School of Engineering, Computing and Construction Management

Assessment Plan

October 2006

Roger Williams University

Learning to Bridge the World

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Section 1

The SECCM Assessment Plan

Introduction

This document outlines the assessment processes and procedures employed in the School of Engineering, Computing and Construction Management (SECCM) at Roger Williams University. The goal of this assessment plan is to evaluate how well our graduates are meeting program objectives as well as measurable outcomes. The approaches used to implement a continuous quality improvement philosophy are described. They include periodic refinement of our objectives by incorporating feedback from our constituencies. Section 2, 3 and 4 of this document present the detailed educational objectives, anticipated outcomes and metrics to measure outcome achievement for each of our three programs: Engineering, Computer Science and Construction Management.

Consistent with the design of any comprehensive assessment plan, our suite of evaluation instruments is also discussed in this document and copies of each are included in Section 5 of this document. We use this collective system of instruments to monitor our objectives and outcomes according to a detailed implementation timeline.

As an introduction to our assessment plan terminology, Table 1.1 provides a summary of terms to ensure consistency in understanding the Roger Williams University SECCM continuous process improvement system. These definitions are periodically updated to reflect changes and modifications from our accrediting bodies as well as to incorporate input from our various constituencies.

Table 1.1 Summary of Terminology

Term	Definition
Objectives	Statements that describe the expected accomplishments of graduates during the first three to five years following graduation from SECCM's programs.
Outcomes	Knowledge, skills and behavior that are we expect our graduates to possess at the time of graduation.
Operationalized Outcome	A group of statements that define each outcome. These statements are expressed in a Bloom's taxonomy hierarchy allowing for the assignment of performance criteria associated with each outcome.
Performance Criteria	Metrics that are used to determine the accomplishment of outcomes and objectives.
Assessment	A collective system of processes directed at students and program constituencies that identify, collect, interpret, analyze and report data for the purpose of determining whether objectives and outcomes have been achieved.
Evaluation	A collective system of processes that facilitate the review and discussion of assessment reports. Evaluation also includes the implementation of improvements to the three programs by means of existing and new change mechanisms.

Correlation of SECCM's Goals and Objectives to University Mission and Objectives

Roger Williams University Mission

It is imperative that there be consistency in mission, objectives and direction within educational units and the University. In formulating SECCM school goals and objectives, we assure that we do not diverge from the philosophy and direction embodied in the RWU mission and core values.

Roger Williams University formally adopted a new mission statement in April of 2005. The mission of RWU is:

Roger Williams University is an independent Liberal Arts University that combines the unique strengths of small liberal arts colleges and those of larger comprehensive universities and where liberal and professional education are enhanced by their integration and the recognition of their unity.

Roger Williams University also adheres to a core set of values that play a central role in guiding a respectful, diverse, and intellectually vibrant university community. These core values are:

- Love of learning as an intrinsic value
- Preparation for careers and future study
- Collaboration of students and faculty in research
- Commitment to community service
- Appreciation of global perspectives.

In addition, the University educational goals embody a philosophy that promotes educating all students to become productive citizens of the social and professional communities in which they will live and build their careers. To achieve success as productive citizens, Roger Williams University prepares students to:

- Communicate clearly in a variety of formats
- Appreciate the ability of the humanities to stir the soul
- Advocate effectively through civil discourse
- Acquire new information and perspectives through traditional research techniques and the use of information technology
- Contribute productively in team projects through leadership and cooperative efforts
- Understand how different cultures, philosophies and historical experiences affect the perspectives of others.

SECCM Mission and Goals

The mission of the School of Engineering, Computing and Construction Management is to:

> ***Deliver the highest quality undergraduate professional educational experience enabling our graduates to excel in the practice of their professional discipline or the pursuit of an advanced degree.***

The School goals are to:

- Deliver educational programs that are nationally accredited, continuously assessed and improved, and inspire excellence in students, faculty and staff
- Maintain an atmosphere that enhances education through student-oriented learning, effective content, pedagogy and mentorship

- Develop students who take responsibility for their education, embrace professional development and develop a global perspective on their profession
- Develop a committed and diverse faculty who understand and apply current and future trends in their disciplines
- Maintain a work environment in which staff and faculty take initiative and receive recognition for their achievements
- Support the goals and objectives of Roger Williams University.

