connection made with controls (3)
- Balance ECON 430 with ECON in Plant Design (1)
- Need seminar about graduate school opportunities (3)
- Dufreche is a poor teacher (2)
- Aspen Economics package is not working on lap top (2)
- Suggest a required Co-op – 5 year program (1)
- Plant design needs to include environmental (1)

Summary of 22 Exit Interviews, Spring 2010 (Positive Remarks)

- Liked overall program (13)
- Easy access to faculty (8)
- Liked lab courses (7)
- Heat Transfer good group project (5)
- Liked team effort courses (5)
- FE test was good (4)
- Liked Controls Lab (4)
- Liked electives (Polymers & Corrosion) (4)
- Dr. Chirdon is great (4)
- Dr. Dufreche is good (4)
- CHEE 400 – good change planned (3)
- Liked integrating of computers in courses (3)
- Core classes were helpful (2)
- Like dual degree (CHEM/CHEE) (2)
- New communications course is good (2)
- Dr. Liu great job (2)
- Liked safety videos (2)
- Good Aspen Project (2)
- Liked Bio-emphasis program (2)
- Like Unit Ops book (2)

Summary of 22 Exit Interviews, Spring 2010
(Suggested Improvements)

- Plant Design – Course structure a problem (need deadlines) (18)
    - Need classroom component (10)
    - No DEQ regs on environmental (8)
    - Too much economics (already have in ECON 430) (6)
    - Needed simple design initially (4)
    - Aspen poorly taught (4)
    - Dr. Bajpai not organized (4)
- CHEE 400 class – needs change (15)
- Mass Transfer course – needs to be more organized (5)
- Controls course – Need more Applications (5)
    - Lab very good (4)
    - Too much theory (2)
- Would like a Materials Lab (2 courses with no lab) (2)

Senior Exit Interviews, Spring 2009
(Positive Remarks)

- Dr. Liu is doing well, Dooley helping (8)
- Like small classes (6)
- Like Toastmaster class (5)
- CHEE Lab helps me to learn (4)
- Can talk to faculty (4)
- Like Dr. Dufreche in Lab, good teacher (3)
- Like new professors use of PowerPoint & Aspen (3)
- Speech class (CMCN 310 is good) (3)
- Heat Transfer – good design project (3)
- Enjoy Classmates (3)
- CHEE 101 is good course (3)
- Dr. Chirdon gave Excel project in Polymers (3)
- Liked Biology emphasis option (3)
- Scholarships are good (2)
- Controls lab was good (2)
- PowerPoint in Lab is good (1)
- Dr. Chirdon is great (1)
- Liked Engr Econ (1)
- Meeting with Dr. Bajpai and groups good (1)
- Like CHEM & CHEE degree combination (1)
- Organic Lab is good (1)
- Dr. Dufreche teaches Aspen (1)
- Materials best class (1)
- VB Class good (1)
- Like using ASPEN (1)

Senior Exit Interviews, Spring 2009
(Suggested Improvements)

- Need problems in Excel, spreadsheet (8)
- MatLab is not explained (7)
- Dr. Reinhardt too much writing on board – use handouts or PowerPoint (4)
- Plant Design – Like to start earlier in project (4)
- Help students get job (4)
- Use Aspen in Unit Ops (3)
- CHEM 402 (Chemistry of Materials) is redundant course (3)
- Some overlap in CHEE 317 and CHEE 427 (3)
- Modeling course not challenging, add excel (3)
- Like faculty to be more connected to industry (3)
- Instead of MatLab use Polymath or Moddle (2)
- Use CHEE 411 for senior elective (1)
- Need more Materials and Engr Balance in 1st semester of design (1)
- PHYS Lab was too simplistic (1)
- Dr. Bajpai not able to help with Aspen (1)
- Design course. No Design the first semester (1)
- Icarrus (Aspen) – Needs new license (1)
- Dr. Bajpai Aspen knowledge is limited (1)
- Design course has too much economics – already had (1)
- Would like to create a Process Control Flow Diagram (1)
- No Plant visits by AIChE (1)
- Give a practical Plant Design problem (1)
- Not interested in plant design for converting rice to ethanol (1)

Senior Exit Interviews, Spring 2008
(Positive Remarks)

