THE OHIO STATE UNIVERSITY

College of Engineering

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Date: 26 October 2010

To: Randy Smith
Vice Provost, Office of Academic Affairs

From: Ed McCaul
Secretary, College of Engineering Committee on Academy Affairs (CCAA)

Subject: Semester Conversion Proposal for the BS Degree in Chemical Engineering

Attached is a letter from Stuart Cooper, Department Chair of Chemical and Biomolecular Engineering, as well as a semester conversion proposal for their BS Degree program.

This proposal was reviewed by a subcommittee of CCAA. After reviewing the proposal and having some changes made to it the subcommittee recommended to the full committee that it be approved. After a discussion, CCAA unanimously approved the proposal on the 25th of October 2010 and requested that I forward the proposal to you for consideration by CAA. If you have any questions concerning this proposal please let me know.

THE OHIO STATE UNIVERSITY

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To: OSU Office of Academic Affairs

From: Stuart Cooper, University Scholar Professor and Department Chair

Date: June 22, 2010

Re: Semester program proposals for the William G. Lowrie Department of Chemical and Biomolecular Engineering

The proposed degree programs to be offered by the Department of Chemical and Biomolecular Engineering when the University converts to semesters in 2012 are enclosed. Preparation of these proposals was the responsibility of the Department's Curriculum and Graduate Studies Committees. Various constituencies were consulted during this process, including faculty, current students, and the Department's advisory board. Feedback from senior exit surveys and alumni surveys were also considered. The proposed BS program was benchmarked against chemical engineering programs at the University of Minnesota, Purdue, and Penn State.

The proposed programs were discussed regularly in faculty meetings over the past year. Several smaller groups, each headed by a member of the Curriculum Committee, worked on areas of the undergraduate core for the BS program. An ongoing Carmen site open to all current undergraduate students was used to get student feedback during the later stages of the process.

Results of the faculty vote on the proposed programs were as follows (18 faculty were eligible to vote): 17-0 in favor of the BS program, and 17-0 in favor of each of the four graduate programs (MS, PhD, BS-MS, and non-thesis MS). I therefore recommend approval of the enclosed proposals for the following programs:

- BS in Chemical Engineering
- MS in Chemical Engineering
- PhD in Chemical Engineering
- BS-MS in Chemical Engineering
- Non-thesis MS in Chemical Engineering

Sincerely,

Stuart L. Cooper

Stuart Cooper

BS in Chemical Engineering (CHEMENG) Program Proposal

Primary Contact: James F. Rathman (rathman.1@osu.edu)

1. **Name of Program**
   Chemical Engineering

2. **Name of Degree**
   Bachelor of Science in Chemical Engineering (CHEMENG)

3. **Responsible Academic Unit**
   William G. Lowrie Department of Chemical and Biomolecular Engineering (CBE)

4. **Type of Program**
   Undergraduate bachelors degree program

5. **Semester Conversion Designation**
   Converted with minor changes to curricular requirements, minimal changes in overall structure of program, and no changes to program goals.

6. **Program Learning Goals**
   In accordance with requirements of the Chemical Engineering program's accrediting body (ABET, Inc.), program learning goals are separated into objectives and outcomes. Generally speaking, the former describe what program graduates will be doing a couple years after graduation, while the latter describe knowledge and skills they will attain by the time of graduation.

   The objectives of the BS CHEMENG program are to educate graduates who will be ethical, productive, and contributing members of society. As they progress professionally after graduation, our alumni will:

   I. Use their engineering foundation to be successful in a breadth of careers and occupations, including: technical careers in industry, academia, government, or other organizations; engineering graduate programs and professional schools; careers in law, medicine, business, management, public policy, secondary education, service industries, and entrepreneurship.

   II. Use lifelong learning skills to: take advantage of professional development opportunities in their disciplines; acquire and integrate new knowledge, skills, and areas of expertise; pursue new careers and adapt to changing global markets and workforce trends.

   III. Engage in professional service and volunteerism by: using their engineering background to benefit society; developing new knowledge and products that promote sustainable development; promoting engineering as a rewarding career and source of societal good.

The outcomes for the BS CHEMENG program are that students will attain:

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

b) an ability to design and conduct experiments, as well as 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.

7. Proposed Program Requirements

The BS CHEMENG program requirements are summarized in Attachment A.

One of the core requirements requires that all students take either Organic Chem II or Biochemistry I. This is consistent with our current quarter-based program.