Mission and Program Educational Objectives: Consistency in Design and Direction

SECCM Program Objectives

The objectives of the Engineering, Computer Science and Construction Management programs are consistent with the University mission and goals due to the well-developed planning paradigm. This planning paradigm demonstrates flexibility and agility with which each of the three SECCM programs approaches the many processes involved in defining their respective missions and educational objectives. For planning purposes, some units opt for retreats, others hire planning facilitators, and still others heavily involve industrial advisory boards in defining the strategic plan for the unit or program. Regardless of how a SECCM program defines its strategic direction and thus objectives and outcomes, the ongoing involvement of constituents is a key element in the determination of the mission, objectives, goals, outcomes and tactical plans. Furthermore, as discussed in under the section, “Significant Constituencies of the Program”, constituents play a major role in assisting each program with determining the specific program outcomes and objectives that are monitored, measured, and refined by our assessment plan.

Program educational objectives for each SECCM program map closely to both the SECCM goals and the University's Core Values and Goals. Due to the administrative attention directed to the strategic planning process, this consistency in association is expected. Figure 1.1 shows a graphic of the interrelationship between University, SECCM and program goals, objectives and outcomes.

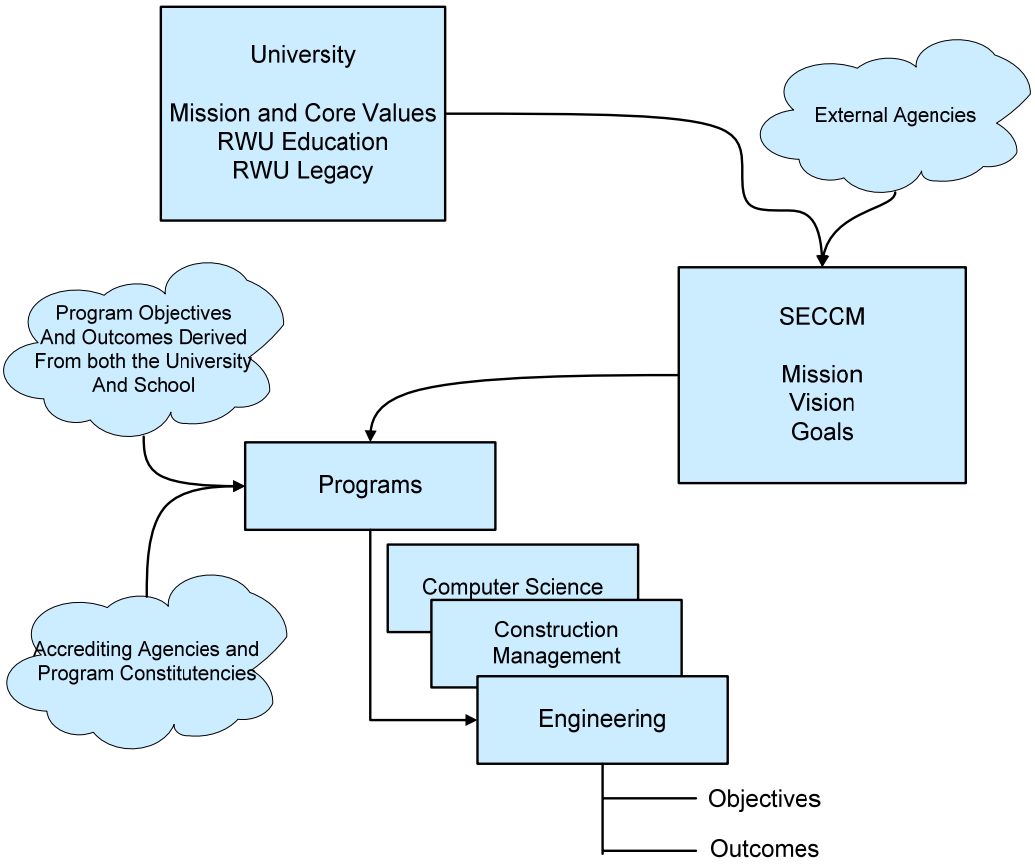

Figure 1.1 Assessment Plan Interrelationships between University and SECCM

Contribution of the Core Education at RWU to Fulfilling Engineering Program Objectives and Outcomes