- Dooley brings reality to controls in lab (8)
- CHEM Lab 233 was very good – distillation (4)
- CHEE 101 was good course (4)
- Chirdon's classes were very good (3)
- Right choice of school (3)
- Computers running better this spring (2)
- CHEE labs are good courses – understand (2)
- Dr. Liu has shown some improvement (2)
- Co-op could be 5-year program (2)
- Liked numerous job offers (2)
- Polymer class was good (1)
- Chemistry of Materials good course (1)
- Good curriculum (1)
- Liked materials classes (1)
- Biochemistry instead of Chemistry of Materials (1)
- CHEE elective in Biological Emphasis (1)
- Co-op was good experience – Junior Level Best (1)
- Liked choice of CHEE elective (1)
- Liked Physics lab (1)

Senior Exit Interviews, Spring 2008
(Suggested Improvements)

- Technical writing was a repeat, prefer Speech 310 (9)
- CHEE 400 Math lab problem need help (EE take) (6)
- Move Controls to fall semester (5)
- Controls is rough-PowerPoint from book, math mostly (5)
- Bajpai not really familiar with Aspen (4)
- In CHEE 403 lab, Farshad did not return reports (2)
- Start Senior Design in fall semester – earlier (2)
- In design ICARUS would be useful (2)
- Introduce ASPEN in junior year (2)
- Dr. Liu does not show any interest or enthusiasm (2)
- Could have multi-effect evaporation (1)
- Need more AIChE field trips (1)
- Plant Design in spring had no structure (1)

2007 SENIOR EXIT INTERVIEWS (15 SENIORS)

(1) Positive Remarks

- CHEE 101 great course (6)
- Enjoyed materials courses (5)
- Like oral presentations, liked Toastmasters (4)
- Dr. Chirdon is doing great, much improvement, approachable (4)
- Mass Transfer (CHEE 401) was really good, made us think (4)
- Mr. Dooley is awesome in controls lab, liked Simtronics (4)
- DCS was great to run (3)
- Ready to fact the world, very satisfied with preparation (3)
- Keep pushing co-op (3)
- Liked the Unit Ops laboratory (3)
- Curriculum changes are good (2)
- Like dual areas of research, materials and bioprocessing (2)
- Professors are friendly and helpful (2)
- Visual Basic course is really good (2)
- Heat transfer was great (2)
- New professors are tough
- Lots of computer work in the program

2007 SENIOR EXIT INTERVIEWS (15 SENIORS)

(2) Suggested Changes

- Extend Aspen over the entire year of design (8)
- Put the controls course earlier in curriculum (3)
- Like to get to do a P&ID in a final design (3)
- CHEE 400 could be improved by using MathLab and not Mathematica (3)
- Polymer class would be a good materials addition (2)
- Plant design should be taught by the same professor, we had 3 of them (2)
- Need more excel work for students during the program (2)
- Dr. Liu is a work in progress. Needs to show more interest. Slow down and no more 30 minute lectures.
- Cover more material in Transport

APPENDIX F

Assessment of Outcomes Covered by Courses

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

SENIORS (SPRING 2013 GRADUATES)
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

		FALL CHEE COURSES									**SPRING** CHEE COURSES						**OTHER** APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
	Outcomes	CHEE 101	CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	ENGR 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	1.4	1.0	1.7	1.1	1.2	1.4	1.0	1.5	1.1	1.1	1.0	1.3	1.3	1.2	1.8	1.6	1.2	1.0
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	1.2	2.3	2.4	1.8	2.4	1.2	1.3	2.0	2.3	2.3	2.1	1.3	2.2	1.8		2.1	2.9	2.6
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2.8	2.4	2.6	2.0	1.9	1.9	1.2	1.5	2.1	2.5	2.2	1.9	1.5	2.1		2.4	2.5	2.5
d.	Experience working in multi-disciplinary teams	1.5	3.0	2.9		1.6	1.9	1.7	2.1	2.8		2.8	1.9	2.0	2.6	2.9	1.8		
e.	Ability to identify, formulate solutions and solve engineering problems	1.7	1.0	2.3	1.5	1.4	1.4	1.2	1.4	1.3	1.4	1.1	1.3	1.3	1.5	2.8	1.8	1.4	1.3
f.	Understanding of professionalism and ethics	1.9	2.3	2.7	2.8	2.9	2.5	2.6	2.0	2.8	2.5	2.2	2.1	1.8	2.6		2.6	2.8	2.7
g.	Proficiency in oral and written communication skills	1.5	2.8	2.6	2.6	2.8	1.2	1.9	1.8	2.8	2.5	2.1	1.3	1.7	2.1	2.9	2.1	2.9	2.7
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	1.9	2.1	2.2	2.1	2.2	1.8	1.9	1.8	1.9	2.4	1.8	1.9	1.7	2.1	2.3	2.2	2.2	2.4
i.	Appreciation of the concept of life-long learning	2.0	1.9	2.0	1.9	2.0	2.0	1.8	2.0	2.1	2.9	1.3	1.8	1.7	2.0	2.2	2.0	2.0	1.9
j.	Awareness of contemporary issues in the profession	1.6	2.1	2.0	2.0	2.2	2.4	1.9	1.9	2.1	2.3	2.2	2.2	1.8	2.0	2.6	2.3	2.2	2.3
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	1.7	1.2	2.0	1.4	1.3	1.5	1.1	1.5	1.6	1.2	1.4	1.3	1.4	1.5	2.0	1.7	2.0	1.6
l.	Computer utilization skills	2.1		2.5	1.2	1.9	1.4	1.1	1.6	2.3	1.7	1.8	1.3	1.1	1.9	2.6	1.1		
	Total Points	21.3	26.1	27.9	20.4	23.8	20.6	18.7	21.1	25.2	26.8	22.0	19.6	19.5	23.4	34.1	23.7	30.1	29.0

