3. Program Outcomes

a. Program Outcomes Established Based on the Program Educational Objectives

The RWU Engineering Program has adopted the following expected Engineering Student Outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering
b. 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 lifelong learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills and modern engineering tools necessary for engineering practice

These program outcomes are related to the Program Educational Objectives as presented in Table 3.1, Program Educational Objectives.

Table 3.1. Program Educational Objectives linked to Engineering Program Outcomes

● (red) = Weak Relationship
● (blue) = Moderate Relationship
● (green) = Strong Relationship

A – K Outcomes	Inquisitive mind, excellence in technical skills and knowledge, success, high ethical standards	Lifelong intellectual growth	Advance the engineering profession, service, role model, assist SECCM
a. an ability to apply knowledge of mathematics, science, and engineering	● (green)	● (blue)	● (blue)
b. an ability to design and conduct experiments, as well as to analyze and interpret data	● (green)	● (blue)	● (blue)

Table 3.1. Program Educational Objectives linked to Engineering Program Outcomes, continued

● (red) = Weak Relationship
● (blue) = Moderate Relationship
● (green) = Strong Relationship

A – K Outcomes	Inquisitive mind, excellence in technical skills and knowledge, success, high ethical standards	Lifelong intellectual growth	Advance the engineering profession, service, role model, assist SECCM
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	● (green)	● (blue)	● (blue)
d. an ability to function on multi-disciplinary teams	● (green)	● (green)	● (blue)
e. an ability to identify, formulate and solve engineering problems	● (green)	● (green)	● (blue)
f. an understanding of professional and ethical responsibility	● (green)	● (green)	● (green)
g. an ability to communicate effectively	● (green)	● (green)	● (green)
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	● (green)	● (green)	● (green)
i. a recognition of the need for, and an ability to engage in lifelong learning	● (green)	● (green)	● (green)
j. a knowledge of contemporary issues	● (green)	● (green)	● (green)
k. an ability to use the techniques, skills and modern engineering tools necessary for engineering practice	● (green)	● (blue)	● (green)

b. How Program Outcomes Encompass and Relate to the Outcome Requirements of Criterion 3

The Engineering Program Outcomes adopted by Roger Williams University embody the suggested competencies required by a graduating engineering student proposed by the Accreditation Board for Engineering and Technology. We choose to adopt the proposed competency areas as presented without summarizing or combining multiple items. This has allowed us greater ease in defining metrics and measuring student success on each a through k item. As expected, our outcomes are ultimately agreed to by our faculty with input from our constituencies.

All program outcomes are operationalized through a process where each faculty member analyzes his or her courses and assigns a metric to the amount of material in the course that corresponds to each outcome. This process is further articulated by having each faculty member review a series of operationalized items associated with each outcome and determining whether certain learning objectives and competencies associated with the specific outcome are covered. The learning objectives presented to the faculty in the operationalization process are defined according to Bloom's taxonomy and derived from several sources including Bloom et al. (1956)[1] McGourty, Besterfield-Sarcre and Shuman (1999)[2] and Besterfield-Sacre et. al (2000),[3] as well as from each faculty member's own contributions. The form was designed in-house using Adobe Acrobat Professional form features. Although the process of filling out each form is time-consuming for the faculty, it allows us to have a systematic evaluation of our outcomes that quickly identifies any areas where process improvement might be implemented. It also allows us to review student material associated with each outcome to begin the process of determining student competency associated with the outcome.

Table 3.2, Sample of Outcomes Worksheet, shows the cover page of the outcomes worksheet and one page from outcome a. This sample is for the course, Engineering 210, Engineering Mechanics. Each faculty member fills out one of these forms for each of his or her courses. Appendix III, Tab E shows the entire a through k operationalized outcomes for a blank form. All forms for each course offered in the program will be available for the accreditation team when visiting.

Table 3.2. Sample of Outcomes Worksheet

Courses Mapped to a-k Outcomes

Course Name: ENGR210 Engineering Mechanics 1 Statics
Does this class have design content? Yes
How much of the class consists of design content?

A – K Outcomes	Are the following outcomes expected in: 0 Engineering Mechanics	What percentage of course material applies to this outcome?
a. an ability to apply knowledge of mathematics, science, and engineering	✓	90%
b. an ability to design and conduct experiments, as well as to analyze and interpret data		0%
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	✓	10%
d. an ability to function on multi-disciplinary teams		0%
e. an ability to identify, formulate and solve engineering problems	✓	90%
f. an understanding of professional and ethical responsibility	✓	10%
g. an ability to communicate effectively	✓	30%
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	✓	10%
i. a recognition of the need for, and an ability to engage in lifelong learning	✓	10%
j. a knowledge of contemporary issues		0%
k. an ability to use the techniques, skills and modern engineering tools necessary for engineering practice	✓	80%

Outcome A: an ability to apply knowledge of mathematics, science, and engineering

Outcome A Operationalized: At the completion of the course, students are expected to:	Is this outcome element covered in 210 Engineering Mechanics 1
Recognize functional relationships among independent and dependent variables.	✓
Describe mathematical and physical significance of functions, derivatives of functions, and integrals of functions.	✓
Explain the role of mathematics as a tool for modeling systems and processes.	✓
Apply mathematical principles to obtain analytical or numerical solution to model equations.	✓
Choose a mathematical model of a system or process appropriate for the required accuracy.	
Apply principles of numerical solutions to integrals and differential equations.	✓
Identify mathematical and physical assumptions that allow model to be developed and solved at the level of accuracy required.	
Apply concepts of integral and differential calculus and linear algebra to solve problems.	✓
Combine mathematics principles to formulate models of chemical, physical, and/or biological processes and systems as relevant to area of concentration.	✓
Evaluate validity and reliability of mathematical models by comparing model solutions to either known results for simplified cases (i.e. numerical solutions compared to asymptotic analytical solutions) or relevant empirical data.	
Interpret mathematical model results to estimate accuracy and reliability.	
Accept limitations of mathematical models to physical reality.	✓
Challenge predictions of mathematical models until independently verified.	
Describe fundamental scientific and engineering principles in chemical, physical, and/ or biological processes and systems as relevant to area of concentration.	✓
Identify which fundamental scientific and engineering principles govern the performance of a given process or system.	✓
Apply engineering science principles as relevant to area of concentration, e.g.: - "conservation" principles of total mass, species mass, linear momentum, angular momentum, energy, or charge to model chemical, physical, and/or biological processes or systems. - rate and constitutive equations to model relevant chemical, physical, and/or biological processes or systems. - thermodynamic principles to predict bounds on the performance of processes or systems. - materials principles to characterize behavior of physical, chemical, and/or biological processes or systems.	✓

Table 3.3, Course Mapping to Expected Engineering Student Outcomes, shows the result of the faculty assessment of exactly how much of the course material supports the achievement of the specific outcome. The input for this table is the respective course outcomes analysis prepared by each faculty member and discussed in the previous section.

Core concentration and core specialization courses outcomes forms are filled out by the Dean and Associate Dean of Engineering in collaboration with faculty members teaching these courses based on a review of course material as well as personal interviews.