In addition to the prescribed core courses, all students are required to take one technical elective in either Math or Statistics. A pick-list of courses that meet this requirement will be prepared once the details of semester course offerings in the Departments of Mathematics and Statistics are known.

8. Current and Proposed Advising Sheets

The current BS CHEMENG advising sheet is presented in Attachments C and the advising sheet for the proposed semester-based program is presented in Attachment D.

9. Curriculum Map Showing Attainment of Program Learning Outcomes

See Attachment B.

10. Rationale for Program Changes and Description of Changes

The proposed BS CHEMENG program for semesters is in most respects very similar to the current quarter-based program. Based on discussions with faculty, students, alumni, and the Department's Advisory Board, the general consensus is that the current program is appropriately rigorous, representative of the current state of the chemical engineering discipline, and in line with benchmark programs.

Development of the semester-based curriculum was guided by the following principles:

- The BS program should be similar to semester-based chemical engineering programs at benchmark institutions.
- The recent name change to the Department of Chemical and Biomolecular Engineering reflects the growing importance of biology and biomolecular engineering in our discipline, and we should therefore consider including biology as a core requirement.
- Effort should be made to keep the core as small as possible to allow students greater flexibility in technical elective choices.
- Feedback from previous accreditation reviews should be considered.
- Input obtained from student and alumni surveys, and from the CBE Advisory board should be considered.

The primary substantive changes in the proposed program are:

- Engineering Survey is now formally included in the total credit hour count; currently, this course is required but the single credit hour is not included in the program total.
- The Engineering Core has been significantly streamlined, as explained in the College of Engineering's cover letter. Chemical engineering majors will no longer be required to take a statics or electrical circuits course.
- The Introduction to Engineering sequence will now run for the full academic year and will offer expanded coverage of computational tools.
- All chemical engineering majors will be required to take Quantitative Biology, a new course being collaboratively developed between engineering and biology faculty. Previously, there was no biology or biomolecular engineering component in the chemical engineering core. Biological phenomena play an increasingly important role in many processes, products, and applications. The traditional core of the chemical engineering discipline has broadened to include relevant areas of biology. In the OSU Department of Chemical and Biomolecular Engineering, nearly half of the faculty have research interests in bio-related areas. The number of BS graduates who find employment in pharmaceutical and biotechnology companies is also increasing. For these reasons, requiring that all students have some exposure to biology fundamentals is justified.

- All chemical engineering majors currently are required to complete at least two quarters of physical chemistry (Chem 530, 531) plus one quarter of physical chemistry lab (Chem 541). All students must also complete either the third quarter of physical chemistry (Chem 532) or Molecular Genetics (Mol Gen 500). The proposed semester program significantly reduces the physical chemistry requirement by prescribing only a single semester course. One rationale for this change is that in the previous two accreditation reviews, the reviewers have suggested that we consider reducing our physical chemistry requirement because in their experience ours was considerably higher than most other chemical engineering programs. In addition, feedback from alumni and senior exit surveys have consistently reported that there is considerable redundancy between topics taught in Chem 531 and 532 with those taught in chemical engineering thermodynamics (ChBE 508 and 509).

11. Credit Hour Changes

Program requirements:	A.) Number of credit hours in current program *(Quarter credit hours)*	B.) Calculated result for 2/3rds of current quarter credit hours *(Multiply the value in column A by 0.667 and round to the nearest tenth of a credit hour)*	C.) Number of credit hours required for proposed program *(Semester credit hours)*
Total required for completion of program	200-201	133.3-134	134
Prerequisite courses required for admission to program which are not counted toward total hours	1	0.7	0
Required courses offered by the unit	59-68	39.3-45.3	44-47
Required courses offered outside of the unit	132-142	88.0-94.7	87-90
Free Electives	0	0	0

12. Rationale for Significant Change in Credit Hours

No significant change is proposed for the number of total credit hours required for the B.S. degree. There is a small change in the distribution of credit hours between required courses offered by the unit vs. outside the unit. As noted in Appendix E, the proposed semester program includes a net increase of 3 credit hours for chemical engineering core courses, which is partially compensated for by decreases of 1 credit hour each in required

mathematics and general engineering. The overall impact of these changes largely depends on how a given student chooses to satisfy the technical elective requirements. For example, a student who takes only two technical elective courses within the unit (the minimal requirement) would see an increase of 4-5 credit hours for required courses offered by the unit under semesters as compared to the current quarter system equivalent. Conversely, for a student who chooses to complete as many technical electives as possible within the unit, the change in credit hour distribution between these two categories is not significant.