Students studying in any of the three SECCM programs at RWU have the advantage of participating in a well-developed and designed University Core Curriculum that directly supports individual program Objectives and Outcomes. The University Core Committee describes the contribution of their curriculum as "providing a contemporary education that celebrates not only the tradition of the individual disciplines, but also the inexhaustible knowledge that we gain when we compare, integrate, and reflect on these subjects." The mission and principles of the University Core Curriculum are:

- Forge meaningful connections between, past, present and future;
- Emphasize the ethical, practical, and theoretical challenges of contemporary life in the context of the historical continuum;
- Stimulate interest in interdisciplinary relationships, because in an international society's global marketplace breadth of knowledge, multiple areas of expertise, innovative ideas and new methodologies are essential;
- Develop skills such as problem solving, reasoned judgment, articulate communication, and cooperative teamwork;
- Incorporate knowledge and skills specific to the Core with those specific to the majors;
- Construct new paradigms and solutions by integrating apparently disparate categories of though;
- Provide an intellectual enterprise that links scholarship to practice, learning to experience, and individual to community;

- Entertain discourse about a central idea: the tension between order and chaos and resulting dilemmas; and
- Encourage reflection on central questions: Who am I? What can I know? And, based on what I know, how should I act?

Significant Constituencies of the Programs

Constituencies

The School of Engineering, Computing and Construction Management serves eight constituencies:

1. The University at large
2. Our students
3. Parents of students
4. Employers or potential employers of students who might select the program
5. Professional advisory board
6. Our alumni
7. The engineering, computing and construction management profession in general and professional societies of the specific concentration areas that the program areas offer, and
8. Our faculty.

Each of these constituencies is engaged in some or all of the processes associated with the SECCM Assessment Plan.

Processes Used to Establish and Review Program Educational Objectives

Our curriculum is designed and refined each year to meet our three programs' objectives while reinforcing the core values and educational objectives of Roger Williams University. We involve our eight constituency groups when formulating and refining our objectives.

The SECCM Assessment Framework establishes the foundation of our continuous quality improvement philosophy. It provides the context within which we assure defined feedback loop processes. Within this framework, results from our various assessment mechanisms are used to improve systems, processes and program components specifically as they relate to individual program objectives and outcomes.

The Assessment Framework includes three interrelated process areas: the processes involved with defining and refining educational program objectives, processes involved with our assessment system and processes defining the collection of, and disposition of assessment results. Figure 1.2 presents a visual portrayal of our SECCM Assessment Framework.

SECCM Change Process

Program assessment, while a continuous process, must be periodically evaluated and summarized. This evaluation is conducted on a semi-annual basis with formal program assessment meetings attended by the faculty. At this meeting faculty members perform an in-depth review of program objectives and outcomes using the data collected by the assessment instruments. The action items resulting from the program assessment meetings are several. These action items include: program curriculum changes; course evolution; identification of facilities needs; identification of faculty needs; modification of school and program goals and/or objectives; and, evolution of the assessment process. The changes made are then assessed during the next assessment period as the process begins anew. Figure 1.3 provides a visual reference to the discussion of this process.