Table 3.3. Course Mapping to Learning Outcomes

Outcome / Courses	A: Apply knowledge of math, science and engineering	B: design and conduct experiments, analyze and interpret data	C: design system, component or process	D: Function on multi-disciplinary teams	E: Identify, formulate and solve engineering problems	F: Understand professional and ethical behavior	G: Communi-cate effectively	H: Broad education to understand impact of engineering	I: Ability to engage in lifelong learning	J: Know-ledge of Contem-porary issues	K: Modern engin-eering tools
ENGR 110 Engr Graphics and Design			50%	50%	50%	10%	50%				50%
ENGR 115 Computer Apps for Engineering	30%		10%	20%	20%		30%				100%
ENGR210 Engr Mechanics I (Statics)	90%		10%		90%	10%	30%	10%	10%		80%
ENGR 220 Engr Mechanics II (Dynamics)	100%		40%		80%						100%
ENGR 240 Circuit Theory and Lab	100%	50%	20%	30%	100%		40%				100%
ENGR 260 Engr Electronics and Lab	100%	40%	20%	20%	100%		50%				80%
ENGR 270 Digital Systems Design and Lab	100%	50%	40%	30%	100%		50%				80%
ENGR 300 Mechanics of Materials & Lab	90%	20%	30%	10%	90%	10%	30%	10%	10%		80%
ENGR 305 Fluid Mechanics and Lab	100%	100%	20%	30%	100%	100%	30%		100%	100%	100%
ENGR 310 Materials Science	90%	20%	70%	10%	80%	10%	10%	10%	10%	10%	70%
ENGR 313 Structural Analysis	90%		30%	10%	80%	10%	20%	10%	10%	0%	80%
ENGR 314 Soil Mechanics and Lab	100%	100%	30%	30%	100%		30%		30%		100%
ENGR 330 Thermo-dynamics	100%				60%	10%	10%	20%	10%	10%	50%
ENGR 335 (ECON 335) Engr Economic Analysis	100%	100%		30%	50%	50%	30%	80%	50%	100%	100%
ENGR 401 Engineering Senior Seminar						30%	60%	20%	20%		
ENGR 409 Design of Structures	90%		80%	30%	70%	10%	20%	10%	10%		80%
ENGR 412 Water Resources Engr and Lab	100%	30%	30%	30%	100%		100%		100%		100%
ENGR 413 Adv Structural Analysis	90%				90%		20%		10%		80%
ENGR 415 Wastewater Treat and Lab	100%	30%	50%		100%	10%	30%	20%	10%	40%	50%
ENGR 417 Groundwater Hydrology	100%	30%			100%	10%	30%	20%	10%	40%	50%
ENGR 424 Digital Signal Processing	100%	20%			100%		20%				100%
ENGR 431 Mechanical Vibrations	100%	40%			10%				10%		100%
ENGR 433 Heat Transfer	100%		40%	20%	80%	10%	20%	10%	10%		80%
ENGR 445 Dynamic Model and Control	100%	30%			100%		20%				100%
ENGR 450 Robotics	100%		60%	60%	60%				10%	10%	100%
ENGR 455 Data Communication	10%	10%			10%		10%	10%			
ENGR 465 Network Analysis and Design	10%	10%	20%	10%	20%	10%	10%	10%	50%		20%
ENGR 490 Engr Design I	60%	50%	80%	100%	80%	70%	100%	70%	100%	50%	60%
ENGR 492 Engr Design II	100%	100%	100%	100%	100%	50%	100%	70%	100%	50%	100%
ENVR 101 Introduction to Environ Engr	100%				60%		10%	100%		100%	
ENVR 405 Air Pollution and Control	100%	30%	30%		100%	10%	30%	20%	10%	40%	50%
ENVR 410 Solid and Hazardous Waste Mgmt	100%	30%			100%	10%	30%	20%	10%	40%	50%
ENVR 411 Water Pollution and Treatment and Lab	100%	30%	50%		100%	10%	30%	20%	10%	40%	50%
COMSC 110 Introduction to Computer Science		100%		50%	20%	20%	100%		100%	10%	100%
COMSC 111 Data Structure and Lab		10%		20%	30%	50%	40%	0%	100%	10%	100%
COMSC 210 Principles of Computer Org and Lab			20%	10%	20%	10%	10%	10%	30%		10%
COMSC 220 Analysis of Algorithms	40%	50%	20%			10%	20%		10%		
COMSC 230 Principles of Programming Languages				10%	10%	10%	10%	10%	50%		30%
CNST 250 Construction Equipment	50%		10%		50%	20%	20%	40%	10%	30%	30%
CNST 302 Surveying and Lab	20%	20%			20%	20%	20%				20%
CNST 455 Electrical and Mechanical Design of Bldgs	100%		70%	70%	100%	10%	20%	20%	30%	10%	40%
CORE 102 History/Modern World		100%					50%	100%		100%	
CORE 103 Human Behavior		100%				50%	50%	100%	50%	100%	
CORE 104 Literature and Philosophy		100%					50%	100%		100%	
CORE 105 Artistic Impulse		100%		40%			50%	100%		100%	
MATH 213 Calculus I and Lab	100%	100%						100%			
MATH 214 Calculus II and Lab	100%	100%						100%			
MATH 315 Probability and Statistics	100%	100%			50%			100%			
MATH 317 Differential Equations	100%	100%			50%			100%			
MATH 330 Engineering Math	100%	100%			100%			100%			50%
WTNG 102 Expository Writing						50%	100%				
WTNG 220 Critical Writing for the Professions						50%	100%				
CHEM 191 Chemistry I and Lab	100%	100%									
CHEM 192 Chemistry II and Lab	100%	100%	50%								
PHYS 201 Physics I and Lab	100%	100%								40%	50%
PHYS 202 Physics II and Lab	100%	100%	50%		40%					40%	50%
Senior Core	100%					100%	100%	100%	100%	100%	

c. Processes and Mechanisms Used to Produce and Assess Program Outcomes

As discussed in Criterion 2, Program Educational Objectives, the faculty semi-annual planning session is the forum used to review data from our multiple constituencies and refine each of the Program Outcomes based on the input of our constituency base. In addition, each faculty member individually participates in a process that "operationalizes" each Program Outcome for each course he or she teaches. This process was discussed in the previous section.

Also discussed in Criterion 2, several different assessment mechanisms are used to measure achievement of Program Outcomes. These assessment mechanisms/ materials are:

- Engineering Student Exit Survey

  Each graduating Engineering senior completes a student exit survey prior to graduation. Questions focus on areas such as program quality, personal and professional development, perceived proficiency levels associated with each Program Outcome, and the educational environment. In addition, overall impressions of the collegiate experience are solicited. The results of these interviews are summarized for review and comment. A sample survey form along with the summarized results of interviews conducted for Academic Years 2001-2002 through 2004-2005 are enclosed in Appendix III, Tab F. Individual student responses are maintained in the SECCM and are available for review.

- Faculty Course Assessment Report

  One of the most important instruments of the assessment process is course assessment report. Individual courses are the building blocks of the curriculum and most curricular changes are expressed in terms of courses. Course assessment is the process of measuring and evaluating the performance of a course against published course objectives and Program Outcomes. Integral to the process is the identification and implementation of strategies designed to improve the course.

  The course assessment report is a written document prepared for every course, every semester by the faculty member. These reports are prepared as soon after completion of the semester as possible. Identification of suggested changes arising from assessment, actions taken in response to assessment, and the efficacy of earlier actions resulting from the ongoing assessment process are all described in the course assessment report. Presented as a package, a set of consecutive course assessment reports presents a clear record of the course assessment process, changes and results. The course assessment report consists of three sections: the course description, the course assessment, and the course recommendations. Minimum content requirements for each section are prescribed by memorandum. Responsible faculty members may include additional data as desired.

  Upon completion, the reports are forwarded to the Dean where they are reviewed and catalogued. The memorandum specifying the format of the course assessment report as well as a sample completed course assessment is enclosed in Appendix III, Tab G. Course assessment reports for Academic Years 1999-2000 through 2004-2005 are maintained in the SECCM and are available for review.

