



College of Engineering

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Date: 9 June 2010

To: Randy Smith
Vice Provost, Office of Academic Affairs

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

Subject: College of Engineering's Semester Conversion Proposal

Attached is a copy of the College of Engineering's Semester Conversion Proposal. The purpose of this proposal is to outline those curriculum issues that impact all engineering programs. This proposal should accompany all semester conversion proposals originating in the College of Engineering.

This proposal was first reviewed by the college's Quarter to Semester Task Force which forwarded it with their recommendation for approval to the college's Core Curriculum and UG Services Committee. The Core Curriculum and UG Services Committee further reviewed the proposal and then forwarded it with their recommendation for approval to CCAA. Upon receipt CCAA assigned the proposal to a subcommittee for review. The subcommittee reviewed the proposal and, after some changes were made to it, recommended to the full committee that it be approved. After a discussion CCAA unanimously approved the proposal on the 9th of June 2010 and requested that I forward it to you for consideration by CAA. If you have any questions concerning this proposal please let me know.



4 June 2010

College of Engineering Quarter to Semester Conversion Proposal

1. Background and Introduction

When the change to semesters was approved the College of Engineering decided to approach the change by working simultaneously on multiple levels. One of the levels was the creation of a Quarters to Semesters (Q2S) Task Force. The Task Force was given the mission of developing recommendations for a semester curriculum in the College of Engineering. All of the Task Force's recommendations were sent to either the College's Core Curriculum and College Services Committee (Core) or Engineering's College Committee on Academic Affairs (CCAA) for approval. One part of the Task Force's work was helping to develop Memorandums of Understanding (MOU) with units outside and inside of the college that offer courses required by all of our majors. As some of the offering units have not yet finalized their syllabi we intend on continuing to work with these units during the transition to semesters and after we have switched to semesters. Students participated in the conversion process at the college level through their student representatives on the college level committees.

All of the programs in the college were encouraged to view the switch to semesters as an opportunity to completely reassess their curriculum rather than just make a straight conversion. As a result many programs have changed their curriculum based on their ongoing outcomes assessment program as well as accreditation expectations and criteria. All programs used Version 1.0 of CAA's conversion template, which is attached as Appendix 7.

This proposal addresses the curriculum common to all engineering programs to include the engineering core and general education requirements. In addition, the college transition, BS/MS, and minor policies are discussed and MOUs for core courses are attached.

2. Structure of the Engineering Core Semester Curriculum

The College of Engineering Q2S Task Force evaluated the content of the existing engineering core curriculum via a subcommittee that reported to the entire task force. (See Appendix 4 for the current engineering core curriculum.) As part of the process the subcommittee collected information on programs at peer institutions and explored several different potential combinations for basic science and engineering courses under semesters. In addition to identifying the common subject matter among all engineering disciplines, the subcommittee also discussed the number of credit hours that would be appropriate for each course.

Based on the subcommittee's recommendation, a proposal was submitted to the Core Committee for approval and subsequent submission to CCAA for adoption. The proposal was approved by CCAA on 9 June 2010. The proposal included Memorandums of Understanding (MOUs) with offering units on campus to specify content and structure in as much as detail as possible. MOUs are attached

representing agreements with the First Year Engineering Program (Appendix 1), the Department of Physics (Appendix 2) and the Department of Mathematics (Appendix 3).

Under semesters the Engineering Core Curriculum will consist of a central required core. The “selected” core requirement that is part of the quarters engineering curriculum is being discontinued under semesters. An overarching goal regarding a core curriculum was that during the first year of their curriculum engineering students have the flexibility to remain undecided on their choice of major without delaying their progress. Our considered opinion is that a single set of required core courses to be taken in the first year largely meets this goal.

There are several points that make up the rationale for discontinuing the “selected” core. In looking at several Colleges of Engineering across the country we observed that where core requirements exist they are minimal, and that several schools have no college level core curriculum. The selected core structure was used to require a “breadth” of topics of common interest to engineering programs, but allowed delivery with different emphases in different programs. The semester system allows fewer course offerings. A careful look at the structure of a similarly sized “selected” core under semesters showed that with fewer individual topics included the structure complicated the description of the engineering core with no benefit to the students or to the degree programs. The selected core system was instituted at a time when departments largely diverged in their curricula early and there was a need to explicitly identify the common elements. It is felt that the pressure to explicitly state those common elements has been relieved somewhat with the success of the common Fundamentals of Engineering course sequences in the first year. We believe the breadth concepts will still exist in program curricula including foundational material such as additional math, science, and programming, and engineering topics such as statics, materials, circuits and economics, but specifically defined requirements are not needed.

3. Required courses in the Engineering Core Semester Curriculum

The following table shows the proposed semester requirements and credit hours for all undergraduates in the College of Engineering:

Course(s)	Credit Hours
Fundamentals of Engineering I and II	4
Engineering Calculus I and II	10
Physics I	5
Engineering 1100	1
Total	20

One change in this model from our previous central required core is the absence of chemistry. Several programs only required one quarter of chemistry and a five-hour semester chemistry course would be more chemistry than is needed for their discipline. Some of these programs are proposing a choice between chemistry and biology for an additional science requirement. Others are proposing a four-hour semester chemistry course. Additionally, we recognize that chemistry is a differentiating topic among engineering disciplines with those that are heavily reliant on chemistry (CBE, BME, FABE, Env Eng, MSE) and those that are not (ME, ECE, CSE, CE, ISE, WE, AER, AV). Because programs will diverge on their chemistry requirements at the first semester, it was not possible to create a single core requirement.

English 110.xx was previously listed as a central engineering core requirement, but is not explicitly included in this proposal since we expect it will be a common general education requirement across the university. It is assumed that the specific mathematics and science courses required here, with the additional math and science courses required to meet accreditation requirements, will overlap with general education requirements.

As before, the Fundamentals of Engineering for Honors (FEH) program will contain equivalent courses that meet the requirements of the Core Curriculum.