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

SENIORS (SPRING 2012 GRADUATES)
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

	Outcomes	FALL CHEE COURSES									SPRING CHEE COURSES						OTHER APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
		CHEE 101	CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	ENGR 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	1.6	1.0	1.2	1.7	1.6	1.2	1.2	1.6	1.2	1.7	1.5	1.4	1.5	1.6	1.8	1.4	1.2	1.0
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	1.3	2.1	1.7	2.1	2.2	1.1	1.4	1.7	2.0	2.8	2.8	1.1	1.7	2.2	2.5	1.4	2.2	1.5
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2.2	1.5	1.6	2.2	2.0	1.8	1.1	1.5	2.0	2.5	2.7	1.9	1.2	2.6	2.9	1.8	2.1	1.5
d.	Experience working in multi-disciplinary teams	1.1	3.0		3.0	2.9	1.3	2.2	1.7				1.3	1.5	2.5	3.0	1.5		1.8
e.	Ability to identify, formulate solutions and solve engineering problems	1.8	1.0	1.8	1.6	1.5	1.1	1.2	1.5	1.2	1.8	1.7	1.3	1.3	2.0	2.1	1.7	1.4	1.3
f.	Understanding of professionalism and ethics	1.8	2.1	2.4			2.0	2.6	1.7		3.0	2.7	2.5	1.7		2.9	2.1	2.2	2.3
g.	Proficiency in oral and written communication skills	1.5	2.5	2.6	2.7	2.7	1.2	2.6	1.7	2.1		2.7	1.2	1.5	2.7	3.0	2.0	2.5	1.5
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	1.8	1.7	2.2	2.9	2.7	1.8	1.8	2.1	2.5	2.9	2.2	1.9	1.9	2.9	1.6	2.3	2.0	2.0
i.	Appreciation of the concept of life-long learning	1.9	1.8	1.8	2.6	2.6	1.8	1.8	2.3	2.6	2.7	2.0	2.0	2.3	2.9	1.7	1.8	1.9	1.0
j.	Awareness of contemporary issues in the profession	2.2	2.1	2.4	2.9	2.8	1.9	2.3	2.0	2.7	3.0	2.8	2.1	1.8		1.7	2.3	2.4	2.0
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	1.9	1.4	1.8	2.0	1.7	1.3	1.5	1.5	1.8	2.4	2.2	1.4	1.2	2.4	1.7	1.5	1.4	1.3
l.	Computer utilization skills	1.9			1.2	1.5	1.5	1.3	1.4	2.7	2.3	2.2	1.5	1.1	2.7	2.5	1.1		2.0
	Total Points	21.0	24.2	27.5	28.9	27.7	18	21	20.7	27.1	33.1	29.5	19.6	18.7	32.1	27.4	20.9	27.3	19.2

Degree of Coverage in Each Course

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2 – Covered
3 – Briefly Covered
Blank – Not at all covered