- Course Student Survey

  Beginning in Academic Year 2001-2002, all student surveys were collected for all courses. (Prior to this time, only courses taught by probationary faculty, faculty scheduled for post-tenure review, or faculty who volunteered to participate were surveyed.) A comprehensive instrument, questions investigate course content and quality, instructor performance, and perceived educational value. Course student survey results are compiled each semester. Instructors receive results for each of their courses and aggregate data are made available to the SECCM allowing the instructor to compare his or her course performance to the SECCM average. A copy of the course student survey form in enclosed in Appendix III, Tab H. Individual course survey results, cataloged by instructor and academic year, as well as aggregate results are maintained in the SECCM and will be available for review.

- Faculty Program Assessment Report

  The program assessment report, like the course assessment report, is a written document prepared for every course, every semester by the faculty member. These reports are prepared as soon after completion of the semester as possible. These reports identify course prerequisite deficiencies, facility or budgetary resource deficiencies, and course-related programmatic impacts. The primary purpose of this report is to provide the faculty member with an instrument that permits identification of issues that are beyond his or her ability to directly control.

  Upon completion, the reports are forwarded to the Dean where they are reviewed and catalogued. Copies of all program assessment reports are distributed to faculty members prior to the semi-annual assessment meeting and serve as a resource for assessment discussion. A copy of the program assessment report form as well as a sample completed program assessment report is enclosed in Appendix III, Tab I. Program assessment reports for Academic Years 2001-2002 (spring 2002 semester) through 2004-2005 are maintained in the SECCM and are available for review.

- Alumni Survey

  The Engineering Alumni Assessment Survey queries Engineering graduates on a number of topics involving their preparation for the workplace, the program's preparation of them for the workplace, and their level of success.

  One of the most important portions of the alumni survey addresses their perception of what skill sets contribute to their success in the workplace and how well the Engineering program at RWU prepared them for achieving success in the workplace. The largest gaps in perceived success factors and preparation are identified and strategies developed to mediate these gaps for present students.

  A copy of the survey instrument is enclosed in Appendix III, Tab J. Results and analysis of the survey conducted during the summer of 2004 will be available for review.

- Graduate Employers

  Employers who hire Engineering Program graduates provide a continuous source of feedback on the quality of program and its graduates. This feedback comes in two primary forms: informal discussion with Engineering faculty members and employer willingness to hire additional graduates. Employers tend to be frank about perceived program strengths and weaknesses. Data are collected at a variety of venues to include Career Fairs, the Senior Design and Construction Showcase, student competitions, professional association meetings, internship evaluation surveys and meetings of the Professional Advisory Board.

- Professional Advisory Board

  The Professional Advisory Board provides an important source of program assessment. One of the important roles of the advisory boards is to periodically assess the curriculum to ensure its relevancy with regards to current industry needs and trends, Furthermore, since many of the advisory board members represent companies that hire graduates and employ interns, these individuals also provide input as Graduate Employers and through the Internship Program. Due to the close relationship enjoyed between advisory board members and program faculty members, assessment input tends to be very candid and offered with a comprehensive understanding of the mission and objectives of the program.

- Fundamentals in Engineering Examination

  Beginning in the spring 2004, all graduating seniors were required to sit for the Fundamentals in Engineering Examination. The SECCM provides the students with financial and educational support in pursuit of the first step toward professional certification.

  Specifically, the SECCM pays the examination fee for the students and provides the students, at no charge, a forty-five hour Review Course. The review session is presented in the evening and is scheduled so as not to conflict with any scheduled SECCM class.

  The students, in exchange for the above-described financial and educational support, sign a contract and agree to the following conditions:

  1. To attend every review session offered as part of the Review Course.
  2. To study for and pass the examination.
  3. To report the results of the examination to the SECCM.

  If the Student fails to comply with the conditions 1 through 3 above, the SECCM may assign an SECCM examination fee equal to the examination fee charged by the Rhode Island Professional Engineering Certification Board to be assessed against the Student's RWU financial account.

  This national examination provides Engineering Program with an excellent opportunity to assess the program and its graduates not only against graduates from other programs, but also against practicing professionals. The most current FE exam results, assessment instruments associated with the FE campaign and an article discussing the philosophy of using the FE exam as an assessment tool are included in Appendix III, Tab K.

- Senior Design Showcase

  Initiated in the spring 2004, the Senior Design and Construction Showcase provides graduating seniors with an opportunity to showcase their senior projects. In 2005, over 15 student groups presented their senior design work in a combination of poster sessions and presentations to members of the RWU community as well as to representatives from companies and institutions. A showcase booklet is included in Appendix III, Tab L.

- Senior Skills Inventory

  The senior skills inventory is a survey administered at the beginning of each engineering student's senior year of study. The objective of the survey is to allow seniors to self-assess their preparation for the workplace or for graduate study. The results from this survey are used to refine the Engineering Design class content to address any perceived technical/tool gaps among students. Secondly, the results of the survey allows faculty to assist students with the development of a personal plan for career or graduate school as well as closing knowledge and skill gaps. A copy of the Senior Skills Inventory is provided in Appendix III, Tab M. Results of the survey are available for review.

- Senior Job Placement Survey

  The senior job placement survey assesses how well the School of Engineering as well as the Roger Williams University career center assists our students in the preparation for their job search or graduate school. The survey also collects job offer information, offer acceptance information and solicits input for improving the system. A copy of the job placement survey is included in Appendix III, Tab N. Results of the survey for the years 2002 through 2005 are available for review.

- Student Competitions

  The Engineering Program has entered teams in the Regional ASCE Steel Bridge Competition (past two years) and Concrete Canoe Competitions (three of the past four years.) This year, Engineering students also participated in the WERC, (Water and Environmental Research Consortium) competition in New Mexico as well as the Disney Imagineering Competition. Participation in these competitions provides faculty members and students alike the opportunity to assess the program's competitiveness and efficacy.

- Other

  In addition to the internal and external assessment instruments described above, there are a number of internal program metrics that are used to evaluate trends within the Engineering Program. These metrics include:

  - Student enrollment trends
  - Freshmen GPA high school and test scores
  - Student retention rates
  - Student graduation rates
  - Faculty allocations
  - Budget allocations
  - Course binders

  Collectively, these mechanisms allow us to assure interrater reliability in the assessment of our program outcomes by using multiple instruments in measuring similar constructs of outcomes.

d. Metric Goals for Each Outcome with Associated Quality Level Deemed Necessary for Accomplishment of the Outcome

After reviewing operationalized learning objectives for each a-k outcome, Engineering constituencies review and refine metrics associated with each outcome. The tables in this section show the metrics associated with each outcome and where the metric is measured. Following each table is an assessment of how well our students are meeting the metrics associated with each outcome supported by qualitative and quantitative data gathered on a regular basis (See Table 2.6 for the timeline associated with assessment processes). The information following the table is just a small sampling of the type of analysis we conduct to identify opportunities for process and program improvement. All of the analysis for all of our assessment mechanisms will be available for accreditation visitors.

