College of Engineering Curriculum Committee (2008-09)

Final Report (04/10/09)

MEMBERS

Prof. Mark Andersland
Prof. Julie Jessop, chair
Prof. Hosin "David" Lee
Dean Alec Scranton, *ex officio*, nonvoting
Rosalind Smith, student representative, nonvoting
Prof. Ralph Stephens
Prof. David Wilder

SUMMARY

During the AY2008-09, the College of Engineering Curriculum Committee met 11 times in its entirety and as subcommittees at various other times to address specific charges. The following sections list the specific charges and progress made to date, as well as any recommendations for the coming year and/or motions to present to the College of Engineering faculty. The committee worked hard to address all 11 charges this academic year; however, time constraints did not permit each charge to be addressed in equal detail. Thus, the committee chose to focus its attention on a subset of the charges. The remaining charges (and any on-going charges) are recommended for the committee to address next academic year.

SPECIFIC CHARGES

CHARGE #1:

Continue to monitor the effectiveness of the newly introduced "Grabbing the Globe" lecture series in satisfying the stated goals of the college global awareness initiative and ABET outcome, paying particular attention to increasing interdepartmental communication in advance of scheduled seminars to make these presentations more available College-wide. If needed, recommend appropriate changes to the series organization or content.

Summary: The committee reviewed the seminars for AY2008-09, and all departments have invited speakers. However, advanced notice of these seminar dates and communication among the departmental seminar coordinators continues to be problematic. In addition, these seminars are not effective for ABET outcome unless the participating students are assessed (e.g., requiring a written summary or analysis of the talk).

Recommendation: The committee recommends that the College continue to encourage advanced scheduling of speakers and timely communication among departments. It also recommends that the departments consider ways to help students understand the value of these seminars for their professional education and development.

CHARGE #2:

Participate in the Leadership, Ethics, and Professionalism (LEAP) initiative, contributing as requested in the redefinition of this task force, and examine possible enhancement in these areas within the College Core Course Curriculum.

Summary: The committee met with John Lee, chair of the LEaP initiative task force, to review this request. He recommended that the committee focus on three main areas detailed in the task force's report: LEaP portfolio, College-wide seminar series, and faculty enthusiasm and ideas.

Recommendation: In the next academic year, the committee should review the ideas formulated by the LEaP task force and decide (with input from the faculty as a whole) whether to implement any of the ideas.

CHARGE #3:

Review Course Activity Reports (CAR) for the College of Engineering core curriculum courses (59: xxx & non-college courses) in coordination with the core course coordinators. Include an analysis of the format and the level of detail that should be required in the CARs. If specific problems need addressing, either with the overall process or with individual courses, report these to the EFC.

Summary: The committee reviewed the CARs for the 059 core courses from AY2007-08 and proposed changes to the CAR template to improve sustainability and usefulness (see attached example). The committee met the with the core course coordinators individually to discuss the submitted CARs and solicit feedback on the proposed CAR template changes. Overall, the core courses are fulfilling their objectives, and coordinators were generally supportive of the CAR process and the proposed changes. There was some concern that the process overhead is too high and that meeting with the committee holds more value. Cheating among students remains a problem. The committee also met with a representative of the Engineering Student Council, and students expressed concern about the elimination of material from core courses.

Recommendation: The committee should review the core course CARs on an academic-year basis and meet with the core course coordinators each spring. Proposed revisions should be monitored for the next several years to evaluate sustainability and usefulness. The committee also proposes that the solicitation of feedback from the Engineering Student Council be a recurring part of this charge.

CHARGE #4:

Examine the <u>usefulness</u> of the Easy Course Goals and Easy ACE Surveys in the assessment of College Core Courses, and recommend any changes in such use, if warranted, to the EFC.

Summary: The committee, in conjunction with the Teaching Committee, analyzed EASY CGA and ACE survey data since the electronic surveys first were introduced in 2003 until the present time. Based on the declining survey use and response rate, the committee voted to present a two-part motion to the EFC regarding EASY CGA Surveys.

Motion:

1. **No longer mandate EASY CGA Surveys for college core courses.** This motion was unanimously approved by the committee.
2. **Eliminate the EASY Course Goal Assessment Survey for all college courses.** This motion was approved by the committee (3 – Y, 2 – N).

Rationale: On May 10, 2001, the faculty voted to adopt the policy outlined in the document entitled "Policy on Assessment Tools for ABET Reports." This policy required the use of EASY ABET questionnaires for all core courses. The motivations behind no longer requiring this survey are: (1) The College favors other tools over surveys in their ABET assessment, (2) the response rate has declined such that its usefulness is questionable, and (3) students are being overwhelmed by the number of survey requests they receive at the end of the semester.