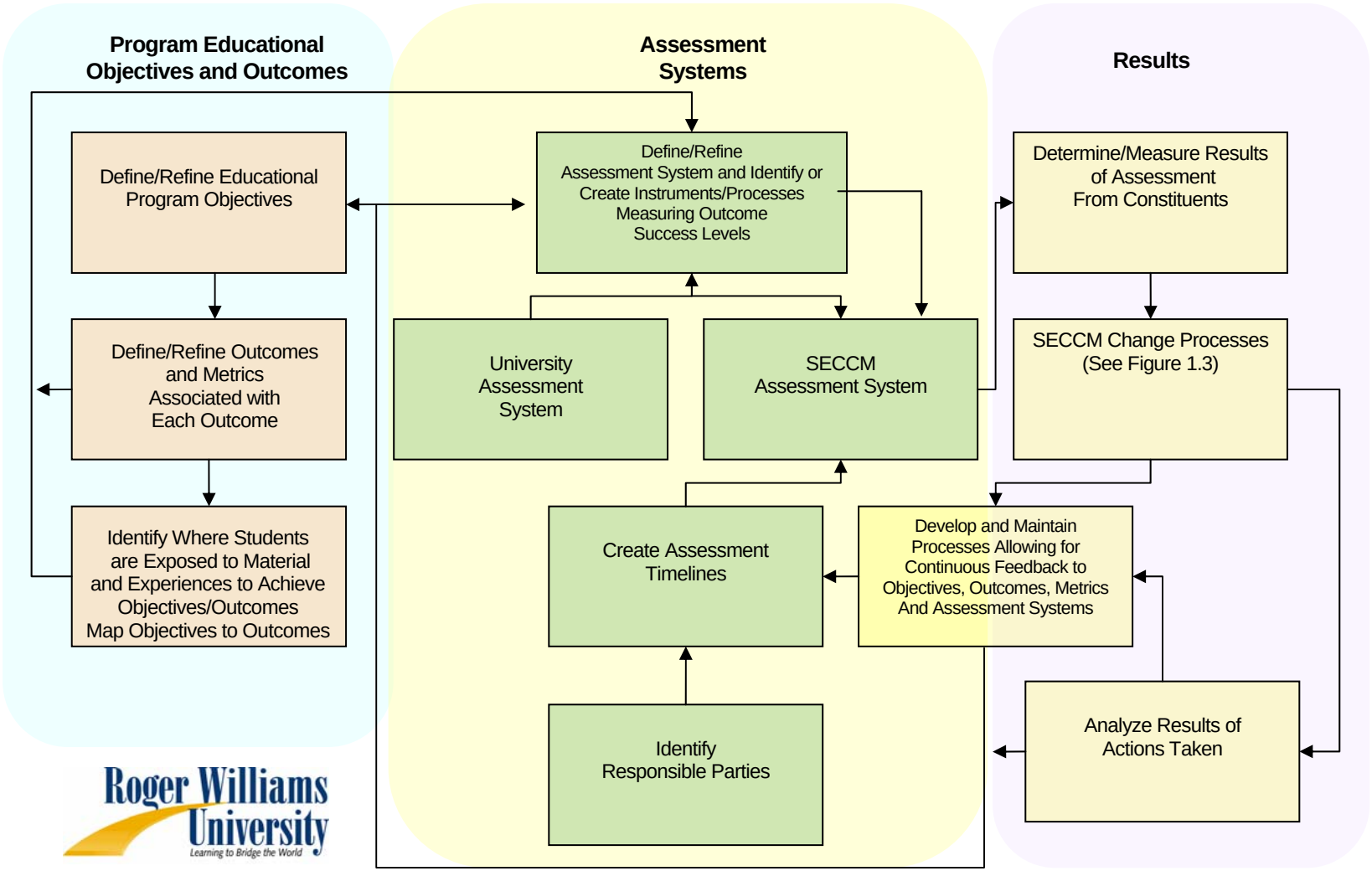

Figure 1.2 School of Engineering, Computing and Construction Management Outcomes Assessment Framework