Table 3.4. Outcome "a" Metrics

Outcome a: an ability to apply knowledge of mathematics, science, and engineering	
Metrics Associated with Outcome a:	**Where Measured**
1. Engineering student pass rate of the FE exam meets or exceeds national average for Masters granting Universities	Fundamentals in Engineering Examination
2. For each required engineering course with a prerequisite in mathematics, science or engineering, at least 75% of the students who have C or better in the prerequisite course pass the course on the first attempt.	Transcript Review
3. All graduating seniors report that they have achieved proficiency in the ability to apply knowledge of mathematics, science and engineering to solve engineering problems. Proficiency is defined of a score of 1 or 2.0 on a 5 point scale.	Course Student Survey Student Exit Survey
4. At least 95% of students are evaluated by sponsors as completely fulfilling the senior design capstone project requirements.	Senior Design Showcase Graduate Employers
5. Faculty report no systemic deficiencies in student learning in basic engineering courses	Engineering Faculty Course Assessment Report Faculty Program Assessment Report
6. At least 85% of all alumni rate their preparation by RWU for the workplace in the ability to apply knowledge of mathematics, science and engineering as good to excellent.	Alumni Survey

Opportunity Areas Associated with Outcome a: **ability to apply knowledge of mathematics, science, and engineering.**

Metric number 1. FE exam results. As a result of historical FE pass rates of RWU engineering majors, a major emphasis was placed on preparing all of our students to take the FE exam and achieve pass rates greater than the national average for general engineering students. Although we exactly matched the national pass rate, (81%), we still missed this metric by not surpassing the national pass rate for our general engineering majors. Still we are very proud of our students' performance because we require that all students take the FE exam, not just those who have self-selected to take the exam, very often those who are at the top of their class.

Table 3.5. FE Pass Rates for General Engineering Majors for the Years 2001 through 2005

Exam Date	Total Examinees	No. Passing	Percent Passing	National Percent Passing	Gap
April 2000	22	10	45.4	63%	17.6%

April 2001	12	6	50.0	66%	16.0%
April 2002	17	12	70.6	81%	10.4%
April 2003	14	6	42.8		
April 2004	12	6	50.0	74%	24%
April 2005	21	17	81.0	81%	0%

In addition, a repeated suggestion for improving the quality of our engineering program from our alumni survey of engineering graduates was to provide more assistance with FE preparation and to assure that students take the exam while still in school.

To address this target, starting in the 2003-2004 academic year and refined in the 2004-2005 academic year, a well-developed marketing program was initiated to stress the importance of professional licensure. This campaign included student contracts, mandatory attendance at a 45 hour FE review course, guest speakers stressing licensure and FE test taking tips in Senior Design and Senior Seminar classes, and application processing for students. As a result of this campaign, several outcomes are evident, the most notable is the improvement in the pass rate of our students.

In the 2005 engineering student exit survey, 100% of all graduating seniors reported that they sat for the FE exam. Furthermore, one of the highest rated factors in graduating seniors' assessment of their proficiency levels was in the recognition of the need for life-long learning. As a follow-up to the 2004-2005 campaign, three separate surveys and two focus group interviews were administered to seniors to solicit additional suggestions for improving the components of the FE marketing campaign for the 2005-2006 launch. All of the material associated with the FE marketing campaign will be available for reviewers during the accreditation visit.

Metrics 2 through 5 were met or exceeded.

Table 3.6. Outcome "b" Metrics

Outcome b: an ability to design and conduct experiments, as well as to analyze and interpret data	
Metrics Associated with Outcome b:	**Where Measured**
1. At least 95% of all Engineering students will demonstrate a proficiency in the design and conducting of experiments as well as in the analysis and interpretation of data.	Engineering Faculty Course Assessment Report Faculty Program Assessment Report
2. At least 20% of all Engineering students will participate in a competition where their ability to design and conduct experiments and analysis and interpret data will be externally judged and assessed.	Student Competitions
3. All graduating seniors report that they have achieved proficiency in the ability to apply knowledge of mathematics, science and engineering to solve engineering problems. Proficiency is defined of at least a score of 1 or 2 on a 5 point scale.	Student Exit Survey
4. At least 85% of all alumni rate their preparation by RWU for the workplace in the ability design and conduct experiments as well as to analyze and interpret data as	Alumni Survey
5. Course binders for the courses reporting a direct contribution to accomplishing Outcome b show examples of experimental design and analysis of designed experiments for each student in the class. An independent evaluator determines that at least 85% of the work is satisfactory.	Course Binders

Opportunity Areas Associated with Outcome b: **an ability to design and conduct experiments, as well as to analyze and interpret data**

Metric 1: 95% of engineering students will demonstrate a proficiency in the ability to design and conduct experiments as well as to interpret data. Faculty course assessment reports indicated over the past three years that engineering students require more applied examples and training in design of experiments. Although students were exposed to design of experiments in several engineering classes, as well as the probability and statistics class, the treatment of the topic varied depending on the class. This fact was validated with a review of course binders. When students reached Senior Design class, a foundation in a common DOE terminology and approach was lacking. Faculty assessment of a DOE proficiency level at the beginning of senior year was 60%. At the end of senior year, faculty assessment of proficiency among students had risen to 80%. This was a result of three key factors. The first involved highlighting this point in the faculty semi-annual planning meeting and discussing strategies involving how to address it. The second involved introducing DOE learning modules into Senior Design class to develop a common terminology and engineering approach. And the third involved introducing the topic as a discussion area with the Math Steering Committee.

Interestingly, from the 2005 senior exit survey, students rated their proficiency in the ability to design and conduct experiments at a 1.29 on a five point scale where 1 means proficiency achieved and 5 means proficiency not achieved. All students participating in the 2005 senior exit survey had been exposed to the improved teaching modules associated with DOE target.

Metric 2: 20% of Engineering students will participate in a competition requiring the incorporation of DOE methods and applications. Table 3.7 Engineering Competition Participation, shows competition participation by Engineering students over three of the past 4 years where elements of DOE applications were used to derive an optimal solution. We believe that student competitions that stress formal Engineering design and analysis paradigms are an excellent venue for students to apply DOE techniques. Although we met the 20% metric for competition at the senior student level, we missed the target for all other levels. In the 2005-2006 academic year, greater emphasis will be placed on involving freshmen, sophomores and juniors in engineering competitions to provide opportunities for more applied experience in the realm of DOE.

Table 3.7. Engineering Competition Participation 2001 – 2005

Year	Number of Students Participating in Competitions	% of all Engineering Students
2001-2002	4	4
2003-2004	15	13
2004-2005	19	16

Metrics 3 through 5 for Outcome b were met.

Table 3.8. Outcome "c" Metrics

Outcome 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	
Metrics Associated with Outcome c:	**Where Measured**
1. 100% of Engineering students participate in a Senior Multi-Disciplinary Capstone Class that involves a year long design project that demonstrates their ability to **successfully** design a system, component or process to meet client needs within specified constraints.	Engineering Faculty Course Assessment Report Faculty Program Assessment Report Transcript Review
2. 100% of all senior Engineering students participate in the Design and Construction Showcase where their work is evaluated by mentors, potential employers and faculty.	Senior Design Showcase Graduate Employers
3. All seniors report that they have successfully integrated their engineering and CORE curriculum culminating in the design of their senior capstone project. Success is defined of at least a score of 4.0 on a 5 point scale.	Senior Skills Inventory Course Student Survey Faculty Course Assessment Report
4. At least 50% of upper-division engineering courses and 25% of lower division engineering courses give students the opportunity to design systems, components or processes considering specified constraints.	Course Binders Engineering Faculty Course Assessment Report
5. At least 65% of engineering students will have accepted a job offer or have been accepted to graduate school before the conclusion of Spring semester.	Senior Job Placement Survey
6. 100% of those graduates that were seeking employment will have a job within 6 months of graduation.	Alumni Survey

Opportunity Areas Associated with Outcome 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**

Metric 3: All seniors report that they have successfully integrated their engineering and CORE curriculum culminating in the design of their senior capstone project. However, senior exit surveys from the past three years have shown a consistent decline in the assessment of external CORE, (general education), courses by students. In 2003, Engineering students rated their satisfaction with the CORE classes at a mean of 4.00 on a 5 point scale where 1 means not satisfied at all and 5 means extremely satisfied. In 2004, that mean dropped to 3.5 for CORE satisfaction level. In 2005, to further explore students perceptions of the CORE curriculum, additional questions were included on the exit interview to probe exactly with which courses students were dissatisfied. This further probing indicated that students were most dissatisfied with the four course sequence of CORE 102, 103, 104 and 105 and not the MATH CORE specialization or writing courses. This finding led to the initiation of discussions with CORE faculty as well as a review of CORE course materials and assignments. The root cause of the dissatisfaction by the students had more to do with not recognizing the value of courses outside the major as integral contributors to providing students with skill sets that contribute to designing systems and processes under realistic constraints. After discussions with CORE faculty, the value of these courses has become even more evident in developing students' problem solving and creative skills especially in the context of incomplete information or subjective information.