Recommendation: In general, the committee supports the EASY ACE proposal submitted to the EFC by the Teaching Committee since the proposal addresses several issues affecting the usefulness of this survey instrument.

CHARGE #5:

Explore extending the math sequence assessment mechanism to include the undergraduate Chemistry and Physics sequences, in order to determine if these important courses are serving the needs of the College curriculum.

Summary: The committee compiled a list of physics and chemistry topics that would form a basis for assessment surveys and determined, through polling all departments, the courses that should be surveyed for these topics. The committee provided this information to Alec Scranton, associate dean of academic programs, who has set up the appropriate math, physics, and chemistry surveys in ICON for the identified Spring classes.

Recommendation: Next fall, the committee should analyze the results from these Spring classes. The committee should determine the frequency and rotation of survey administration that is needed for each of these three surveys to be effective. The committee should also discuss whether or not it should review samples of sequence course exams, in addition to the survey data, to determine which concepts are emphasized.

CHARGE #6:

Suggest ways to increase student understanding and exposure to internationally relevant components in our curriculum. Meet with the interim associate provost for International Programs to explore how this charge may be advanced considering University wide goals.

Summary: The committee intended to meet with Downing Thomas, the interim associate provost and dean of International Programs at the University of Iowa, to review opportunities; however, time did not permit further work on this charge.

Recommendation: This charge should be addressed by the committee next academic year.

CHARGE #7:

Recommend a policy to allow advanced or upper level students to substitute another UI course for EPS I.

Summary: The committee met with Allen Bradley, EPSI Course Coordinator, to review this request. The committee developed an EPSI substitution policy based on the criteria emphasizing technical teaming and design skills and a cost neutral option (given the current budgetary environment). Other options were also generated that would be acceptable if funds were available (e.g., developing an advanced EPSI design section for transfer and honors students).

Recommendation: The committee recommends the following EPSI substitution policy for advanced students:

- This EPSI substitution is available for "mature" students (i.e., students studying engineering after being in the workforce) with technical experience and for transfer students with engineering credits before their first fall semester in the UI College of Engineering.
- Eligible students may substitute a technical elective, as defined by their home department, for EPSI after they have written an acceptable summary of a technical team and problem-solving/design experience that they have completed.
- Student eligibility will be determined by Megan Allen, as she processes transfer student applications, and the EPSI lecture and/or design instructors as they interact with the students. The acceptability of the technical team and problem-solving/design experience will be determined by Megan Allen and the EPSI core course coordinator.

CHARGE #8:

Review the possibility of changing the 22M:032 (Multi-variable Calculus) pre-requisite for 059:009 (Thermodynamics) to 22M:031 (Single-variable Calculus).

Summary: The committee met with Charlie Stanier, Thermo Course Coordinator, to review this request. Since Charlie and the other course instructors agree that Math I is sufficient for the content taught in this course, the committee unanimously moved to present a motion to the EFC to make the appropriate change.

Motion: **For the core course 059:009 (Thermodynamics), change the math pre-requisite from 22M:032 (Multi-variable Calculus) to 22M:031 (Single-variable Calculus).**

Rationale: Concepts from 22M:032 are found in the Thermodynamics textbook only twice (i.e., heat capacity defined as a partial derivative and work defined as a vector); however, all examples in the course are one-dimensional. Thus, multivariable calculus is not needed at this time when the focus of the course is on engineering understanding of the concepts.

CHARGE #9:

Review the possibility of changing the name of the Technological Entrepreneurship Certificate to the Innovation Management Certificate.

Summary: The committee met with John Robinson, member of the Technological Entrepreneurship Committee, to review this request. The committee expressed its concerns that the certificate name should reflect the student aspirations and coursework.

Recommendation: The committee recommended a new name encompassing the key ideas of the program: *Technology Innovation and Entrepreneurship (TIE) Certificate*.

CHARGE #10:

Recommend specific charges for 2009-10.

Recommendation: The committee recommends that the following charges be considered for the next academic year:

- Continue to monitor the effectiveness of the newly introduced "Grabbing the Globe" lecture series in satisfying the stated goals of the college global awareness initiative and ABET outcome, paying particular attention to increasing interdepartmental communication in advance of scheduled seminars to make these presentations more available College-wide. If needed, recommend appropriate changes to the series organization or content.
- Participate in the Leadership, Ethics, and Professionalism (LEAP) initiative, contributing as requested in the redefinition of this task force, and examine possible enhancement in these areas within the College Core Course Curriculum.
- Review Course Activity Reports (CAR) for the College of Engineering core curriculum courses (59: xxx & non-college courses) in coordination with the core course coordinators. Include an analysis of the format and the level of detail that should be required in the CARs. If specific problems need addressing, either with the overall process or with individual courses, report these to the EFC.
- Review the math, physics, and chemistry sequence assessment mechanism and results, in order to determine if these important courses are serving the needs of the College curriculum.
- Suggest ways to increase student understanding and exposure to internationally relevant components in our curriculum. Meet with the interim associate provost for International Programs to explore how this charge may be advanced considering University-wide goals.