13. Transition Policy

As in all previous curriculum changes, transition issues will be anticipated and planned for in the conversion process. In concordance with promises from both the University and College of Engineering, the CBE department is committed to insuring that no student will be impeded towards the completion of graduation requirements by the conversion from quarters to semesters.

All students will still be required to fulfill the accreditation requirements (ABET) for the completion of the degree. Within our proposed curriculum (Attachment D) all ABET-specified requirements have been fully taken under consideration and will be implemented accordingly.

The guidelines outlined below provide a general strategy for working with students who are at different stages in the BS program when the transition occurs. We expect to work with each student individually to insure that the transition plan for each student will meet all requirements for graduation and will not be impeded by the transition. CBE academic advisors will therefore play a key role during the transition. A key part of the transition policy will be the offering of "bridge courses" when appropriate. These courses will be offered as needed.

Freshman class (students with Freshman standing autumn 2012)

Since this group of students will have no previous enrollment under the quarter system, there will be no issues when switching to semesters. Those students who have completed AP course exams will make the transition under the University's new transfer policy.

Sophomore class:

For the semester sophomore class, the greatest issues lie within the former core engineering course sequences: Math, Physics, and Chemistry.

1) Since the Math department has agreed to create a two semester calculus sequence, what will students who have taken Math 151, or Math 151 and 152, be permitted to enroll in next? Will these students be permitted to enroll in the Engineering Calculus II course? Students will also need to complete Math 254.01 under quarters in order to begin the 3rd Engineering math course in fall semester (Diff EQ, linear algebra).

   Transition Plan: Since the Math department is still in the process of configuring their own transition plan, a plan will be eventually worked out with Engineering to address these issues.

2) Will students who have completed Physics 131 be permitted to take Physics II under the semester system? Some students may have also completed both Physics 131 and 132, so will they be required to complete Physics II?

   Transition Plan: Students who have completed Physics 131 will be permitted to enroll in Physics II under semesters. The College of Engineering is currently working with the Physics Department in regards to the second scenario where students have taken both Physics 131 and 132. Since the Physics majors also complete the 13x series, the CBE department will follow the transition plan developed by the Physics department for their own majors.

3) If students have taken Chem 121 or both Chem 121 and 122, will they be permitted to enroll in Chem II? Should students who have completed 121 and 122 be required to take Chem II or will a bridge course be created?

   Transition Plan: Students will be strongly advised to complete the 121-123 sequence during freshman year. The College of Engineering is still working with the Chemistry department on a transition plan for this scenario.

Junior Class:

1) If semester juniors have taken Chem 251, will they be permitted to take Organic Chem II under semesters? Will those students who have taken Chem 251 and Chem 252 be required to take all of Organic Chem II or will there will a bridge course for this?

   Transition Plan: CBE is still working with the Chemistry Department to devise a plan to accommodate students in this scenario.

2) Students should have completed the mass and energy balance sequence since ChBE 200 will be last offered Winter 2012 and ChBE 201 will be last offered in Spring 2012.

   Transition Plan: Students who have passed ChBE 200 but not taken or failed ChBE 201 will be required to enroll in a bridge course to cover the missing material in 201.

3) As most students will have completed ChBE 420 at the end of their sophomore year, will they be permitted to enroll in Transport II (CBE 3521) in the autumn?

   Transition Plan: Students who have completed ChBE 420 will be permitted to enroll in CBE 3521 if they have successfully completed ChBE 420 during spring quarter 2012.

Senior Class:

1) An unlikely scenario will occur if a student completes ChBE 508 and does not complete or fails ChBE 509 during junior year. Will this student be required to complete CBE 3508 or will a bridge course be created?

   Transition Plan: Students who have completed 508 and 509 under quarters or ChBE 508 plus the full Physical Chemistry sequence (530-532), will have satisfied the thermodynamics requirement. For those students who have completed just ChBE 508, they will be required to complete Thermo I under semesters or a bridge course depending on the decision made by the CBE faculty.

2) Students will be instructed to either complete the Physical Chemistry sequence under quarters or wait to begin the course under semesters. CBE will now require only Physical Chemistry I under semesters. For those students who do complete Chem 530 under quarters, will they be required to take P-chem I under semesters or will there be a bridge course created?