For example, in CORE 105, The Artistic Impulse, one assignment involves students being placed in multi-disciplinary teams with the goal of designing a funding plan for allocating a $100,000 budget to dance companies. Students must review dance performance tapes, define quality criteria for funding based on fuzzy and subjective perceptions of dance excellence, and reach consensus on the allocation of constrained resources. This assignment provides engineers with some excellent experience in design under realistic constraints outside the engineering field. Many of the skills used in an assignment such as this are transferable to engineering contexts.

At our next semi-annual faculty planning meeting, we will discuss a strategy for assuring that all Engineering faculty have a clear understanding of what is covered in our CORE curriculum and how we can build stronger partnerships with our CORE curriculum colleagues to assure that transferal of knowledge is reinforced between Engineering and CORE and CORE and Engineering.

All other metrics were met or exceeded.

Table 3.9. Outcome “d” Metrics

Outcome d: an ability to function on multi-disciplinary teams	
Metrics Associated with Outcome d:	**Where Measured**
1. 85% of Engineering students participate in a Senior Multi-Disciplinary Capstone Class that involves a team with members having different engineering disciplinary backgrounds.	Engineering Faculty Course Assessment Report
2. 100% of all Engineering students will participate in the university CORE sequence and University Senior Integrative Experience.	Transcripts
3. At least 80% of all graduating seniors will report that their teaming skills have improved from benchmarked data collected at the beginning of their senior year to ending data collected at graduation.	Senior Skills Inventory Course Student Survey Faculty Course Assessment Report
4. At least 25% of upper-division engineering courses, 50% of lower division engineering, and 80% of CORE courses will give students the opportunity to strengthen their skills associated with functioning on multidisciplinary teams.	Course Binders Engineering Faculty Course Assessment Report

Opportunity Areas Associated with Outcome d: **an ability to function on multi-disciplinary teams.**

All metrics were met or exceeded.

Table 3.10. Outcome “e” Metrics

Outcome e: an ability to identify, formulate and solve engineering problems	
Metrics Associated with Outcome e:	**Where Measured**
1. General engineering student pass rate of the FE exam meets or exceeds national average.	Fundamentals of Engineering Examination
2. At least 70% of all engineering courses will address this outcome.	Course Student Survey Course Binders
3. Senior engineering students report proficiency achieved in their ability to identify, formulate and solve engineering problems. Proficiency defined as all students reporting a 1 or 2 on a five point scale where 1 means proficiency achieved and 5 means proficiency not achieved.	Senior exit survey Course surveys
4. Faculty and professional constituencies report that students have achieved proficiency in their ability to identify, formulate and solve engineering problems by the time of graduation.	Faculty Course Assessment Reports Course Binders Design Showcase

Opportunity Areas Associated with Outcome e: **an ability to identify, formulate and solve engineering problems.**

Metric 1: As a result of historical FE pass rates of RWU engineering majors, a major emphasis was placed on preparing all of our students to take the FE exam and achieve pass rates greater than the national average. Although we matched the national pass rate, (81%), our goal is to show continual improvement in the metric. We are very proud of our students' performance because we require that all students take the FE exam, not just those that are at the top of their class.

In addressing this metric, our campaign included preparing the FE registration packets for students and handling all of the paperwork, facilitation of references, coordination with the state Board offices, payment, and correspondence on behalf of the students. Students are given pertinent deadlines for packet submission and a designated faculty member travels to the Providence Board office to submit collectively all of our applications. This faculty member is also responsible for ordering the FE review manuals and associated materials and distributing them to students.

The student in turn is required to sign a contract indicating that he or she will fully participate in all of the preparatory activities leading up to the exam as well as attend all of the review sessions. If not, the student could be responsible for repaying the School for our expenses associated with supporting him or her. All students signed the contract and agreed to the terms. A copy of the student contract is presented as Appendix III, Tab O.

Another valuable component of this campaign was a complete understanding by the students as well as review session presenters of the new calculator requirements for the FE exam. Since facility with calculator use positively correlates with how comfortable students feel in taking the FE exam, we prepared a complete analysis of the advantages and disadvantages of each allowable calculator. This analysis is provided in Appendix III, Tab P.

Because we feel strongly that the FE exam is a good assessment tool for general engineering majors we have placed a great deal of emphasis on designing processes and systems that support the accomplishment of this metric. We also feel that a student graduating from our program in general engineering possesses a differential advantage over other potential hires in the eyes of employers having passed the FE. This is especially the case because of some misunderstanding on the part of employers as to exactly what a general engineering degree entails.

All metrics were met or exceeded.

Table 3.11. Outcome “f” Metrics

Outcome f: an understanding of professional and ethical responsibility	
Metrics Associated with Outcome f:	**Where Measured**
1. All graduating seniors, (100%) will sit for the FE exam.	Fundamentals in Engineering Examination
2. At least 90% of all graduating seniors will attend the 45 hour FE review course.	Fundamentals in Engineering Examination Review Course
3. All students will be exposed to at least three lectures from external speakers in senior seminar class that focus on professional and ethical responsibility.	Course Student Survey Course Binders
4. At least 50% of all engineering students will be members of at least one of the professional engineering society student chapters.	Faculty Student Sponsorship
5. At least 25% of all engineering classes will address, and students will demonstrate an understanding of professional and ethical responsibility.	Course Binders Course Student Surveys
6. At least 50% of engineering students will have held an engineering related summer position, engineering internship or coop, or engineering work study related position by the time of graduation.	Senior Skills Inventory

Opportunity Areas Associated with Outcome f: **an understanding of professional and ethical responsibility**

Metric number 4. Professional Society Membership. This is one area where faculty and students have been working to maximize opportunities for students to join chapters of professional societies. One of the challenges we face is because of the size of our program, a critical mass of students is lacking to support a full range of activities associated with a student chapter of a professional society membership. Still we have a very active Engineering Club, which serves as an umbrella organization for chapters of the ASCE and SWE. In addition, engineering students, especially civil and structural engineering minors, often attend professional society meetings of the Rhode Island Department of Transportation and construction related organizations. Because a formal membership application is not required for the Engineering Club, the number of participating students in the School is transitory. However, at the senior class level, approximately 80% of students participate in professional society activities.

To address the lack of a formal mechanism to track professional society activities of our students, we are instituting a system where student club officers will meet on a bi-monthly basis with the Dean and Associate Dean for leadership and club management mentoring. Meeting and attendance tracking will be charged to the leadership teams of the various student organizations with a requirement to provide a semester report on the participation and activities of the organization to the Dean and Associate Dean. A formal process of announcing club activities will also be established for the purpose of information dissemination to Engineering faculty and the various University communities.