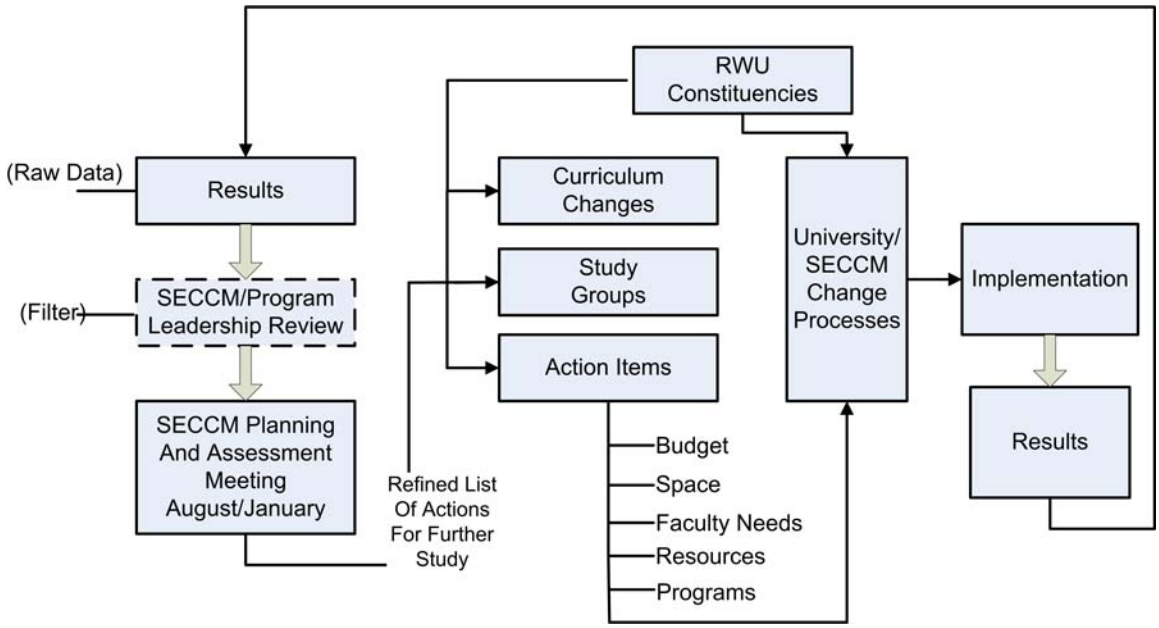

Figure 1.3 SECCM Change Processes

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

1. Course adjustments (objectives, content, focus)
2. Curriculum changes
3. Budget requests or modifications
4. Space requests or modifications
5. Faculty requirements
6. Program resource needs
7. 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.

Assessment Instruments Included in SECCM Assessment Plan

Assessment Instruments

Several types of assessment instruments, materials and feedback opportunities are integrated into our Assessment Framework. To facilitate the assessment process, these assessments instruments have been developed and continuously refined to capture the numerous data that are required for analysis. The assessment instruments provide the structure that permits for quantifiable measurement of performance indicators that are used to assess program objectives and outcomes. Table 1.2, Instruments and Materials Used to Assess and Refine Educational Objectives and Outcomes, outlines the specific tools used to gain feedback from our constituencies and the associated types of information collected from these tools.

Table 1.2 Instruments and Materials Used to Assess and Refine Educational Objectives and Outcomes

Instruments/Materials Used to Assess and Refine Educational Objectives (Frequency)	Information Collected
Alumni Survey (Bi-annual)	Curricular review Professional preparation Success metrics Licensure Life-long learning Gap analysis
Associate Constructor Exam (Annual)	Curricular strengths and weaknesses National comparative benchmarking Licensure of graduates
Course Assessment Report (Semester)	Student rating of course and program objectives Faculty rating of course and program objectives Faculty subjective evaluation Identification of deficiency area
Course Binder (Documentation year)	Examples of student work Course objectives and organization Course content Course rigor
Course Student Survey (Semester)	Numerical and subjective evaluation of course content Numerical and subjective evaluation of instructor performance Educational value Prerequisite deficiencies Resource deficiencies Course impact on program
Fundamentals of Engineering Examination (Annual)	Curricular strengths and weaknesses National comparative benchmarking Licensure of graduates
Graduate Employers (Continuous)	Recruitment and hiring Feedback on preparation for the workplace Feedback on program strengths and weaknesses
Professional Advisory Board Meetings (Semi-Annual)	Review of curriculum Review of student work Industry trends Determinants of engineering success in the workplace
Senior Design and Construction Showcase (Annual)	Review of professional component Monitor industry trends Assessment of workplace readiness Assessment of communication skills
Senior Job Placement Survey (Annual)	Identify number of job offers Derive benchmark data on job placement Identify gaps in career advising and placement services
Senior Skills Inventory (Annual)	Assess workplace readiness Identify skill gaps Determine requirements for personal career plan
Student Club Activities Report (Annual)	Enrichment activities Professional interactions

Instruments/Materials Used to Assess and Refine Educational Objectives (Frequency)	Information Collected
Student Competitions and Conferences (As available)	Student participation statistics Student performance statistics
Student Exit Survey (Upon graduation)	Program quality Curricular strengths and weaknesses Resource deficiencies Benchmark out the door Personal and professional development Educational environment
Transcript Review (Semi-Annual)	Rate of progress statistics Prerequisite checks Course flow

Explanation of Instruments

- Alumni Survey

The Alumni Assessment Survey queries SECCM 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 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.