4. Memoranda of Understanding with Provider Units

The purpose of these MOUs is to move forward on curriculum changes before semester versions of the courses are finalized and approved. For each course or course series presented in this proposal, an MOU has been prepared and signed by the College of Engineering's Associate Dean for Undergraduate Education and Student Services and the offering department. The outline of each MOU is described below:

- a) Department Relationships - Provider and Clients (note, not all Clients may have the same relationship to the Provider Course(s))
- b) Primary Course(s)
- c) Client Objectives
- d) Provider Objectives
- e) Course(s) Objectives
- f) Course(s) Structure - Credit hours, meeting days, recitation, lab, etc.
- g) Course(s) Topic List
- h) Procedures for adjusting any of the above Objectives and/or Course(s) Structure
- i) Relationship to other Courses or other MOUs
- j) Transition Plan

For the purposes of the core curriculum, MOUs with the First Year Program, Mathematics, and Physics are included with this proposal. The college, along with its departments, will continue to work on MOUs with units offering courses for engineering programs.

5. Engineering General Education Requirements

5.1 Assumptions and General Information

The College of Engineering highly values the contribution general education makes to the program of our students and has committed to maintaining a size of general education comparable under the semester system to the previous system. Engineering has assumed that the exceptions currently granted to it will continue under semesters and that it will be given an exception from the Biological Sciences requirement. Shown below is a table outlining the most current University-Level Advisory Committee for the General Education Curriculum (ULAC) General Education requirement along with how Engineering will implement its General Education requirements. This table may change as Engineering evaluates any changes to the ULAC recommended General Education requirements consistent with the Rules of the University Faculty.

5.2 Curriculum

Courses	ULAC Recommended		Engineering Requirement		
	Course Type	Hours	Course Type	Hours	Notes
1	Writing Level 1	3	Writing Level 1	3	
2	Writing Level 2	3	Writing Level 2/Technical Communication	3	1
3	Literature	3	Literature	3	
4	Arts	3	Arts	3	
5	Math or Logic	3	Engineering Calculus I	5	
6	Data Analysis	3	Data Analysis	3	2
7	Biological Science	3+	Science (Chem, Bio, Phys)	3-5	4
8	Physical Science	3+	Physics I	5	
9	Historical Study	3	Historical Study	3	
10	Social Science 1	3	Social Science 1	3	3
11	Social Science 2	3	Social Science 2	3	3
12	Culture & Ideas or Historical Study	3	Culture & Ideas or Historical Study	3	3
13	Open option	3	Engineering Calculus II	5	
14	Open option	3	Math or Logic	3	2
15+	Language proficiency level	0-12	Language proficiency level	0	5
16	Not required	---	Ethics	0	3
17	Capstone	---	Capstone	3-9	6
	Total	42-54+	Total	51-59	7, 8
Notes:					
1	It is proposed to modify second writing courses open to engineering students to include a focus on expository and technical writing that helps students write and present more effectively within their professional interest and technical fields of expertise.				
2	Per major; every Engineering major requires some course with content in this area.				
3	Consistent with current Engineering GEC, where an ethics course is required of all students and double counts in either Social Science or Culture & Ideas depending on the specific course.				
4	Consistent with current Engineering GEC, where a biological science is not required.				

5	<p>Consistent with current Engineering GEC, where a foreign language is waived, with provisions:</p> <p>A. Completion of a foreign language sequence through [104 equivalent], or enrollment in a foreign language course with a prerequisite of [104 equivalent], may be substituted for one Gen Ed course requirement in the Literature or Arts category.</p> <p>B. Completion of a foreign language minor may be substituted for two Gen Ed course requirements, one in the Social Science category and one in the Culture and Ideas or Historic Studies category.</p>
6	<p>All Engineering students in an ABET accredited program are required to take an Engineering Capstone Course. In addition, consistent with current Engineering GEC, a Social Science 597 (capstone course) may be substituted for any Social Science GE course; an Arts & Humanities 597 (capstone course) may be substituted for a Visual/Performing Arts course.</p>
7	<p>One "0-count" course in "Social Diversity in US" in any General Education category may be required. This requirement will be carefully considered when the General Education requirements have been more fully defined.</p>
8	<p>One "0-count" course in "Global Studies" in any General Education category or completion of an approved "Education Aboard" experience will be carefully considered when the General Education requirements have been more fully defined.</p>

5.3 Engineering Ethics Requirement

Engineering is unique in its CAA approved ethics requirement. The college uses a three tiered approach to ethics. Our students are first introduced to engineering ethics in their Introduction to Engineering sequence. Later, they are required to take a course outside of the college which will give them an overall view of ethics. Then, in their higher level major courses they are exposed to professional ethics within their discipline. Shown below is the review process approved by CAA for the college's ethics requirement.

The College of Engineering Ethics & Professionalism Course Review Procedures

The Core Curriculum and UG Services (Core) Committee will serve as the approval and review body for all courses that constitute the approved list of Ethics & Professionalism courses for the College of Engineering GEC.

Approval Process

1. The course must be approved as a course in the regular manner through the University's Office of Academic Affairs, but can be considered by the Review Panel prior to final approval by OAA. Approval for the category will be contingent on final approval by OAA.
2. A copy of the syllabus must be submitted along with a cover letter and other explanatory material to the College of Engineering's Office of Academic Affairs attention Program Director for Academic Affairs and Student Services.
3. The course will be considered for inclusion on the list of approved courses by the Ethics & Professional Subcommittee of the Core Committee based on the published guidelines approved by the Core Committee. (Appendix 5)

4. The Ethics & Professional Subcommittee will make a recommendation to the full committee which will then vote on whether the course should be included on the approved list of courses.

Review Process

1. The Ethics & Professional Subcommittee of the Core Curriculum and UG Services Committee will be responsible for reviewing all of the courses on the approved list at least once every five years to determine if each of the courses still meets the objectives as stated in published guidelines.
2. The Ethics & Professional Subcommittee will report to the full committee on its findings and the committee will vote on whether the list should be amended.

Ethics & Professional Subcommittee Membership

1. The subcommittee will consist of no fewer than four members.
2. Faculty members will be appointed by the Chair of the Core Committee for three-year terms. One member shall be from outside of the College of Engineering based on recommendation of the Chair of the Colleges of the Arts and Sciences Curriculum Committee. A student member shall be appointed annually to the Subcommittee by the Dean or the Dean's designee.
3. The chair of the subcommittee will be appointed annually by the Chair of the Core Committee.

6. Engineering Minors

- 6.1. The College of Engineering has updated its minor policy in preparation for the switch to semesters with the rules for a minor in Engineering being:
 - 6.1.1. Minors require a minimum of 12 semester credit hours with no maximum.
 - 6.1.2. Courses numbered less than 2000 may not count toward the 12 credit hour minimum.
 - 6.1.3. Letter graded courses taken on a Pass/Non-Pass basis may not be applied to the minor.
 - 6.1.4. Courses graded S/U may count for no more than 25% of the credit hours in the minor.
- 6.2. The entire policy is included as Appendix 5.