SPRING 2011 GRADUATES
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

		FALL CHEE COURSES									SPRING CHEE COURSES						OTHER APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
	Outcomes	CHEE 101	CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	ENGR 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	1.8	1.0	2.0	1.9	1.9	1.2	1.1	2.0	1.6	1.3	1.2	1.4	1.8	1.6	1.8	1.7	1.2	1.0
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	1.4	1.8	2.3	2.1	2.5	1.7	1.4	2.1	2.2	2.2	2.3	1.8	1.7		2.3	1.7	2.5	1.0
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		2.3	2.0	1.9	2.4	2.5	1.2	2.0	2.4	2.3	2.5	2.3	1.4	2.7	3.0	2.3	2.8	2.0
d.	Experience working in multi-disciplinary teams	1.5	3.0	2.0			2.4	3.0	2.8		3.0		2.5	1.8		3.0	1.7		1.0
e.	Ability to identify, formulate solutions and solve engineering problems	2.0	1.0	2.0	1.6	2.2	1.5	1.2	1.8	1.7	1.7	1.6	1.5	1.5	2.8	2.1	1.8	1.2	1.0
f.	Understanding of professionalism and ethics	2.2	1.6	2.0			1.5	2.3	2.1	2.6	3.0	2.0	1.9	1.9		2.4	2.1	2.4	2.0
g.	Proficiency in oral and written communication skills	1.6	2.7	1.7			1.1	2.3	2.3	2.1		2.5	1.6	1.5			1.9		2.0
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	1.8	1.7	1.3	2.6	2.4	1.5	2.0	2.2	2.2	2.3	2.1	1.8	1.7	2.6	1.4	2.3	2.0	2.0
i.	Appreciation of the concept of life-long learning	1.7	1.7	2.3		2.5	1.5	1.6	2.5	1.8	2.1	1.8	1.6	1.9	2.5	1.4	2.4	2.2	2.0
j.	Awareness of contemporary issues in the profession	1.9	1.5	2.3		3.0	1.5	2.0	2.2	2.0	2.3	2.0	1.3	1.7	2.2	1.8	2.1	2.4	2.0
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	2.0	1.5	1.3	1.9	2.1	1.2	1.3	1.8	1.8	2.5	1.5	1.5	1.5	2.1	1.9	1.6	1.7	2.0
l.	Computer utilization skills	1.9			1.6	1.9	2.4	1.3	1.5	2.1	2.4	2.4	2.0	1.2	2.4		1.0		2.0
	Total Points	23.7	23.8	25.2	33.6	33.6	20.0	20.7	25.3	26.5	29.1	25.9	21.2	19.6	34.9	29.1	22.6	30.4	20.0

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

SPRING 2010 GRADUATES
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

		FALL CHEE COURSES									SPRING CHEE COURSES						OTHER APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
	Outcomes	CHEE 101	CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	ENGR 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	1.7	1.0	1.3	1.6	1.7	1.2	1.1	2.7	1.4	1.6	1.1	1.1	2.0	1.6	1.7	1.7	1.1	1.2
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	1.2	2.6	2.5	2.5	2.8	1.2	1.7	2.8	2.3	2.1	2.4	1.0	2.4	2.5	2.9	1.8	2.7	2.3
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2.6	2.9	2.8	2.6	2.4	2.3	1.2	2.2	2.9	2.0	2.6	2.3	1.9	2.5		1.4	2.4	1.9
d.	Experience working in multi-disciplinary teams	1.5	2.2				1.3		1.7				1.4	1.8			1.8		1.6
e.	Ability to identify, formulate solutions and solve engineering problems	2.0	1.1	1.5	2.0	2.2	1.3	1.2	2.5	1.6	1.8	1.2	1.2	2.1	1.9	2.3	1.6	1.3	1.3
f.	Understanding of professionalism and ethics	1.9	2.7	2.9			2.0	2.8		2.8		2.8	1.6	2.2	2.2		2.4	2.5	
g.	Proficiency in oral and written communication skills	1.6	2.7	2.7	2.1		1.1	2.4	2.5	2.6			1.2	1.8	2.7		2.1	2.9	2.5
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	2.2	2.0	1.7	2.5	2.9	2.0	1.6	2.7	2.4	2.7	2.1	1.8	2.1	2.1	1.7	2.2	2.1	2.3
i.	Appreciation of the concept of life-long learning	1.9	1.5	2.0	2.6	2.8	1.7	1.6		2.2	2.1	1.8	1.3	2.4	1.9	1.7	1.9	1.9	2.3
j.	Awareness of contemporary issues in the profession	2.0	1.9	1.6	2.8	2.8	1.4	1.7	2.7	2.7	2.8	2.3	2.0	2.4	1.7	1.7	2.0	2.1	2.6
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	1.9	1.3	1.6	2.5	2.2	1.4	1.4		2.3	1.7	1.7	1.4	2.1	2.0	2.0	1.4	1.8	1.8
l.	Computer utilization skills	1.9			1.7	2.1	1.6	1.5	2.1	2.7	1.6	2.1	1.5.	1.4	1.9		1.1		2.3
	Total Points	22.4	25.9	28.6	30.9	33.9	18.5	22.2	33.9	29.9	30.4	28.1	17.8	24.6	27	34	21.4	28.8	26.1