Metric number 6. Engineering Related Positions. One of our metrics measuring an understanding of professional and ethical responsibility on the part of our students is the participation in an engineering work environment. This work experience could be in the form of a co-op, internship or summer employment. By actively collaborating with engineering professionals on a day-to-day basis, we feel our students will be exposed to engineering practices characterized by professional and ethical standards. Of our graduating seniors, only 37.5% had participated in any type of paid engineering employment over the course of their college careers.

We are addressing this missed metric in three ways. First, we have instituted a zero credit engineering internship program that will be reported on a student's transcript. This process overcomes a University challenge of having students pay tuition for a class related to an external work experience. Second, we are working with the University Career Center in identifying and formalizing more engineering work opportunities for our students during summer break months. Last, faculty are using professional society contacts and employment websites to identify potential work possibilities for students.

All other metrics were met or exceeded.

Table 3.12. Outcome "g" Metrics

Outcome g: an ability to communicate effectively	
Metrics Associated with Outcome g:	**Where Measured**
1. At least 85% of all mentors and potential employers agree that graduating seniors possess the ability to communicate effectively.	Senior Design Showcase Professional Advisory Board Meetings Graduate Employers
2. 100% of seniors will have the opportunity in engineering classes to make an oral presentation at least twice a month in their senior year.	Course Binders Faculty Course Assessment Report
3. 100% of all freshmen will have the opportunity in engineering classes to make an oral presentation at least once a month.	Course Binders Faculty Course Assessment Report
4. Through the CORE curriculum, all engineering students will pass all writing and communication classes with a grade of "C" or better.	Transcript Review
5. At least 90% of alumni report that their RWU education has prepared them extremely well in communication skills for the workplace. "Extremely well" is defined as a 4 or 5 on a five point scale where 1 means no preparation at all and 5 means the RWU education prepared the graduate extremely well for the workplace.	Alumni Survey
6. At least 90% of graduating seniors report an increase of at least one full point from a pre-test measurement of communication skills to a post-test measurement, two semesters later, in their proficiency in communication skills.	Senior Skills Inventory Senior Exit Survey

Opportunity Areas Associated with Outcome g: **an ability to communicate effectively**

Metric number 5. RWU Educational Preparation. As discussed in Section 2, Educational Objectives, alumni perception of communication skill preparation was rated as the largest gap area between required for success and educational preparation at RWU. The average rating for RWU educational preparation in communication skills was 3.56. Overall, only 50% of alumni rated our communication skill preparation as a 4 or a 5.

Metric number 6. Graduating senior preparation. The positive change in communication skill preparation from pre-test of seniors at the beginning of senior year to a post-test exit survey only equaled .75.

Clearly, proficiency in communication skills remains an area of directed attention by our program. We are addressing this metric in several different ways. At our faculty planning meetings, we continually stress the need to integrate more communication assignments into courses. We are also in the process of establishing partnerships with the CORE curriculum faculty members to discuss their role in helping us fulfill several of the engineering program outcomes, one of which is communication skills. Also, as discussed in Section 2, additional strategies include:

1. Incorporating oral presentations on a weekly basis for the entire senior year in senior design class.
2. Designing formal rubrics for faculty and student assessment of oral communication skills of present students in freshmen and senior classes.
3. Moving the Introduction to Speech Communication class from junior year to freshmen year.
4. Incorporating the requirement of a formal 45 minute to an hour client presentation at least two times a year for senior design class.
5. Filming freshmen presentations for students to later review and critique their performance.
6. Implementing the senior skills inventory at the beginning of a student's senior year to assess perceived communication skills and then design customized personal plan for remediation if needed.

All other metrics were met or exceeded.

Table 3.13. Outcome "h" Metrics

Outcome h: the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
Metrics Associated with Outcome h:	**Where Measured**
1. 100% of engineering students fulfill the Multidisciplinary Core Education component as well as the Core Concentration component of study to include the Core Senior Seminar.	Transcripts
2. At least 25% of engineering courses address this outcome.	Faculty Course Assessment Report Course Binders

All metrics were met or exceeded.

Table 3.14. Outcome “i” Metrics

Outcome i: a recognition of the need for, and an ability to engage in lifelong learning	
Metrics Associated with Outcome i:	**Where Measured**
1. All graduating seniors, (100%) will sit for the FE exam.	FE Exam Results
2. At least 90% of all graduating seniors will attend the 45 hour FE review course.	FE Review Course
3. All (100%) of seniors will participate in the Senior Design Showcase.	Senior Design Showcase
4. At least 75% of surveyed alumni indicate participation in professional training, professional societies or a graduate school since graduating from RWU.	Alumni Survey
5. At least 70% of our present students indicate that they will attend graduate school in the future.	Senior Skills Inventory

Opportunity Areas Associated with Outcome i: **a recognition of the need for, and an ability to engage in lifelong learning**

Metric number 4. Alumni Participation

Since graduate behavior might be considered a predictor for present student behavior, we included this metric as an outcome indicator. As discussed in Section 2, only 50% of our graduates reported that they had participated in courses, seminars or workshops since graduating from RWU. Additionally, 35% of our graduates were currently enrolled in studies for, or had completed an advanced degree at such institutions as: Stanford, University of Connecticut, Northeastern University, Rhode Island College, Bentley College, Columbia, Virginia Tech, and University of Pennsylvania.

We are addressing this missed metric by formalizing programs that stress the value of lifelong learning. Two of these programs are the 45 hour FE review course and the senior seminar class. In addition, we have facilitated presentations by representatives from engineering graduate schools and assist our present students with the application and recommendation process. Each year for the past four years, we have had at least one student that has been accepted directly into a Ph.D. program. Furthermore, 71% of our present students indicated that they plan to attend graduate school in the future.

All metrics other were met or exceeded.

Table 3.15. Outcome "j" Metrics

Outcome j: a knowledge of contemporary issues	
Metrics Associated with Outcome j:	**Where Measured**
1. All (100%) of engineering students will be exposed to contemporary issues in through the Multidisciplinary Core Education component as well as the Senior Multidisciplinary Core course	Course Binders
2. At least 20% of engineering courses will address this outcome.	Course Binders Faculty Course Assessment Report
3. At least 85% of graduating seniors will rate their proficiency in knowledge of contemporary issues at a score of 1 or 2 on a five point scale where 1 means proficiency developed and 5 means proficiency not developed.	Engineering Student Exit Survey
4. All (100%) of engineering students will be exposed to contemporary issues through the Senior Seminar class.	Course Binders
5. All (100%) of engineering students will participate in the Feinstein Service Learning Requirement of at least 5 hours in the surrounding community.	Transcripts

All metrics were met or exceeded.

Table 3.16. Outcome “k” Metrics

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

Metrics Associated with Outcome k:	Where Measured
1. All, (100%) of students will successfully demonstrate their ability to use the techniques, skills and modern engineering tools necessary for engineering practice through the year-long senior capstone project.	Faculty Course Assessment Report Course Student Survey Senior Design Showcase
2. All, (100%) of students participating in the senior design projects will be favorably rated by external mentors and clients.	Senior Design Showcase Graduate Employers Professional Advisory Board
3. At least 80% of graduating seniors will rate their proficiency in the ability to use modern engineering tools at a score of 1 or 2 on a five point scale where 1 means proficiency developed and 5 means proficiency not developed.	Senior Student Exit Survey
4. At least 75% of engineering classes address this outcome.	Course Binders Faculty Course Assessment Report

All metrics were met or exceeded.

e. Assessment Results Applied to Further Develop and Improve the Engineering Program

As discussed in Section 2, the review and refinement of Engineering Program Objectives and Engineering Program Outcomes based on assessment results is considered primarily during the semi-annual SECCM Planning and Assessment Meetings held in August and January of each year. Figure 3.1 (also displayed in Criterion 2 as Figure 2.3) is provided once again for a visual reference to the discussion of this process.