7. BS/MS Program

- 7.1. Based upon the permission granted by the Graduate School, the College of Engineering has the authority to establish combined BS/MS Degree Programs within the college. As such, it is the desire of the College to establish combined BS/MS Degree Programs, where appropriate, with the view of encouraging our best students to obtain an advanced degree and thus furthering their education and academic preparation. Consequently, only those programs that have stricter rules than those established by the college will have a BS/MS semester conversion section to their semester conversion proposal.
- 7.2. The following are minimum criteria for admission to a combined BS/MS degree in the College of Engineering.
 - 7.2.1. All current graduate school requirements for a combined BS/MS degree must be met.

- 7.2.2. A student must have a minimum GPA of 3.5 on all undergraduate work to enter the program
- 7.3. College limits upon programs having such a program are:
- 7.3.1. All ABET requirements for a B.S. degree must be met.
- 7.3.2. A maximum of 12 semester credit hours may be counted toward both the B.S. and M.S. degrees. This rule is subject to a decision by the Graduate School on how many semester credit hours may be double counted and will comply with Graduate School policy.

8. Transition Plans

8.1. **College Philosophy:** Shown below is an excerpt from a message from the Associate Dean for Undergraduate Education & Student Services to all engineering students. The entire message along with proposed semester curriculum sheets and some frequently asked questions can be found on the college's website at <http://engineering.osu.edu/q2s/index.php>.

"As we prepare to convert to semesters in Summer 2012, the faculty and staff in the College of Engineering are carefully planning for the effect of the transition on our students. Having gone through curriculum changes before, we have some experience in getting students changed over from one system to the other. And in fact, we have always done curriculum change in such a way that students are not disadvantaged by the process. We feel the quality and value of Engineering degree programs will be improved by the new semester curricula and the transition will occur without increasing time to degree. **We pledge that student progress toward graduation will not be delayed by the conversion to semesters.**

Our approach for advising students is to have each degree program prepare an individual Transition Advising Plan (TAP) for students to fill out and go over with their academic advisor. This plan will spell out how one will complete the remaining requirements for their degree from the Summer of 2012 until graduation. Programs will commit to developing a TAP with each student that meets the student's needs and does not delay graduation compared to what would happen had OSU remained on quarters. For their part, students will be expected to make satisfactory progress on that plan."

8.2. Engineering Core:

8.2.1. **Fundamentals of Engineering (ENG 1181 & 1182):** This is an initial Transition Plan and will be updated as revisions are developed. The expectation is that students will either start in the semester sequence or have completed the quarter sequence. For those students that start with Engineering 181 under quarters and need to transition to Fundamentals of Engineering course sequence under semesters, a bridge course will be developed.

8.2.2. **Physics (PHY 1131):** This is an initial Transition Plan and will be updated as revisions are developed. The main course of action is proactive advising in which all Engineering students are strongly encouraged to either finish their Physics 13x requirements before the transition, or wait until after. For students who have taken Physics 131 ONLY: These students will be permitted to take Physics 1132. If Depts. want/need their students to have

credit for Physics 1131, then they will need to take a one hour special course.

- 8.2.3. **Math (Engineering Calculus I & II):** This is an initial Transition Plan and will be updated as revisions are developed. The main course of action is proactive advising in which all ENG students are strongly encouraged to either finish their Math 15x.xx requirements before the transition, or wait until after. Whether a student with credit for Math 151.xx can or cannot enroll in Eng. Calc II will be decided by an academic advisor taking into consideration additional data about that student (e.g. AP background, AB/BC test scores, course load, etc). This means it would be handled on a case by case basis. If the student(s) needs a bridge (say 1/2 semester one or two credits) course then this is something which the Mathematics Department can address.
- 8.3. **General Education:** Under the quarter system all Engineering students are required to take seven (35 hours) liberal arts general education courses, with the exception of those in CSE who are required to take 40 hours. Of those seven, three were designated as first writing requirement (English 110), second writing requirement (any 367), and a double counted Ethics course. Under the semester system, all Engineering students will be required to take eight (24 hours) liberal arts general education courses. Of those eight, three will again be designated as first writing, second writing, and a double counted Ethics course. Any student who is accepted into the College of Engineering prior to the start of semesters (Summer 2012) will only be required to take seven GEC liberal arts courses using the same distribution as in the quarter system. This will be in effect until the Summer of 2017 at which time those students will be required to meet the new semester General Education liberal arts requirements.
- 8.4. **Transfer Credit:** All requests for transfer credit received by the college after Spring Quarter 2012 will only be evaluated under the semester system.
- 8.5. **Engineering Minors:** Any student who has not completed a minor will comply with the transition plan of the offering unit.
- 8.6. **BS/MS Program:** Any student who is in the BS/MS program and has not yet completed their undergraduate degree will comply with the undergraduate transition plan of their program. If a student has completed their BS degree then they will comply with the graduate transition plan of their program.

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Appendix 1 - Memo Of Understanding (MOU) for Fundamentals of Engineering, 18 May 2010

This Memorandum of Understanding (MOU) is between the Departments in the College of Engineering as represented by the Core Curriculum and College Services Committee and the Engineering Education Innovation Center (EEIC) that administers courses under ENGINEER and ENGRAPH course numbers. The purpose of the MOU is to move forward on curriculum changes before semester versions of the courses are finalized and approved. The MOU articulates the relationship and objectives among the "Provider" (EEIC) and "Clients" (Departments), the distribution of course topics and credits under semesters, and an agreement on how adjustments will be made to any of these.

A. Department Relationships - Provider and Clients (note, not all Clients may have the same relationship to the Provider Course(s))

Provider - Engineering Education Innovation Center.

Clients - All Engineering Departments and the Department of Physics for the Engineering Physics degree.

B. Primary Courses

Fundamentals of Engineering I and II - Engineering 1181 and Engineering 1182

C. Client Objectives

A common freshman engineering course sequence for all engineering programs that helps the student 1) develop professional skills for success in engineering, including teamwork; written, oral, and visual communications; and ethics, 2) understand the basic elements of problem solving with engineering tools such as EXCEL and MATLAB, 3) visualize and present objects and systems in three-dimensions and 4) understand and gain experience with the elements of engineering design. Students will be motivated towards opportunities within engineering careers and appreciate the range of engineering disciplines open to them.