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

SENIORS (SPRING 2009 GRADUATES)
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

		FALL CHEE COURSES									SPRING CHEE COURSES						OTHER APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
	Outcomes	CHEE 101	CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	ENGR 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	1.2	1.0	1.5	1.3	1.6	1.0	1.0	2.0	1.2	2.1	1.3	1.0	1.7	1.6	1.6	1.4	1.1	1.9
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	1.3	2.4	2.5	1.8	2.2	1.1	1.9	2.4	1.8	2.4	2.1	1.3	1.3	2.3	2.7	2.1	3.0	2.2
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2.8	1.6	2.4	1.9	2.3	2.0	1.8	1.6	1.9	2.2	2.3	1.3	1.3	2.2	2.8	1.7	2.7	1.8
d.	Experience working in multi-disciplinary teams	1.2					1.6		1.6				2.0	1.3			1.8		1.5
e.	Ability to identify, formulate solutions and solve engineering problems	2.3	1.0	1.5	1.7	1.7	1.1	1.3	2.2	1.6	1.9	1.3	1.0	1.3	1.8	1.9	1.4	1.3	1.6
f.	Understanding of professionalism and ethics	2.3	1.8	2.7	2.6		2.0		2.5	2.8	2.6	2.7	1.8	1.7	2.8	2.8	2.6		2.4
g.	Proficiency in oral and written communication skills	1.8	2.1	2.6	2.0		1.1	2.4	2.1	3.0	2.6	2.1	1.3	2.3	2.6	3.0	1.8		2.1
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	1.7	1.1	1.7	2.2	2.8	2.0	2.6	2.2	2.5	2.4	2.1	1.8	1.3	2.7	2.3	2.0	1.9	2.0
i.	Appreciation of the concept of life-long learning	2.1	1.1	1.9	1.7	2.6	1.5	1.7	2.1	1.5	2.3	1.9	1.5	1.7	1.8	1.9	1.4	2.0	2.0
j.	Awareness of contemporary issues in the profession	1.9	1.5	1.6	2.5	2.7	1.8	2.5	1.8	2.2	2.4	2.2	1.8	1.7	2.2	2.2	1.6	2.2	2.0
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	1.8	2.1	1.7	1.8	2.0	1.2	1.9	1.9	1.8	2.4	1.7	1.3	1.7	1.7	2.1	1.5	2.5	2.0
l.	Computer utilization skills	2.1			1.6		1.4	2.5	1.2	2.7		2.4	2.3	1.7	2.7		1.0		2.4

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

SENIORS (SPRING 2008 GRADUATES)
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