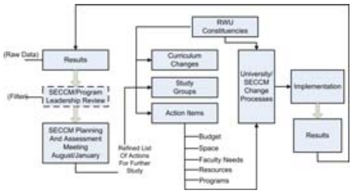

Figure 3.1. SECCM Change Processes

Changes and refinements as a result of assessment processes may take the form of:

1. curriculum changes (which may occur at a School or individual course scope)
2. budget requests or modifications
3. space requests or modifications
4. faculty needs
5. program resource needs
6. program modifications.

Depending on the nature of the change or refinement, a different process at the faculty, committee, program, School or University level is launched to support the change proposal. Some changes and refinements are easily handled at the School level, whereas others involving programmatic changes may require Faculty Senate approval. Still others involving capital expenditures or budget requests must follow the University budgeting system. Summaries of the semi-annual faculty planning meeting minutes from September 2001 through January 2005 where a number of change processes are initiated are included in Appendix III, Tab Q.

f. Additional Documented Changes as a Result of Assessment Processes

This section provides an overview of major documented changes as a result of our assessment processes not discussed elsewhere in this section. Table 3.17, SECCM Curriculum Changes, from 2001 through 2005 shows curriculum changes occurring at a School level scope that were made as a result of constituency input from various assessment mechanisms. Table 3.18, SECCM Non-Curricular Program-Related Assessment-Driven Actions, shows non-curricular changes resulting from various assessment processes.

Number	Curriculum Change	Substantive/ Non-Substantive	Approved	Implemented (AY)	Program
AY0001-1	Create Computer Engineering major	Substantive	Yes	2001-2002	Computer Engineering
AY0001-2	Expansion of existing Computer Science program (new requirements and course)	Substantive	Yes	2001-2002	Computer Science
AY0001-3	Major revisions to Construction Management Program (bundled change including course additions and significant curriculum modification)	Substantive	Yes	2001-2002	Construction Management
AY0001-4	Bundled course additions (ENGR 270, ENGR 340, ENGR 401, ENGR 426, ENGR 435, ENGR 450, ENGR 455, ENGR 465, ENGR 323, COMSC 400, COMSC 410, COMSC 490, COMSC 492)	Non-Substantive	Yes	2001-2002	Engineering Computer Science
AY0102-1	Create Mechanical Engineering minor	Substantive	Yes	2002-2003	Engineering
AY0102-2	Create new course, ENGR 431, Mechanical Vibrations	Non-Substantive	Yes	2002-2003	Engineering
AY0102-3	Create a new course, ENVR 411, Water Pollution and Treatment	Non-Substantive	Yes	2002-2003	Environmental Engineering
AY0102-4	Business elective choices in CM program	Non-Substantive	Yes	2002-2003	Construction Management
AY0102-5	Eliminate ENVR 345, Applied Meteorology, and math elective and replace with ENGR 314, Soil Mechanics, and MATH 330, Engineering Mathematics	Non-Substantive	Yes	2002-2003	Environmental Engineering
AY0102-6	Create Civil Engineering minor	Substantive	Yes	2002-2003	Engineering
AY0102-7	Create Electrical Engineering minor	Substantive	Yes	2002-2003	Engineering
AY0102-8	Replace Physics I & II or Chemistry I & II requirement with PHYS 201 and CORE 101	Non-Substantive	Yes	2002-2003	Construction Management

Table 3.17. SECCM Curriculum Changes

Table 3.17. SECCM Curriculum Changes, continued

Number	Curriculum Change	Substantive/ Non-Substantive	Approved	Implemented (AY)	Program
AY0203-1	Eliminate the Computer Engineering major	Substantive	Yes	2003-2004	Computer Engineering
AY0203-2	Change the name and course description for COMSC 110	Non-Substantive	Yes	2003-2004	Computer Science
AY0203-3	Change the name and course description for COMSC 220	Non-Substantive	Yes	2003-2004	Computer Science
AY0203-4	Require ENGR 350, Signals and Systems, or ENGR 430, Special Topics: Dynamic Modeling and Simulation, in lieu of fourth free elective	Non-Substantive	Yes	2003-2004	Computer Science
AY0203-5	Add MGMT 100, Management Principles, in place of one of the free business electives	Non-Substantive	Yes	2003-2004	Construction Management
AY0203-6	Restrict business elective choices to BUSN 100, Enterprise, MGMT 100, Management Principles, and MRKT 100, Marketing Principles	Non-Substantive	Yes	2003-2004	Engineering
AY0203-7	Replace MATH 231, Math Reasoning, with a math elective at the 200-level or higher	Non-Substantive	Yes	2003-2004	Computer Science
AY0304-1	Change CNST 203, Structures I, and CNST 204, Structures II, course numbers to CNST 303 and CNST 304, respectively	Non-Substantive	Yes	2004-2005	Construction Management
AY0304-2	Replace math elective with MATH 330, Engineering Mathematics	Non-Substantive	Yes	2004-2005	Engineering
AY0304-3	Change prerequisite for ENGR 450, Robotics	Non-Substantive	Yes	2004-2005	Engineering

Table 3.17. SECCM Curriculum Changes, continued

Number	Curriculum Change	Subs Non-S
AY0405-1	Eliminate the Environmental Engineering major	Sub
AY0405-2	Eliminate the Undeclared Engineering Major	Sub
AY0405-3	Create ENGR 320, Environmental Engineering Science	Non-S
AY0405-4	Remove ENVR 101, Intro to Envr Engr Science, from Engr program and replace with ENGR 320	Non-S
AY0405-5	Rename CNST 130, Blueprint Reading, to CNST 130, Plans, Specifications and Building Codes	Non-S
AY0405-6	Create ENGR 335, Engineering Economic Analysis	Non-S
AY0405-7	Replace ECON 335, Engineering Economics, with ENGR 335, Engineering Economic Analysis	Non-S
AY0405-8	Replace CNST 303, Structures I, with ENGR 210, Engineering Mechanics I, in the CM program	Non-S
AY0405-9	Create ENGR 301, Mechanics of Materials for Architects and Construction Managers	Non-S
AY0405-10	Replace CNST 304, Structures I, with ENGR 301, Mechanics of Materials for Architects and Construction Managers, in the CM program	Non-S

Non-Curricular Program-Related Assessment-Driven Actions

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Category	Action	Date	Reason for Action	Assessment Tools
Faculty & Staff	Hired new Construction Management faculty – Dr. R. Miers	Jan 01	• Increased enrollment in CM program	• Student exit surveys • Analysis of enrollment data and trends • ACCE criteria
	Hired new Computer Science faculty – Dr. A. Ruocco	Aug 02	• Acquisition of Computer Science program	• Student exit surveys • Course assessment reports • Program assessment reports • ABET criteria
	Hired new Laboratory Manager – J. Dorothy	Jul 03	• SECCM student enrollment growth and program development	• Student exit surveys • Course assessment reports • Program assessment reports • SOP (health and safety)
	Hired new Computer Technician – R. Beauchemin	Jan 03	• Improve computer support	• Course assessment reports • Program assessment reports
	Hired new Construction Management faculty – Dr. Z. Torbica	Aug 04	• Increased enrollment in CM program	• Student exit surveys • Course assessment reports • Analysis of enrollment data and trends • SOP (Faculty Contract)
	Hired new Computer Science faculty – Dr. Y. Bai	Aug 04	• Acquisition of Computer Science program	• Student exit surveys • Course assessment reports • Program assessment reports • ABET criteria