D. Provider Objectives

Course topics should have a logical structure that can be covered within the allotted resources and meet course objectives and outcomes.

E. Course Objectives

Course objectives for these courses will remain the same as in the quarter versions. The order and depth of topics may be changed to accommodate client needs.

F. Course Structure: Credit hours, meeting days, recitation, lab, etc.

We propose to make semester based Engineering 1181 and 1182 2 Semester credits each:

2 Lectures/Recitations (Lecture + Recitation) at 80 minutes each
1 Lab at 2h 5minutes (two 55 minute classes plus 15 minute break)

The standard pattern for incoming students will be to take Engineering 1181 in the Autumn Semester and Engineering 1182 in the Spring semester, although trailer sections of both courses might need to be taught every term to handle out-of-sequence students. We have yet to resolve if the May term and summer terms would be viable structures. The content of the courses will be carefully reviewed and structured to meet a semester pattern. A set of courses to accommodate transfer students will also be planned.

G. Course Topic List

ENGINEER 1181 Topics List

Topic	Lec Hours	Rec Hours	Lab Hours
Course introduction and overview	1.0		
Teamwork fundamentals and agreements	1.5		
Problem solving fundamentals -- Problem types, systems descriptions, SI units, significant digits, understanding analysis vs. design	3.0		
Using spreadsheets for problem solving -- Excel spreadsheet structure; equations, operators, array elements; models and systems; mathematical models; plots and charts	6.0		
Ethics for engineers	2.0		
Using MATLAB for problem solving -- MATLAB tool/environment; command mode; script files, arrays, and strings; problem solving structure for MATLAB, algorithms, statements and functions; Input, output, plotting; systems and mathematical models	14.0		
Series of laboratory exercises will draw from a wide range of engineering domains -- Fundamental Engineering Concepts; Hands-on Experiences with Measurement and Instrumentation; Collection and Analysis of Data; Reporting and Communication of Results; Modeling of Engineering Systems			25.0

ENGINEER 1182 Topics

Topic	Lec Hours	Rec Hours	Lab Hours
Introduction to Course and Overview	1.0		
Engineering Design Process Fundamentals	2.0		2.0
Project Management			2.0
Visualization of 3-D Objects (Sketching, Pictorials, & Orthographics)	3.0		

Construction of 3-D Objects with CAD	10.0		
Standard Views and Presentations of Objects	10.0		
Assembly and Presentation of Systems	5.0		
Conventions and Standards (Dimensioning, Tolerance, Sections)	5.0		
Design/Build Project Preparation Exercises			10.0
Design/Build Project (Project to make use of both Problem Solving and CAD knowledge)			10.0

H. Procedures for adjusting any of the above Objectives and/or Course Structure
Changes to the proposed course structure may be brought forward by either clients or the provider and will be addressed in the Core Curriculum and College Services Committee ("Core Committee"). Since this committee serves as the curriculum committee for the EEIC, this MOU does not change the existing relationship.

I. Relationship to other Courses or other MOUs

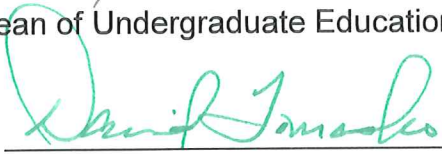
It is understood that EEIC will develop Honors versions of Fundamentals of Engineering I and II that will become a part of the Fundamentals of Engineering Honors (FEH) sequence and will also meet the goals of the core curriculum for all engineering students.

J. Transition Plan

This is an initial Transition Plan and will be updated as revisions are developed.

The expectation is that students will either start in the semester sequence or have completed the quarter sequence. For those students that start with Engineering. 181 under quarters and need complete the Fundamentals of Engineering course sequence under semesters, a bridge course will be developed.

For the provider (EEIC):  19 May 2010
Signature Date

For the clients (Associate Dean of Undergraduate Education):  18 May 2010
Signature Date

Appendix 2 - Memo Of Understanding (MOU) for Physics, 18 May 2010

This Memorandum of Understanding (MOU) is between the Departments in the College of Engineering as represented by the Core Curriculum and College Services Committee and the Department of Physics. The purpose of the MOU is to move forward on curriculum changes before semester versions of the courses are finalized and approved. The MOU articulates the relationship and objectives among the "Provider" (Physics) and "Clients" (Departments), the distribution of course topics and credits under semesters, and an agreement on how adjustments will be made to any of these.

A. Department Relationships - Provider and Clients (note, not all Clients may have the same relationship to the Provider Course(s))

All Clients will subscribe to Physics I.

B. Primary Course

Physics I - Physics 1131

C. Client Objectives

A common Physics course for all Engineering programs that introduces concepts used in later Engineering Science courses.

Physics I can be taken either concurrent or subsequent to Engr. Calculus I.

D. Provider Objectives

Course topics should have a logical structure that can be covered within the allotted resources and meet course objectives and outcomes.

E. Course Objectives

A calculus based physics course introducing mechanics, energy, rotational motion, fluids, waves, and thermodynamics.

F. Course Structure: Credit hours, meeting days, recitation, lab, etc.

5 credit hours

4 Lectures/Recitations (3 Lecture + 1 Recitation) at 55 minutes each
1 Lab at 2h 5minutes (two 55 minute classes plus 15 minute break)

G. Course Topic List

The following is the initial topic list. The syllabus may be slightly adjusted but not in a manner to affect the follow-on Physics II course.

Semester I: Mechanics, Waves, Thermodynamics

Topics

Newtons Laws

1D Motion

Vectors

Projectile Motion

Forces

Energy

Work and Kinetic energy;

Potential Energy Functions

conservation of energy;

Power

Momentum

Collisions, and Impacts

conservation of momentum;

Rotational Motion

Rotational variables and kinematics;

angular acceleration;

Angular Momentum

Angular Momentum Conservation

Gravitation

Introduction to Orbits

Planetary Motion

Rotational Motion

Rotational variables and kinematics;

angular acceleration;

Angular Momentum

Angular Momentum Conservation

Rolling without slipping

Statics & Equilibrium

Fluids

Density and Pressure

Bernoulli's equation

Oscillations and Simple Harmonic Motion

Pendulum

Waves

Types of waves: Longitudinal, Transverse

Wave equation

Interference

Standing waves

Sound waves

Doppler Effect

Thermodynamics

1st Law of Thermodynamics

2nd Law of Thermodynamics

Kinetic theory of gases

H. Procedures for adjusting any of the above Objectives and/or Course Structure
Changes to the proposed course structure may be brought forward by either clients or the provider and will be addressed in the Core Curriculum and College Services Committee ("Core Committee").