- Associate Constructor Examination and Fundamentals of Engineering Examination

Beginning in the spring 2004, all graduating engineering and construction management seniors were required to sit for either the Fundamentals of Engineering Examination or the Associate Constructor 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 respective professional boards.

These national examinations provide the Engineering and Construction Management Programs with an excellent opportunity to assess the programs and its graduates not only against graduates from other programs, but also against practicing professionals.

- 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.

- Course Binder

Prepared during the record years of ACCE and ABET accreditation visits, these binders provide a detailed view into course objectives, course organization, course focus and student performance. The binders are divided into three sections: Course Administration and Assessment; Course Examinations; and, Design Problems, Computer Problems, Laboratory Reports and Homework.

- 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 members 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.

- Graduate Employers

Employers who hire SECCM 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 SECCM 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 Meetings

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.

- Senior Job Placement Survey

The senior job placement survey assesses how well the SECCM 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.

- 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 allow faculty to assist students with the development of a personal plan for career or graduate school as well as closing knowledge and skill gaps.

- Student Club Activities Report

Completed annually by the outgoing student leadership of the Construction Management and Engineering Student Clubs, these reports provide insight into the effectiveness of those activities sponsored by the club and the RWU Student Senate. These reports also detail the professional interactions conducted by the clubs during the year and provide an appraisal of the activity.

- Student Competitions and Conferences

The Engineering, Computing and Construction Management Programs have consistently entered teams in both regional and national competitions such as the AGC/ASC Design Build, Heavy Highway and Commercial Build Competitions, the ASCE Steel Bridge Competition and Concrete Canoe Competitions, the WERC, (Water and Environmental Research Consortium) competition in New Mexico as well as the Disney Imagineering Competition. Students also participate in national conferences, such as the National Conference on Undergraduate Research, where student work is presented and compared to undergraduate research from universities around the country. Participation in these competitions and conferences provides faculty members and students alike the opportunity to assess the program's competitiveness through external validation mechanisms.

- Student Exit Survey

Each graduating SECCM 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.

- Transcript Review

Each semester, as part of the advisement process, every student's transcript is reviewed by his or her advisor. These reviews identify issues associated with prerequisites and ensure the smooth delivery of the program. In addition to the transcript review associated with the advisement process, the transcripts of every senior filing a graduation petition is reviewed by the Registrar's Office for program completion and compliance prior to the student's participation in the graduation exercise.

- 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 SECCM programs. These metrics include:

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

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

Assessment Plan Timeline

The timeline associated with the periodic evaluation of program objectives and outcomes is provided in Table 1.3, Timeline for Assessment Activities Associated with SECCM Program Objectives and Outcomes.

Table 1.3 Timeline for Assessment Activities Associated with SECCM Program Objectives and Outcomes

Instruments/Materials Used to Assess and Refine Educational Objectives	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
Alumni Survey		✓				✓				✓		
Associate Constructor Exam		✓		✓		✓		✓		✓		✓
Course Assessment Report	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Course Binder									✓	✓		
Course Student Survey	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fundamentals of Engineering Exam		✓		✓		✓		✓		✓		✓
Graduate Employers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Professional Advisory Board	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Senior Design and Construction Showcase		✓		✓		✓		✓		✓		✓
Senior Job Placement Survey		✓		✓		✓		✓		✓		✓
Senior Skills Inventory	✓		✓		✓		✓		✓		✓	
Student Club Activities Report		✓		✓		✓		✓		✓		✓
Student Competitions and Conferences	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Student Exit Survey		✓		✓		✓		✓		✓		✓
Transcript Review	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

The results obtained during the periodic evaluation of the program objectives and outcomes are discussed and reviewed in semi-annual January and August SECCM Planning and Assessment Meeting.