Table 3.18. SECCM Non-Curricular Program-Related Assessment-Driven Actions, continued

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Category	Action	Date	Reason for Action	Assessment Tools
Faculty & Staff	Hired new Engineering faculty – Dr. C. Thomas	Aug 05	• Increased enrollment in Engineering program	• Student exit surveys • Course assessment reports • Analysis of enrollment data and trends • SOP (Faculty Contract)
	Hired new Construction Management faculty (in-progress)	Aug 05	• Increased enrollment in Construction Management program	• Student exit surveys • Course assessment reports • Analysis of enrollment data and trends • SOP (Faculty Contract)
Facilities and Equipment	Reorganized laboratory space • Relocated soils lab to former storeroom and expanded CM Methods and Materials lab • Reorganized CM storeroom and installed shelving • Reclaimed storeroom creating CM student competition lab • Relocated Fluids Mechanics lab	Summer 02	• Increased enrollment in programs resulted in increased lab utilization • CM students needed space for competition preparation	• Student exit surveys • Student course surveys • Course assessment reports • Program assessment reports • SOP (OSHA)
	Created Linux lab from reclaimed storeroom	Summer 02	• CS program required Linux capability	• Course assessment reports • Program assessment reports
	Purchased equipment needed to establish a digital signal processing laboratory	Summer 02	• Expanded curricular offering • Enhanced laboratory experience	• Program assessment reports

Table 3.18. SECCM Non-Curricular Program-Related Assessment-Driven Actions, continued

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Category	Action	Date	Reason for Action	Assessment Tools
Facilities and Equipment	Installed networked computers with SECCM software in student project room	Aug 02	• Increased usage of computer lab resulted in reduced student access for projects	• Student exit surveys • Student course surveys • Course assessment reports • Program assessment reports
	Installed networked computers in Circuits lab	Aug 02	• Enhanced experimental analysis	• Student course surveys • Course assessment reports • Program assessment reports
	Installed additional wall writing surfaces in classrooms	Summer 02 & 03	• Enhanced instructional environment	• Course assessment reports • Program assessment reports
	Acquired new wood and machine tools for CM and Engineering labs	Summer 02, 03, & 04	• Increased enrollment in programs resulted in increased lab utilization • Enhanced laboratory experience	• Student exit surveys • Student course surveys • Course assessment reports • Program assessment reports
	Replaced outdated surveying equipment	Summer 02, 03, & 04	• Enhanced laboratory experience	• Student exit surveys • Student course surveys • Course assessment reports • Program assessment reports • SOP (Lab plan) • PAB input
	Acquired portable computer carts w/ full range of AV equipment	Summer 02 & 03	• Enhanced instructional environment	• Course assessment reports • Program assessment reports

Table 3.18. SECCM Non-Curricular Program-Related Assessment-Driven Actions, continued

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Category	Action	Date	Reason for Action	Assessment Tools
Facilities and Equipment	Published Laboratory Safety Manual	Aug 03	• Enhanced laboratory environment	• Course assessment reports • Program assessment reports • SOP (OSHA)
	Developed laboratory inventory and laboratory maintenance plan	Fall 03	• Better management of laboratory resources	• Student exit surveys • Student course surveys • Course assessment reports
	Established annual participation in Associated Schools of Construction (ASC) Construction Management	AY 01-02	• Enhanced academic experience • Outreach to professional	• PAB input • ACCE criteria

	student competitions		community • Program publicity	
Professional Enhancement and Outreach	Redesigned Engineering capstone course to include "client-based" design	AY 02-03	• Enhanced capstone design experience • Outreach to professional community • Program publicity	• Alumni surveys • Student exit surveys • Student course surveys • Course assessment reports • Program assessment reports • Graduate employers
	Established Ahlborg Internship program	AY 02-03	• Enhance professional experience • Outreach to professional community	• Alumni input • Student exit surveys • Graduate employers • PAB input
	Established SWE member attendance at annual conference	AY 02-03	• Enhanced professional experience for students • Outreach to professional community • Program publicity	• Student exit surveys • Program assessment reports

Table 3.18. SECCM Non-Curricular Program-Related Assessment-Driven Actions, continued

Category	Action	Date	Reason for Action	Assessment Tools
Professional Enhancement and Outreach	Reestablished annual participation in ASCE Concrete Canoe competition	AY 02-03	• Enhanced academic experience • Outreach to professional community • Program publicity • Benchmark program	• Student exit surveys • Program assessment reports
	Established annual participation in ASCE Steel Bridge competition	AY 03-04	• Enhanced academic experience • Outreach to professional community • Program publicity • Benchmark program	• Student exit surveys • Program assessment reports
	Established annual Senior Design and Construction Showcase	AY 03-04	• Enhanced academic experience • Enhanced professional experience • Outreach to professional community • Program publicity	• Alumni input • Student exit surveys • Program assessment reports • PAB input
	Established annual participation in WERC student competition	AY 04-05	• Enhanced academic experience • Outreach to professional community • Program publicity • Benchmark program	• Student exit surveys • Program assessment reports

Table 3.18. SECCM Non-Curricular Program-Related Assessment-Driven Actions, continued

Category	Action	Date	Reason for Action	Assessment Tools
Policies, Processes and Procedures	Revised SECCM assessment process introducing course and program assessment reports and semi-annual planning and assessment meetings	AY 01-02	• Improve and institutionalize the assessment process	• ABET criteria • ACCE criteria • Student exit surveys • Student course surveys
	Revised student course survey analysis process	AY 01-02	• Improve assessment process • Provide better feedback to faculty on performance • Improve teaching	• Alumni input • Student exit interviews • Student course surveys
	Established policy strongly encouraging and funding faculty member attendance at teaching workshops	AY 01-05	• Improve teaching • Enhance instructional experience	• Student exit surveys • Student course surveys
	Revised advisor assignment process and advisement procedures	AY 01-02	• Improve advisement • Minimize deviations from curriculum	• Alumni input • Student exit surveys • Transcript review
	Establish policy mandating that all CM seniors take the CPC exam	AY 03-04	• Enhance graduate credentials • Benchmark program performance	• Alumni input • PAB input • Graduate employers
	Establish CPC exam review program	AY 03-04	• Improve performance on CPC exam	• Alumni input • PAB input • Graduate employers
	Conduct Fundamentals of Engineering examination preparation study and revise and review program	Summer 04	• Improve senior performance on FE exam • Identify curricular areas needing improvement	• Alumni input • Student exit surveys • FE examination results

Table 3.18. SECCM Non-Curricular Program-Related Assessment-Driven Actions, continued

Category	Action	Date	Reason for Action	Assessment Tools
Policies, Processes and Procedures	Established policy requiring all seniors taking the FE exam (Engineering and Environmental majors) and the CPC exam (CM majors) to sign performance contract	Summer 04	• Improve senior performance on FE and CPC exam	• Student exit surveys • FE examination results
	Revised alumni survey and analysis process	Summer 04	• Improve assessment process	• Alumni input
	Revitalize the Engineering Professional Advisory Board	Summer 05	• Improve assessment process by formalizing existing input	• Alumni input

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