I. Relationship to other Courses or other MOUs

Physics II – Physics 1132

All Clients with the exception of CSE will subscribe to Physics II.


J. Transition Plan

This is an initial Transition Plan and will be updated as revisions are developed. The main course of action is proactive advising in which all ENG students are strongly encouraged to either finish their Physics 13x requirements before the transition, or wait until after.

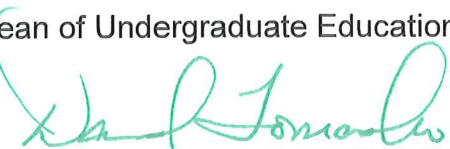
For students who have taken Physics 131 ONLY:

These students will be permitted to take Physics 1132. If Depts. want/need their students to have credit for Physics 1131, then they will need to take a one hour special course.

For the provider (Physics):
Chair: Jim Beatty

 _____
Signature Date 5/18/10

For the clients (Associate Dean of Undergraduate Education):

 _____
Signature Date 18 May 2010

Appendix 3 - Memo Of Understanding (MOU) for Calculus, May 27, 2010

This Memorandum of Understanding (MOU) is between the Departments in the College of Engineering as represented by the Core Curriculum and College Services Committee and the Department of Mathematics. The purpose of the MOU is to move forward on curriculum changes before semester versions of the courses are finalized and approved. The MOU articulates the relationship and objectives among the "Provider" (Math) and "Clients" (Departments), the distribution of course topics and credits under semesters, and an agreement on how adjustments will be made to any of these.

A. Department Relationships - Provider and Clients (note, not all Clients may have the same relationship to the Provider Course(s))

All Clients will subscribe to Engineering Calculus I & II

B. Primary Courses

Engr. Calculus I & II

C. Client Objectives

A common Calculus sequence for all Engineering programs that introduces concepts used in later Math and Engineering Science courses.

D. Provider Objectives

Course topics should have a logical structure that can be covered within the allotted resources and meet course objectives and outcomes. Engineering Calculus I will match Calculus I as defined by Ohio's TAGs.

E. Course Objectives

A two semester calculus sequence for engineering students introducing differentiation, integration, parametric equations, multi-variable differential calculus, and preparation for a differential equations course.

F. Course Structure: Credit hours, meeting days, recitation, lab, etc.

Two courses, each one semester, with 5 Lectures/Recitations (3 Lecture + 2 Recitation) at 55 minutes each.

G. Course Syllabi

The following is the initial topic list. The topic list may be slightly adjusted but not in a manner to affect the subsequent Differential Equations course.

Engr. Calculus I

Exponential, Inverse, and Logarithm Functions
Tangent and Velocity
Limits, lines, and Continuity
Derivatives and Rate of Change
Product Rule, Quotient Rule, Chain Rule, Implicit Differentiation
Examples in the Sciences
Related Rates
Linear Approximation and Differentials
Maxima, Minima and Optimization
Mean Value Theorem
Derivatives and Graphs
Antiderivatives
Indeterminate Forms and L'Hospital's Rule
The Definite and Indefinite Integral
Volumes, Areas, Distance
Substitution Rule
Fundamental Theorem of Calculus
Work

Engr. Calculus II

Integration by Parts
Trigonometric Integrals and Substitution
Rational Function Integration
Improper Integrals
Arc Length, Surface of Revolution
Intro to Simple Differential Equations
Parametric Curves and Functions
Polar Coordinates
Vectors (Dot and Cross Products)
Equations of Lines, Planes, Cylinders and Quadric Surfaces
Vector Functions, Differentiation and Integration
Functions of Several Variables
Limits, Continuity and Partial Derivatives
Tangent Planes and Linear Approximation
Chain Rule
Directional Derivative and the Gradient
Maxima, Minima, Optimization and Lagrange Multipliers
Sequences and Power Series
MacLaurin and Taylor Series
Applications of Taylor Polynomials

H. Procedures for adjusting any of the above Objectives and/or Course Structure

Changes to the proposed course structure may be brought forward by either clients or the provider and will be addressed in the Core Curriculum and College Services Committee ("Core Committee").

I. Relationship of this MOU to other Courses or other MOUs

Subsequent courses to Engineering Calculus I and II whose topics are yet to be determined: Differential Equations course, Linear Algebra course, or a combined Differential Equations / Linear Algebra course.

J. Transition Plan

The main course of action is proactive advising in which all ENG students are strongly encouraged to either finish their Math 15x.xx requirements before the transition, or wait until after.

Whether a student with credit for Math 151.xx can or cannot enroll in Eng. Calc II will be decided by an academic adviser on a case by case basis. If the student(s) needs a bridge (say 1/2 semester one or two credits) course then this is something which the Mathematics Department can address.

For the provider (Math): David Goss June 8, 2010
David Goss Signature Date

For the clients (Associate Dean of Undergraduate Education):

Dave Tomasko 7 June 2010
Dave Tomasko Signature Date

Appendix 4 – College of Engineering Quarter Core Curriculum

COLLEGE OF ENGINEERING CORE CURRICULUM

24 July 2001

Administratively Revised 31 March 2005

Revised by CCAA 15 February 2007

Revised by CCAA 2 May 2007

Administratively Revised 1 October 2007

Required Central Core *

All engineering students must take the following courses:

Engineering 181, 183 **(6)**

Physics 131, 132 **(10)**

Chemistry 121 **(5)**

Math 151, 152, 153, 254 (or equivalent) **(20)**

The total hours of the above courses, including English 110, is **46**.

Selected Core

All engineering programs must include at least 9 topics intended to provide breadth for all engineering students from within the following three subsections (*Additional Science; Mathematics and Statistics; General Engineering*). The topics are listed below along with courses. These courses include the original sample courses referred to below in (2) and denoted in italics, as well as courses which have since been approved by College Committee on Academic Affairs (CCAA) as appropriate for the topic. This list of approved courses may be amended or changed at any time through CCAA's approval. Programs may satisfy a topic requirement by requiring single courses, or by material distributed through several courses. The onus is on the program to demonstrate:

- (1) That the number of hours devoted to the topic meets the credit requirements (at least **three credit hours**).
- (2) That the level of the material is at least equivalent to that of the sample courses cited.
- (3) That the courses selected are appropriate for accreditation requirements of the program.