   Transition Plan: CBE is currently working with the Chemistry department to determine whether students will need to take P-Chem I under semesters if they have already taken Chem 530.

3) Semester seniors will be instructed to complete the transport sequence (ChBE 420, 521, 522) during junior year. If students do not complete ChBE 522, will they be required to enroll in CBE 3521 or will a bridge course be created?

   Transition Plan: Students who have completed 521 but not 522 will be required to complete a one-time offering bridge course.

4) Students who have completed all of the ChBE junior core courses under quarters will have no transitional issues as all of the senior courses can be taken with the junior coursework as pre-requisites.

14. Assessment Practices

The Chemical Engineering Program has implemented a carefully developed assessment plan that has been used for many years. Details are discussed in item 15 (submitted via the assessment plan survey form). All essential components of the plan will be carried over to the new program as we switch to semesters.

15. Assessment Plan on File with OAA

CBE has a detailed assessment plan on file.

Attachment A

BS CHEMENG Proposed Program Requirements

General Education (Liberal Arts Portion)	Course Number	Credit Hours
2 writing courses		6
6 other courses		18
TOTAL		**24**

Engineering Core	Course Number	Credit Hours
Engineering Survey	ENG 1100	1
Introduction to Engineering I	ENG 1181	2
Introduction to Engineering II	ENG 1183	2
Engineering Calculus I	Math ____	5
Engineering Calculus II	Math ____	5
Physics I	Physics ____	5
TOTAL		**20**

CHEMENG Core	Course Number	Credit Hours
Quantitative Biology	Biol ____	3
General Chemistry I	Chem ____	5
General Chemistry II	Chem ____	5
Physics II	Physics ____	5
Differential Equations/Linear Algebra	Math ____	4
Computer Programming	CSE 1222	3
Organic Chemistry I	Chem ____	4
Organic Chemistry II or Biochemistry I	Chem ___	4
Organic Chemistry Laboratory	Chem ____	3
Physical Chemistry I	Chem ____	4
Process Fundamentals	CBE 2200	4
Transport Phenomena I	CBE 2420	4
Separation Processes	CBE 2523	3
Transport Phenomena II	CBE 3521	4
Thermodynamics	CBE 3508	4
Kinetics and Reactor Design	CBE 3610	4
Unit Operations Laboratory I	CBE 3630	1
Unit Operations Laboratory II	CBE 4630	3
Process Dynamics and Control	CBE 4624	3
Process Design, Economics and Strategy	CBE 4760	4
Process Simulation and Product Engineering	CBE 4764	4
TOTAL		**78**

Attachment A (continued)

Technical Electives	Course Number	Credit Hours
Math or Statistics		3
CBE technical electives	CBE 5XXX	6
Other technical elective (may include CBE courses)		3
TOTAL		**12**

TOTAL Credit Hours for BS CHEMENG Program	**134**

Attachment B

Curriculum Map Showing Attainment of Program Learning Outcomes

CBE Core Course	a	b	c	d	e	f	g	h	i	j	k
2200	*	*	*		*		*				*
2420	*	*	*		*		*				*
3508	*	*	*		*		*				*
3521	*	*	*		*		*		*		*
3523	*	*	*		*		*			*	*
3610	*	*	*		*	*	*				*
3630/4630	*	*	*	*	*	*	*		*		*
4624	*	*	*		*		*		*		*
4760	*	*	*	*	*	*	*	*	*	*	*
4764	*	*	*	*	*	*	*	*	*	*	*

ATTACHMENT C – Current Advising Sheet

Chemical & Biomolecular Engineering (2009-2010)