		FALL CHEE COURSES									SPRING CHEE COURSES						OTHER APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM									ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
	Outcomes	CHEE 101	CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	ENGR 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	1.9	1.0	2.0	1.1	1.4	1.4	1.1	1.5	1.0	1.6	1.2	1.5	2.0	1.5	1.9	1.6	1.2	1.3
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	1.2	3		1.5		1.0	2.9	2.3	2.6	2.0	2.5	1.0	2.3	3.0	2.8	1.3		2.3
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		2.9		1.8	1.7	2.8	1.6	1.4	1.8	1.5	2.5	2.0	1.2	3.0		1.1		1.9
d.	Experience working in multi-disciplinary teams	1.4					2.3						2.5	2.7			1.6		1.8
e.	Ability to identify, formulate solutions and solve engineering problems	2.3	1.0	2.4	1.4	1.6	1.8	1.5	1.7	1.5	1.7	1.5	1.5	1.9	2.3	2.0	1.4	1.3	1.3
f.	Understanding of professionalism and ethics	1.1	2.5	3.0	2.8	2.4	3.0	3.0	2.5	3.0	2.4	2.6	2.5	2.5		2.8	3		3.0
g.	Proficiency in oral and written communication skills	1.7	3		1.7		1.3				3.0	2.9	1.2	1.9		3.0	2.5		2.7
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	1.6	2.1	1.9	1.9	2.2		2.4	1.8	2.6	2.1	2.5	2.0	2.0	2.6	1.8	2.4	2.4	2.6
i.	Appreciation of the concept of life-long learning	1.6	2.1	2.2	2.5	2.4	2.7	2.4	2.3	2.5	2.7	2.6	2.4	2.4	3.0	2.1	2.5		2.9
j.	Awareness of contemporary issues in the profession	1.8	2.0	2.0	2.5	2.5	2.4	2.6	2.3	2.0	2.1	2.4	2.2	2.0	2.5	2.0	2.3	2.8	2.8
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	1.8	1.4	2.2	1.6	2.0	1.3	1.5	1.5	1.9	2.4	2.1	1.7	1.7	2.1	1.8	1.6	2.7	2.6
l.	A fundamental understanding of materials science and engineering	3		1			2.9	2.5	3.0	2.7	2.8		2.7	2.5	3.0	1			2.6
m.	Computer utilization skills	2.7			1.3		2.4		1.6			2.3	1.6	1.4	2.3		1.1		2.6

Degree of Coverage in Each Course

1 – Strongly Covered
2 – Covered
3 – Briefly Covered
Blank – Not at all covered

SENIORS (SPRING 2007 GRADUATES)
ASSESSMENT OF OUTCOMES COVERED BY THE FOLLOWING COURSES

	Outcomes	FALL CHEE COURSES								SPRING CHEE COURSES						OTHER APPLICABLE COURSES		
		ADEQUACY OF CHEE CURRICULUM								ADEQUACY OF CHEE CURRICULUM						ADEQUACY OF CHEE CURRICULUM		
		CHEE 201	CHEE 317	CHEE 400	CHEE 401	CHEE 403	CHEE 405	CHEE 407	CHEE 420	CHEE 302	CHEE 310	CHEE 404	CHEE 408	CHEE 413	CHEE 427	ENGR 210	ENGR 301	ENGR 305
a.	Ability to apply math, science and engineering principles	1.3	1.6	1.3	2.2	1.2	1.3	2.7	1.5	1.6	1.2	1.3	1.3	1.5	1.5	1.9	1.4	1.6
b.	Ability to design and conduct experiments and to analyze and interpret resultant data	2.5	3	1.9		1.0	3.0		2.8	2.8	2.6	1.2	2.5	2.2	3.0	2.8		
c.	Ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	2.1	2.6	1.6	2.0	2.2	1.8	3.0	1.4	1.7	2.4	1.6	1.2	2.4	2.8	1.6		2.5
d.	Experience working in multi-disciplinary teams					2.5						2.2				2.1		1.7
e.	Ability to identify, formulate solutions and solve engineering problems	1.1	3	1.5	2.1	1.4	1.7	2.5	1.6	1.9	1.4	1.4	1.4	2.0	2.6	2.3	2.0	2.1
f.	Understanding of professionalism and ethics	3.0		3.0	3.0	2.6		2.0			2.9	2.8	2.6					
g.	Proficiency in oral and written communication skills					1.2		2.2				1.3	1.6			2.3		
h.	Broad educational base and understanding of the impact of engineering solutions in a global and societal context	2.4	2	2.7	2.6	2.5	3.0	1.6	2.6	2.5	2.4	2.4	1.8	2.7	2.5	2.9	2.3	
i.	Appreciation of the concept of life-long learning	2.0	2.1	2.5	2.7	2.3	2.7	2.3	2.6	2.7	2.4	2.4	2.4		2.6	2.8	3.0	
j.	Awareness of contemporary issues in the profession	2.5	1.9	3.0	2.1	2.4		2.0	2.8	2.5	2.2	2.2	1.9	2.2	2.8	3.0	2.8	2.7
k.	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	2.9	2.5	2.0	2.9	1.4	2.9		2.5	2.7	2.6	1.5	1.3	1.3	2.9	2.2		2.7
l.	A fundamental understanding of materials science and engineering	2.9	1.4		3.0	2.4	2.8			2.8		2.6	2.8		1.1		2.9	2.7
m.	Computer utilization skills	2.6		1.1		1.6					1.8	1.8	1.2	1.6		1.2		2.1