This must be done by submission of appropriate syllabi and other materials to CCAA.

The topics listed in the General Engineering subsection are selected as being those that a significant number of programs will choose to require at a level appropriate for a breadth requirement. That is, those programs will not require those topics at a depth requiring a multi-course sequence. Courses may be either within or outside the College of Engineering.

It is recognized that engineering is a continually changing discipline and that changes in the core structure may be appropriate from time to time. First, the proposed core provides great flexibility for departments to adjust the core components of its programs. Second, a department may bring a proposal to CCAA if they believe a change in the core structure is necessary. The onus will be on the department to convince CCAA that the proposed change is consistent with the criteria cited herein for the subsections of the engineering core. CCAA may drop topics from any subsection of the selected core. A topic may be dropped if it is not being used or is no longer needed by any program to satisfy the core requirements.

Additional Science: All programs must include **at least one** of the following topics. Some programs may specify what is required for students in their program. Others may leave some choice to their students. **No more than three** topics from this list may be counted toward the selected core requirement.

TOPIC	APPROVED COURSES
Biological Science	Biology 113
Chemistry	Chemistry 122
	Chemistry 125
Earth and Geological Sciences	Geological Science 121
	Geodetic Science 612
Physics	Physics 133
Advanced Chemistry	Chemistry 231
	Chemistry 251

The criteria for a topic to be considered part of the additional science subsection of the proposal are (1) Ensure reasonable breadth in natural science (physical or biological) appropriate for individual programs. (2) Provide programs the flexibility to specify appropriate additional science for their students. (3) Have a course available college wide. Its longest prerequisite chain should be no more than **one** beyond the required central core.

Mathematics and Statistics: All programs must include **at least two** of the following topics. Some programs may specify what is required for students in their program. Others may leave some choice to their students. **No more than four** of the following topics from this list may be counted toward the selected core requirement.

TOPIC	APPROVED COURSES
Complex Variables	Math 514
Discrete Math	Math 366
Linear Algebra	Math 568
	Math 571
Ordinary Differential Equations	Math 255

	Math 415
Numerical Methods	CE 406
	CSE 541
	ME 250
	Math 512
Partial Differential Equations	Math 512
Probability and/or Statistics	CE 405
	FABE 225
	ISE 406
	Math 530
	Stat 245
	Stat 427
	Stat 420
Vector Analysis	Math 513
	Math 551

The criteria for a topic to be considered part of the mathematics and statistics subsection of the proposal are (1) Ensure depth in mathematics and statistics appropriate for individual programs, (2) Provide programs the flexibility to specify appropriate mathematics and statistics for their students. (3) Have a course available college wide. Its longest prerequisite chain should be no more than **one** beyond the required central core.

General Engineering: All programs must include **at least four** of the following topics. Some programs may specify what is required for students in their program. Others may leave some choice to their students.

TOPIC	APPROVED COURSES
Computer or Information Science	CSE 230
	CSE 222
	Geod 563
Programming	CSE 202
	CSE 214
	CSE 221
	EG 167
Statics	ME 410
Dynamics	ME 430
	Phy 261 – both courses must be taken
	Phy 262
Strength of Materials	ME 420
Materials	CE 451
	ECE 331
	MSE 205
Engineering Economics	ChE 760 – both courses must be taken
	ChE 764
	CE 576
	ISE 504
Thermo and/or Heat Transfer	ChE 508
	MSE 401

	ME 500
	ME 501
Electrical Topics	ECE 205
	ECE 300
	FABE 525
	Phy 517

The criteria for a topic to be considered part of the general engineering subsection of the proposal are: (1) ensure breadth in general engineering topics, (2) have a course available college wide with its longest prerequisite chain no more than **two courses** beyond the required central core, and (3) be such that at least two programs utilize the topic.

* Students successfully completing the full Freshman Engineering Honors Program will be considered to have satisfied the following core course requirements:

From the Central Core:

Engineering 181, 183

Physics 131,132

Math 151, 152, 153, 254

From the General Engineering Topics:

Programming

Statics

Appendix 5 - Guidelines for Approval and Re-evaluation of Ethics & Professionalism Courses in the College of Engineering

Engineers must have an understanding of ethics and professionalism both within professional practice and life activities in general. It is recognized that the engineering curriculum has multiple elements contributing to the development of students in this area. The College of Engineering will be responsible for dealing with the ethical and professionalism issues specific to engineering in both the engineering core and major. It is expected that Ethics & Professionalism courses, as part of the Engineering General Education requirements, will deal with ethical and professional issues relevant to engineering but in a larger context. The general learning objectives for Engineering Ethics & Professionalism courses are that upon completion engineering students will have:

1. An ability to explain the ways in which society regulates the use of technology
2. An ability to identify stakeholders in an engineering solution
3. An ability to identify moral problems and dilemmas
4. An ability to analyze moral problems from different ethical perspectives
5. An ability to identify the personal values that an individual holds and uses to resolve moral problems and dilemmas
6. An ability to describe the relationship between personal values, social values, and professional values

Guidelines for initial evaluation of courses

1. Courses, while not being required to assist students in meeting all of the stated goals, must contribute to a majority of them.
2. Programs submitting a course for approval should state and show evidence for which of the goals the course addresses.
3. Courses should be proposed in a format that will fully support students meeting the stated goals.

Guideline for re-evaluation of courses

1. Courses currently being offered in this category may be periodically asked to submit a current syllabus for the course, representative work of the class (papers, exercises, exams), and other evidence supporting contribution of the course to the goals listed.
2. Student evaluations and other data may be collected and considered by the subcommittee in its deliberations.
3. Based on the learning objectives listed for the course, the Ethics and Professionalism Subcommittee will develop a recommendation as to continuation of the course in the category to be acted on by the full Core Committee.

Approved Courses (Current courses are shown. All offering units have been contacted and have responded that they plan on offering a semester version of their approved course.)