YEAR	AUTUMN	WINTER	SPRING
1	Math 151.01 (Calc & Analyc Geom) 5____ Chem. 121 (Gen Chem.)..... 5____ Engr 181.01 (Intro to Engr I)..... 3____ Engr 100.03 (Engr Survey) ..... 1____	Math 152.01(Calc & Analyc Geom) .5____ Chem. 122 (Gen Chem).....5____ Engr 183.02 (Intro to Engr II).....3____	Math 153.01 (Calc & Analyc Geom) 5____ Chem. 123 (Gen Chem).....5____ CS&E 202 or CS&E 214, En Graph 167 (Programming Req't)4____
2	Chem. 251 (Organic Chemistry) .... 4____ ChBE 200 (Prcs Calc 1)..... 3____ Math 254.01 (Calc & Analyc Geom) 5____ Physics 131 (Partcls & Motion) ..... 5____	Chem. 252 (Organic Chem).....4____ ChBE 201 (Procs Calcs 2).....3____ Math 415.01 (Ord& Part Diff Equ)...4____ Physics 132 (Electrcty & Magntsm).5____	Chem. 253†† (Organic Chem).....4____ ChBE 420 (Transpt Phn I).....4____ Physics 133 (Elctrdynmc & Quant) .5____ Chem 254 (Organic Chem Lab) .....3____
3	**Chem. 530** (Physical Chem)..... 3____ ChBE 508 (Thermo I) ..... 3____ ChBE 521 (Transp Phn II) ..... 3____	**Chem. 531** (Physical Chem).....3____ ChBE 509 (Thermo II) .....3____ **ChBE 522** (Transp Phn III).....3____ Chem. 541 (Physical Chem Lab) ....3____	**Chem. 532**†† (Physical Chem) .....3____ **ChBE 610** (ChE Kinetics) .....4____ **ChBE 523** (Unit Operations).....4____ **ChBE 750** (Profs ChE) .....1____
SU	**ChBE 630** (ChE Operations Lab).....6____		
4	**ChBE 624** (Procs Dyn & Ctrl) ..... 4____ ChBE 760 (Econ & Strat) ..... 4____	ChBE 764 (Procs Dsgn) .....4____ ME 410 (Statics) .....4____ or ECE 300 (Electrical Circuits) ....3____	**ChBE 762** (Procs Dsgn).....4____

Courses printed in BOLD are taught one quarter per year.
Please check On-Line Course Offerings for availability of other courses.

GENERAL EDUCATION (35 hrs)
English & Communication Skills (10)
English 110.xx (5) _____
2nd Writing Course (5) _____
Writing in core ( ) _____

Students must take 25 hours across Social Sciences, Historical Study, and Arts & Humanities with a minimum of 5 hours and maximum of 10 hours per category.

Historical Study (5-10)
_____( )_____
_____( )_____

Arts & Humanities (5-10)
_____( )_____
_____( )_____

Social Sciences (5-10)
_____( )_____
_____( )_____

TECHNICAL ELECTIVES (18 hrs)
ChBE xxx (3) _____
ChBE xxx (3) _____

Additional math requirement**
_____ ( ) _____
_____ ( ) _____
_____ ( ) _____
_____ ( ) _____
_____ ( ) _____

ETHICS (5 Hours)
(May overlap w/ a GEC category)
_____ ( ) _____

SOCIAL DIVERSITY
(May overlap w/ a GEC category)
_____ ( ) _____

Sub-total Core.....148/149
General Education.....35
Technical Electives 18

TOTAL HOURS 201/202

** Technical electives **MUST** include one of the following courses: CIS 541, Math 366, Math 512, Math 513, Math 514 , Math 530 Math 551,Math 568, Math 571, Stat 427, Stat 420

††OPTIONAL SUBSTITUTIONS
Biochemistry 511 may replace Chem 253
Mol Gen 500 may replace Chem. 532
(extra hours count as technical elective credit)

For full list of technical elective courses, visit http://www.chbmeng.ohio-state.edu and look to the "Academics" section for current students.

Acceptance into the Chemical Engineering major is limited to 100 students per year and will depend on the cumulative point-hour ratio (CPHR) upon completion of the following pre-major courses: *Chemistry 121,122,123; Math 151,152, & 153.* Students with CPHR of 3.0 are assured of acceptance. **Formal application is required to take ChBE 200. Students are accepted into the major Autumn and Winter quarters with the applications due in Spring for Autumn and Autumn for Winter. Visit http://www.chbmeng.ohio-state.edu/undergrad/cs_application.html or contact ChBE Academic Advisors, Brian Endres (endres.10@osu.edu) or Holly Prouty (prouty.18@osu.edu), for more information.**
Rev 06/03/09 BTE