Parts 2, 3 and 4 of this plan specifically details individual program objectives, outcomes and metrics for each of the three SECCM programs of study, engineering, computer science and construction management.

Annual Assessment Report

While assessment is a continuous process, it is appropriate to benchmark progress on a periodic basis. For the purpose of this plan, an annual report will be prepared each fall detailing the assessment activities for the proceeding academic year. The report will be prepared by the conclusion of the fall semester and presented to the faculty for review at the Planning and Assessment Meeting conducted in January.

The Annual Assessment Report will consist of an overall assessment of the SECCM as well as an assessment of each program. Responsibility for writing these reports will rest with the Dean (overall SECCM assessment) and the Program Coordinators (for their respective programs.)

Each Annual Program Assessment report will include the following sections:

- Executive Summary
- Section 1: Introduction
- Section 2: Analysis of Evaluation Instruments Data
- Section 3: Program Objective Efficacy Assessment
- Section 4: Program Educational Outcome Efficacy Assessment
- Section 5: Assessment of Previously Implemented Program Changes
- Section 6: Discussion of Recommended Program Changes

For Sections 3 and 4, specific data should be used to measure efficacy and appropriately referenced. These data should relate to the metrics should be those identified in the appropriate section of the Assessment Plan.

Section
2

Assessment Plan for the Engineering Program

Introduction

The Engineering Program is founded on an educational philosophy that encourages exploration and discovery. Students study the art of engineering in an environment unconstrained by disciplinary restrictions and that focuses on the development of the "whole" person. While designed to develop the essential knowledge, skills and abilities needed for professional practice or graduate study, the curricular structure of the program, coupled with the strong influence of the liberal arts (as evidenced by the core curriculum) equips our graduates with a "holistic" educational experience that is designed to prepare graduates to succeed in a world marked by rapidly increasing technology, growing complexity and globalization.

The engineering program is designed to encompass six functional categories of courses:

- General engineering
- Basic mathematics and science
- Engineering proficiency
- Professional development
- Advanced mathematics
- Core education.

Each of these categories provides the student with an essential component of their overall educational experience and, in sum, ensure that students are prepared for engineering practice as required by our accrediting body.

Curricular Functional Design

As discussed above, the engineering curriculum is designed around six functional categories of courses. Each of these functional categories is discussed below.

1. **General Engineering**

   These courses are common to most undergraduate engineering programs. They provide the introduction to the fundamental principles and relationships that define the domain of engineering. These courses complement and build upon the mathematics and basic sciences presented in previous and concurrent instruction. In short, they provide the foundation for further study that leads to professional expertise. The courses included in this category are a required part of the curriculum for all Engineering majors. Table 2.1, General Engineering Courses, lists the courses in this category.

Table 2.1 General Engineering Courses

Course Number	Course Title	Credits
ENGR 110	Engineering Graphics and Design	3
ENGR 115	Computer Applications for Engineering	3
ENGR 210	Engineering Mechanics I (Statics)	3
ENGR 220	Engineering Mechanics II (Dynamics)	3
ENGR 240	Circuit Theory and Lab	4
ENGR 260	Engineering Electronics and Lab	4
ENGR 300	Mechanics of Materials and Lab	4
ENGR 305	Fluid Mechanics and Lab	4
ENGR 310	Materials Science	3
ENGR 313	Structural Analysis	3
ENGR 320	Environmental Engineering (to be offered in AY 2007-2008)	3
ENGR 330	Thermodynamics	3
ENGR 335	Engineering Economic Analysis	3
Total Credits		**43**

2. Basic Mathematics and Science

These courses provide students with the basic mathematics and science tools required to describe the physical world. The material presented complements the instruction provided in the General Engineering courses above. Table 2.2, Basic Mathematics and Science Courses, lists these courses. With the exception of MATH 221, Discrete Mathematics which is required for the Computer Engineering minor, all of the courses listed are a required part of the curriculum for all Engineering majors.