1. Sociology 302
2. Sociology 464
3. Economics 348
4. Philosophy 131.01
5. Comparative Studies 272

Appendix 6 – College of Engineering’s Undergraduate Minor Program Policy

MINOR PROGRAMS AT THE OHIO STATE UNIVERSITY

Minor programs (“Minors”) are established by an “Offering Program” and are taken by students majoring in programs other than the Offering Program.* For a student to complete a Minor, the criteria for a Minor established by the Offering Program must be fulfilled. These criteria (usually a set of classes or choice of classes) are established by the Offering Program. Satisfaction of these criteria is verified by the Home College (i.e., the college which contains the Major Program) prior to awarding of the Minor.

ACTIONS REQUIRED OF STUDENTS

Minors pursued by students with Majors in the College of Engineering are administered as follows:

1. Minor Program Forms must be signed by an advisor in the Offering Program and by the student’s advisor in their Major Program *prior to* the student being accepted into the Minor program. Copies of this form will be retained by the Offering Program and the Major Program.
2. Students file Minor Program Forms with the College of Engineering when they file applications to graduate.
3. To change a Minor after submitting a Minor Program Form, a student must re-file a new Minor Program Form with all the appropriate signatures.

INFORMATION FOR ENGINEERING STUDENTS

The College of Engineering encourages the pursuit of Minors as enriching experiences for students and thus minimizes the obstacles to its students pursuing Minors in any area. A Minor signifies meeting certain standards established by the Offering Program. The following statements apply:

1. A Minor consists of course work, as determined by the sponsoring program.
2. A Minor is not required for graduation.
3. Minors are awarded only at the time that the student receives a bachelor’s degree.
4. Engineering Minors will be listed on the College’s web page.
5. Minors will appear on a student’s transcript.
6. There is no College of Engineering rule barring double counting of courses taken as part of a Major and Minor, including General Education courses. Any double counting must be approved by the student’s Major Program as it may have rules affecting this practice.
7. A minimum aggregate PHR of 2.00 in the Minor is required.

MINOR PROGRAMS IN THE COLLEGE OF ENGINEERING

The College of Engineering has rules governing Minors offered by Offering Programs within the College:

1. A Minor must meet the following criteria:
 - 1.1. Minors require a minimum of 12 semester credit hours with no maximum.

- 1.2. Courses numbered less than 2000 may not count toward the 12 credit hour minimum.
- 1.3. Letter graded courses taken on a Pass/Non-Pass basis may not be applied to the minor.
- 1.4. Courses graded S/U may count for no more than 25% of the credit hours in the minor.

INITIATION OF A MINOR IN THE COLLEGE OF ENGINEERING

The procedure for establishing a Minor in the College of Engineering is as follows:

1. An Offering Program may apply for permission to have a Minor by submitting a package to CCAA. After approval, CCAA will forward it to the Council on Academic Affairs. The packet must have the following minimum information:
 - 1.1. Name of the Minor, rationale for its development, a description of its purpose, and its anticipated benefits for the students.
 - 1.2. Description of the proposed curriculum along with a list of required courses, electives, and their prerequisites that constitute that curriculum.

*CCAA voted on 18 May 2009 that students majoring in Computer Science and Engineering may take the Minor in Computational Science.

Appendix 7

COVER LETTER for Proposals (Programs and Courses)

Each program-offering unit (e.g., department, division, center) should submit a transmittal cover letter to the Office of Academic Affairs that:

- Summarizes college, division, and department / unit level review processes for programs and courses
- Recommends approval
- Lists all current programs in the department / unit (as identified by the University Registrar):
 - a. Undergraduate bachelors degree programs and/or majors
 - b. Undergraduate minors
 - c. Undergraduate associate degree programs
 - d. Graduate degree programs
 - e. Graduate minors
 - f. Graduate certificate programs
 - g. Graduate interdisciplinary specializations
 - h. Professional degree programs
 - i. Combined programs (e.g., BS/MS, Ph.D./ MD)
- Indicates which, if any, program is being withdrawn
- Includes any additional materials required for the college-level program review of programs and courses
- Includes signature from department / unit chair

Quarter to Semester Conversion Template: Programs

This template presents the information that will need to be submitted to the Office of Academic Affairs and reviewed by the Council on Academic Affairs for quarter to semester conversion of programs. An electronic submission process is being developed which will use terminology consistent with the Student Information System [SIS]. This template may be modified based on user feedback.

PROGRAM Proposal (for each PROGRAM being converted)GENERAL PROGRAM INFORMATION

1. Identify the name of the program (current and proposed names, if different)
2. Identify the degree title (current and proposed names, if different).

3. Identify the academic unit(s) responsible for administrating the program
4. Specify the type of program:
 - a. Undergraduate bachelors degree program or major
 - b. Undergraduate minor
 - c. Undergraduate associate degree program
 - d. Graduate degree program
 - e. Graduate minor
 - f. Graduate certificate program
 - g. Graduate interdisciplinary specialization
 - h. Professional degree program
 - i. Combined program (e.g., BS/MS, Ph.D./ MD)
5. Select the appropriate semester conversion designation (*Note: To aid in the approval process, please self-select which of the following seems more applicable based on your own understanding of what was done*):
 - a. Re-envisioned with significant changes to program goals and/or curricular requirements (e.g., changes in program goals, changes in core requirements, structural changes to tracks / options / courses)
 - b. Converted with minimal changes to program goals and/or curricular requirements (e.g., name changes, changes in electives and/or prerequisites, minimal changes in overall structure of program, minimal or no changes in program goals or content)

PROGRAM REQUIREMENTS*

6. List program learning goals** (i.e., knowledge, skills, and attitudes / perspectives) to be attained by students at time of completion of the program. (*Notes: These should be broad goals, not detailed ones. Depending on one's field or academic discipline, goals are also known by other terms including objectives, outcomes, and competencies. A list of 3 to 10 goals is recommended.*)
7. List the semester courses (department, title, credit hours) that constitute the requirements and other components of the program.

* *Notes: Departments are encouraged to work with their college's curricular associate dean for guidance on how to complete this section. For more information on developing program goals, curricular maps, and assessment plans, contact the University Center for the Advancement of Teaching for consulting services, workshops, and recommended readings* <http://ucat.osu.edu/>.

** *Additional notes: This information is strongly recommended but not required for graduate programs at this time. If not submitted now, program goals (item #6) will be required for all graduate degree programs after the semester conversion is accomplished.*

8. Append a current (quarters-based) and proposed (semesters-based) curriculum advising sheet for the program, formatted to meet the unit's standards.