ATTACHMENT D – Proposed Advising Sheet for Semesters

YEAR	AUTUMN	SPRING
1	Math 1 (Engineering Calculus I).....5 Chem1 (General Chem I).....5 Engr Survey.....1 Engineer 1181 (Intro to Engineering I).....2 GEC.....3	Math 2 (Engineering Calculus II).....5 Chem 2 (General Chemistiry II).....5 Engineer 1183 (Intro to Engineering II).....2 Quantitative Biology.....3 CSE 1222 (Programming).....3
2	Math 3 (Differential equations/linear algebra).....4 Physics 1 (General Physics I).....5 Chem 3 (Organic Chem I).....4 CBE 2200 (Process Fundamentals).....4	Physics 2 (General Physics II).....5 Chem 4 (Organic Chem II).....4 CBE 2420 (Transport Phenomena I).....4 CBE 2523 (Separation Processes).....3
3	Chem 5 (Physical Chem I).....4 CBE 3521 (Transport Phenomena II).....4 CBE 3508 (Thermodynamics).....4 Math or Statistics Technical Elective.....3 GEC.....3	CBE 3610 (Kinetics and reactor design).....4 Chem 6 (Organic Chem Lab).....3 Technical Elective.....3 CBE 3630 (Unit Operations Lab I).....1 GEC.....3
SU	CBE 4630 (Unit Operations Lab II).....3	
4	CBE 4624 (Process Dynamics and Control).....3 CBE 4760 (Process Design, Economics and Strategy).....4 Technical Elective.....3 GEC.....3 GEC.....3	CBE 4764 (Process Simulation and Product Engineering).....4 Technical Elective.....3 GEC.....3 GEC.....3 GEC.....3

The schedule above applies for a student who enters the major Autumn quarter of the second year, and who moves through the curriculum without interruption. Most of the core CBE courses will be taught twice per year, so many other scheduling scenarios are possible. This includes CBE 4630, which will be offered during the summer and also in either the fall or spring.

ATTACHMENT E – Detailed comparisons of credit hour changes

Mathematics					
Current Quarter Curriculum			**Proposed Semester Curriculum**		
Topic	**# Courses**	**Credit hours**	**Topic**	**# Courses**	**Credit hours**
Calculus and Analytical Geometry	4	20	Engineering Calculus	2	10
Differential Equations	1	4	Differential Eqs/ Linear Algebra	1	4
Elective	1	3	Elective	1	3
	Total (semester equivalent)	**27 (18)**		**Total**	**17**

Physics, Chemistry, and Biology					
Current Quarter Curriculum			**Proposed Semester Curriculum**		
Topic	**# Courses**	**Credit hours**	**Topic**	**# Courses**	**Credit hours**
General Physics	3	15	General Physics	2	10
General Chemistry	3	15	General Chemistry	2	10
Organic Chemistry	3	12	Organic Chemistry	2	8
Organic Chemistry Lab	1	3	Organic Chemistry Lab	1	3
Physical Chemistry	3	9	Physical Chemistry	1	4
Physical Chemistry Lab	1	3	Quantitative Biology	1	3
	Total (semester equivalent)	**57 (38)**		**Total**	**38**

General Engineering					
Current Quarter Curriculum			**Proposed Semester Curriculum**		
Topic	**# Courses**	**Credit hours**	**Topic**	**# Courses**	**Credit hours**
Survey	1	–	Survey	1	1
Introduction to Engineering	2	6	Introduction to Engineering	2	4
Computer Programming	1	4	Computer Programming	1	3
Statics or Electrical Circuits	1	3-4			
	Total (semester equivalent)	**13-14 (9)**		**Total**	**8**

Chemical Engineering Core					
Current Quarter Curriculum			**Proposed Semester Curriculum**		
Topic	**# Courses**	**Credit hours**	**Topic**	**# Courses**	**Credit hours**
Process Fundamentals	2	6	Process Fundamentals	1	4
Transport	3	10	Transport	2	8
Thermodynamics	2	6	Thermodynamics	1	4
Reactor Design and Kinetics	1	4	Reactor Design and Kinetics	1	4
Equilibrium Processes	1	4	Equilibrium Processes	1	3
Unit Operations Lab	1	6	Unit Operations Lab	2	4
Process Control	1	4	Process Control	1	3
Economics, Process Design, Process/Product Development	3	12	Economics, Process Design, Process/Product Development	2	8
Profession of Chemical Eng	1	1			
Total (semester equivalent)		**53 (35)**		**Total**	**38**

As shown in the table below, changes in the overall structure of the program are minimal.

Overall Credit Hour Distribution			
Current Quarter Curriculum		**Proposed Semester Curriculum**	
Topic	**Credit hours (Semester equivalent)**	**Topic**	**Credit hours (Semester equivalent)**
Core	147-148 (97)	Core	98
Technical Electives	18 (12)	Technical Electives	12
General Education	35 (24)	General Education	24
TOTAL	**200-201 (133-134)**	**TOTAL**	**134**