CHARGE #11:

Submit an interim report by January 15, 2009, and final report by April 1, 2009.

Summary: The committee submitted its interim and final reports to the EFC as requested.

NEW BUSINESS TO CONSIDER:

- Prof. Wilder would like to discuss the need for engineering sketching in the core curriculum.

Respectfully submitted,

Julie Jessop
Assistant Professor
Chemical & Biochemical Engineering

APPENDIX MATERIALS:

Core Course CAR Template, revised Spring 2009

Course Assessment Report
College of Engineering, The University of Iowa

(Revised 9 April 2009)

Course # and Name: 059:008 Fundamentals of Engineering II: Electrical Circuits (3 semester hours)
Semester and Instructor: Fall 2008, Associate Professor Mark Andersland, ECE Department
Coordinator: Professor Soura Dasgupta, ECE Department
Student Head Count: 217
Teaching Assistants Head Count and FTE: 4 TAs (2 FTE)
Catalog Description: 059:008 Fundamentals of Engineering II: Electrical Circuits 3 s.h. Kirchhoff's laws and network theorems; analysis of DC circuits; first order transient response; sinusoidal steady-state analysis; elementary principles of circuit design; laboratory experience with DC, AC, and transient circuits. Corequisite: 22M:034

I. Course Goals and Program Outcomes

Indicate the Program Outcomes associated with each Course Learning Goal along with the extent (moderate or substantial) of these associations

Course Learning Goal	Program Outcome
1. Application of Ohm's Law and Kirchhoff's Laws to resistive circuits.	*a(●), b(●)*
2. Analysis of resistive circuits using node and loop analysis.	*a(●), e(●)*
3. Modeling of ideal operational amplifiers and analysis of basic op-amp configurations.	*a(●), c(●), k(●)*
4. Determination of the Thévenin equivalent of a circuit.	*a(●), c(●), e(●)*
5. Simplification and analysis of circuits using source transformations and superposition.	*a(●), e(●)*
6. Use of SPICE to describe and analyze circuits.	*a(●), b(●), c(●), k(●)*
7. Characterization of capacitors and inductors.	*a(●)*
8. Computation of the transient response of single capacitor or inductor circuits.	*a(●), e(●)*
9. Representation of sinusoidal signals in the frequency domain using phasors.	*a(●)*
10. Computation of impedance and analysis of AC circuits in the frequency domain.	*a(●), c(●), e(●)*
11. Formulation of basic voltage and current relationships in transformers.	*a(●)*

Notes: ○ denotes moderate contribution to the outcome ● denotes substantial contribution to the outcome

II. Program Outcomes (provided for reference).

New graduates from the College of Engineering Undergraduate Programs will have:
(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.

III. Assessment

Part A. Log of Recent Improvements, Recommendations and Comments. Append a brief, dated, summary of improvements and recommendations made during the current offering along with motivations and significant comments. If the course is meeting its objectives and no comments are needed, say this. Six year and older entries may be deleted.

Fall 2004 (Andersland) *– Introduced three multi-week, multi-person design projects to provide circuits students with additional circuit design, teamwork and writing experience. Students found the projects to be too time-consuming. Recommendations: reduce project load and move midterm exams to evenings to better accommodate 200+ student exams.*

Spring 2005 (Poroy) *– Assigned only two step-by-step PSPICE computer lab exercises to ease students' workloads. No need for spring evening exams as class size is only 65.*

Fall 2005 (Andersland) *– Dropped the design projects' teamwork and writing components and condensed the design experiences into six design homework problems assigned roughly bi-weekly throughout the semester. Following up on a fall 2004 recommendation, moved midterms to evenings to improve fairness and simplify administration of 200+ student exams. Recommendations: drop optional coverage of transient RLC circuits and further simplify the design experiences.*

Spring 2006 (Poroy) *– Assigned one design project and three step-by-step PSPICE computer lab projects. Held midterms during class.*

Fall 2006 (Liu) *– Assigned four design homework problems instead of multiple PSPICE projects. Transient RLC circuits were covered. Comment: variance in interest and abilities of students from various backgrounds may be better served by teaching separate courses for majors and non-majors.*

Spring 2007 (Reinhardt) *– Assigned three design homework problems. Following up on a fall 2004 recommendation, moved midterms to evenings. Had to create homework assignments 10, 11 and 12 from scratch after it was discovered (after hw 9) that Irwin solutions manual solutions were widely available and being used for cheating.*