9. Provide a curriculum map ** that shows how, and at what level (e.g., beginning, intermediate, advanced), the program's courses facilitate students' attainment of program learning goals. A table format is recommended (*see example below*).

Required Courses (offered by the unit)	Program Learning Goals			
	Goal #1	Goal #2	Goal #3	Goal #4, etc.
Course 1	beginning		beginning	
Course 2		beginning	intermediate	beginning
Course 3	intermediate	intermediate	intermediate	
Course 4	advanced			intermediate
Course 5, etc.	advanced	advanced	advanced	advanced
Required Courses (offered outside of the unit)				
Course 1	beginning			beginning
Course 2, etc.			intermediate	
Elective Courses, Tracks, Categories, or Baskets of Courses (may be offered inside or outside of unit)				
Category 1				
Course 1 under Category 1	beginning			
Course 2 under Category 1, etc.		intermediate		
Category 2, etc.				
Course 1 under Category 2	beginning			
Course 2 under Category 2, etc.				intermediate
General Education courses			beginning	

10. Provide a rationale for proposed program changes (either significant or minimal) and a description of how the changes will benefit students and enhance program quality. Include date of last significant program revision. [Word limit: 750]

** *Additional note: This information is strongly recommended but not required for graduate programs at this time.*

11. Provide a table to aid the Council on Academic Affairs reviewers as they check for credit hour changes. The table should include the following information:

Program credit hour requirements:	A.) Number of credit hours in current program <i>(Quarter credit hours)</i>	B.) Calculated result for 2/3rds of current quarter credit hours <i>(Multiply the value in column A by 0.667 and round to the nearest tenth of a credit hour)</i>	C.) Number of credit hours required for proposed program <i>(Semester credit hours)</i>
Total credit hours required for completion of program			
Prerequisite credit hours required for admission to program which are not counted toward total hours			
Required credit hours offered by the unit			
Required credit hours offered outside of the unit			
Double counted credit hours that meet two or more requirements (e.g., prerequisites, General Education courses, and/or program requirements)			
Free elective credit hours			

12. Provide a rationale for a change in credit hours if the difference is more than 4 semester credit hours between the values listed in columns B and C for any row in the table above. [Word limit: 500]

TRANSITION POLICY

13. Include a policy statement from the chair of the department / unit that assures those students who began their degree under quarters that the transition to semesters will not delay their graduation nor disrupt progress toward a degree. This may include a description of how individual transition advising plans will be developed and possible use of bridge courses. It should address students in the program and students taking service courses offered by the department / unit.

ASSESSMENT CONVERSION*

14. Summarize how the program's current quarter-based assessment practices will be modified, if necessary, to fit the semester calendar [Word limit: 150]. *(Note: For example, if there are embedded assessments in selected courses, a modified assessment plan may identify the new semester courses which will include testing student attainment of program goals.)* All undergraduate degrees and majors should have an assessment plan on file with the Office of Academic Affairs; preliminary assessment planning (item #15.b. i through iii) is encouraged for all other programs.
15. Indicate, for an undergraduate degree program or major proposal, whether the program has a plan on file with the Office of Academic Affairs (Yes / No). If no, please select and complete one of the following two options:
- a. Submit your assessment plan on the survey form at <http://surveys.studentaffairs.ohio-state.edu/snaponline/surveylogin.asp?k=124535167041UH> using the username and password provided to your college's curricular associate dean in June 2009 (web address and passwords will be updated late spring 2010), or
 - b. Provide a preliminary assessment plan which includes the following:
 - i. Program learning goals (a repeat of the entry from item #6 above)
 - ii. The means the program uses or will use to evaluate how well students are attaining program goals. For some examples, please refer to the following list of Means to Evaluate Achievement of Program Goals (page 6 of template).
 - iii. How the program uses or will use the evaluation data to make evidence-based improvements to the program periodically. For some examples, please refer to the following list of Uses of Assessment Data (page 7 of template).
 - iv. Projected quarter by which the program will submit a full assessment plan using the survey form, to be submitted no later than Summer 2012.

* *Departments are encouraged to work with their college's curricular associate dean for guidance on how to complete this section. For more information on developing assessment plans, contact the University Center for the Advancement of Teaching for consulting services, workshops, and recommended readings <<http://ucat.osu.edu/>>.*

Examples of Means to Evaluate Achievement of Program Goals

(to be used for item # 15.b.ii.)

DIRECT MEASURES (means of assessment that measure performance directly, are authentic, and minimize mitigating or intervening factors)

Standardized tests

- National standardized examination
- Certification or licensure examination
- Local comprehensive or proficiency examinations

Classroom assignments

- Embedded testing (i.e., specific questions in homework or exams that allow faculty to assess students' attainment of a specific learning goal, often used to compare student performance from year to year)
- Pre- and post- testing
- Other classroom assessment methods (e.g., writing assignments, oral presentations, oral exams) -- Specify

Evaluation of a body of work produced by the student

- Practicum, internship or research evaluation of student work
- Portfolio evaluation of student work
- Senior thesis or major product
- Capstone course reports, papers, or presentations
- Performances or gallery display of work

Direct assessment methods specifically applicable to graduate programs (Note: other tools listed above may also be used for evaluating student attainment of learning goals in graduate programs)

- Candidacy exams
- Research proposals written and grants awarded
- Thesis / dissertation oral defense and/or other oral presentations
- Thesis / dissertation (written document)
- Publications

Other - specify

INDIRECT MEASURES (means of assessment that are related to direct measures but are steps removed from those measures)

Surveys and Interviews

- Student survey
- Alumni survey
- Employer feedback or survey
- Student evaluation of instruction
- Student interviews or focus groups

Additional types of indirect evidence

- Job or post-baccalaureate education placement
- Student or alumni honors/recognition achieved
- Peer review of program
- External program review
- Curriculum or syllabus review
- Grade review
- Outreach participation
- Comparison or benchmarking

Other - specify

Examples of Uses of Assessment Data (to be used for item # 15.b.iii.)

- Meet with students directly to discuss their performance
- Analyze and discuss trends with unit's faculty
- Analyze and report to college / school
- Analyze and report to accrediting organization
- Make improvements in curricular requirements (e.g., add, subtract courses)
- Make improvements in course content
- Make improvements in course delivery and learning activities within courses
- Make improvements in learning facilities, laboratories, and/or equipment
- Periodically confirm that current curriculum and courses are facilitating student attainment of program goals
- Benchmark against best programs in the field
- Other (specify)