Fall 2007 (Andersland) *– Assigned homework using the Irwin text's WileyPlus on-line supplement to algorithmically generate unique numbers for each student's problem assignments and provide students with opportunities to check their answers (up to five times) prior to homework submission. This change was received well by students and seemed to enhance learning and reduce cheating but work should still be submitted to ensure development of students' paper and pencil solution skills. Disappointing competence and assessment scores (new this semester) for goals 4, 5 and 10 suggest extra time needs to be devoted to these goals. The low score for goal 3 is an exam question artifact.*

Spring 2008 (Thedens) *– Many students seemed uncomfortable with the course pre- and co-requisite material. Providing review lectures on complex numbers and differential equations may help. Assessment scores for several goals show improvement over fall 2007. Lower scores for goals 1 and 3 are likely exam artifacts. Did not use WileyPlus. As the SPICE version used by the textbook (PSPICE 9.1) is rather antiquated some thought should be given to the pros and cons of using a more modern version, even if it is incompatible with the textbook.*

Spring 2002–Spring 2008 ABET Summary (Dasgupta) – *The course is running smoothly and meeting its objectives. Incorporation of simple design exercises into the syllabus has benefited students. The adequacy of students' math preparation and incidence of cheating remain concerns. Use of computer-based problem assignments (e.g., WileyPlus) during the large fall offerings has helped to reduce cheating and provides students with helpful problem solving feedback. No significant course changes are currently contemplated or recommended.*

Fall 2008 (Andersland) *– The optional coverage of transient RLC circuits was dropped to free 2+ lectures for additional coverage of goals 4, 5 and 10, and a brief complex number review. Although mastery and competency assessment scores for all goals were good student discomfort with differential equations and complex numbers remains a concern. The PSPICE version was not changed as suggested in spring 2008 because: as far as the features used by beginning students go, only its GUI, not its core capabilities, differ from more current versions; it is supported by the text; and it is free. Overall the course is meeting its objectives.*

Part B. Quantitative Assessment Results. Enter in the table below an assessment of the percentage of **passing students** achieving **mastery** (B+ to A+ level achievement), **competency** (C- to B level achievement) or **exposure** (D- to D level achievement) for each course learning goal.

To make room for the rightmost "new" entry, delete the leftmost "old" entry.

Course Learning Goal And Assessment Basis		F08	Sp08	F07	Sp07	F06	Sp06	F05
1. Application of Ohm's Law and Kirchhoff's Laws to resistive circuits. ***F'08 assessment basis:*** *Exam 1 Q4+ Q5 score (voltage and current divider)*	M C E	34 54 12	43 29 29	58 24 18				
2. Analysis of resistive circuits using node and loop analysis. ***F'08 assessment basis:*** *Final Q12+ Q13 score (node and loop analysis)*	M C E	44 44 12	40 52 8	49 31 20				
3. Modeling of ideal operational amplifiers and analysis of basic op-amp configurations. ***F'08 assessment basis:*** *Exam 2 Q3+ Final Q7 score (ideal op-amp analysis)*	M C E	35 55 10	62 22 16	28 25 47				
4. Determination of the Thévenin equivalent of a circuit. ***F'08 assessment basis:*** *Exam 2 Q4+ Final Q14 score (Thévenin equivalence)*	M C E	34 59 7	40 35 25	27 20 53				
5. Simplification and analysis of circuits using source transformations and superposition. ***F'08 assessment basis:*** *Exam 2 Q1+ Final Q4 score (source transformation and superposition)*	M C E	37 53 10	30 48 22	50 15 35				
6. Use of SPICE to describe and analyze circuits. ***F'08 assessment basis:*** *Hw 10, problem 7.92+7.94 score (transient PSPICE)*	M C E	75 18 7	- - -	81 3 16				
7. Characterization of capacitors and inductors. ***F'08 assessment basis:*** *Exam 2 Q2+ Final Q8 score (C and L dynamics)*	M C E	32 58 10	75 21 5	41 25 34				
8. Computation of the transient response of single capacitor or inductor circuits. ***F'08 assessment basis:*** *Exam 2 Q5+ Final Q11: RL and RC circuit analysis*	M C E	39 48 13	38 38 24	40 29 21				
9. Representation of sinusoidal signals in the frequency domain using phasors. ***F'08 assessment basis:*** *Final Q10+ Q14 score (phasor element models)*	M C E	38 51 11	65 29 6	54 29 17				
10. Computation of impedance and analysis of AC circuits in the frequency domain. ***F'08 assessment basis:*** *Final Q14+ Q15 score (Z and V-phasor analysis)*	M C E	32 57 11	40 35 25	22 12 66				
11. Formulation of basic voltage and current relationships in transformers. ***F'08 assessment basis:*** *Final Q15 score (transformer circuit analysis)*	M C E	44 45 11	- - -	49 26 25				

Part C. Please attach a current syllabus.