Table 2.2 Basic Mathematics and Science Courses

Course Number	Course Title	Credits
MATH 213	Calculus I and Lab	4
MATH 214	Calculus II and Lab	4
CHEM 191	Chemistry I and Lab	4
CHEM 192	Chemistry II and Lab	4
PHYS 201	Physics I and Lab	4
PHYS 202	Physics II and Lab	4
MATH 221	Discrete Mathematics (elective)	3
Total Credits		**24**

3. Engineering Proficiency

The courses included in this category build upon the general engineering foundation and provide the elective base for minor options and advanced study. These courses provide study in depth in more advanced engineering topics. Many of these courses contain significant design exposure and serve as a transition between the understanding of the fundamental engineering principles developed in the general engineering courses and the professional competence achieved in the engineering professional courses. Students take four of these courses as part of their curriculum. They are permitted to select any four elective courses according to their interests. Specialization is permitted and may lead to a minor as discussed below.

The Engineering program was originally designed to allow students to select their engineering electives from a variety of courses that would provide an interdisciplinary engineering perspective. While some students pursued a diverse selection of electives, others concentrated their elective choices in one of the more traditional engineering disciplines such as civil or mechanical engineering. As the program matured, assessment tools indicated a clear desire from those students who concentrated their electives to be awarded some formal recognition for their concentrated course of study.

The decision to award formal recognition was studied in depth by the program faculty. While there was a clear desire to preserve the "general" nature of the program, the faculty realized that one of the central attributes of a general engineering program was the student's exposure to a range of engineering areas. The faculty concluded that student specialization of elective choices was a natural outgrowth of the program and a major strength.

Accordingly, in Academic Year 2001-2002, the faculty developed curricular criteria for awarding minors in five disciplinary areas: civil, computer, electrical, environmental and mechanical engineering. Minor options were first offered in Academic Year 2002-2003. In most cases, students desiring to minor are required to take additional courses that result in a total program credit hour count higher than the nominal 125 credit hours. It is important to recognize that there is no requirement for students to pursue a minor and students are still free to select their engineering electives from the total offerings. The elective courses offered by the program are listed in Table 2.3, Engineering Proficiency Courses.

Table 2.3 Engineering Proficiency Courses

Course Number	Course Title	Credits
COMSC 110[1]	Introduction to Computer Science and Lab	4
COMSC 111[1]	Data Structures and Lab	4
COMSC 210[1]	Principles of Computer Organization and Lab	4
COMSC 220[1]	Analysis of Algorithms	3
COMSC 230[1]	Principles of Programming Languages	3
CNST 250[2]	Construction Equipment	3
CNST 302[2]	Surveying and Lab	4
CNST 455[3]	Mechanical and Electrical Design for Buildings	3
ENGR 270	Digital Systems Design and Lab	4
ENGR 314	Soil Mechanics and Lab	4
ENGR 405	Air Pollution and Control	3
ENGR 407	Solid and Hazardous Waste Management	3
ENGR 408	Water Pollution and Treatment and Lab	4
ENGR 409	Design of Structures	3
ENGR 412	Water Resources Engineering and Lab	4
ENGR 413	Advanced Structural Analysis	3
ENGR 415	Wastewater Treatment and Lab	4
ENGR 417	Groundwater Hydrology	3
ENGR 424	Digital Signal Processing	3
ENGR 430	Special Topics	3
ENGR 431	Mechanical Vibrations	3
ENGR 433	Heat Transfer	3
ENGR 445	Dynamic Modeling and Control	3
ENGR 450	Robotics	3
ENGR 455	Data Communications	3
ENGR 465	Network Analysis and Design	3
Minimum Total Credits		**12**

Notes:

1. In general, Computer Science courses (COMSC) only count as engineering electives if a student is pursuing a Computer Engineering minor.
2. In general, Construction Management courses (CNST) only count as engineering electives if a student is pursuing a Civil Engineering minor
3. In general, Construction Management course (CNST 455) only counts as an engineering elective if a student is pursuing a Mechanical Engineering minor.

4. Professional Courses

The courses in this category are designed to ensure that students are prepared for engineering practice as specified in Criterion 4, the Professional Component. As illustrated in Table 2.4, Professional Courses, this category includes three courses: ENGR 401, Engineering Senior Seminar; ENGR 490, Engineering Design I; and ENGR 492, Engineering Design II. ENGR 490 and 492 form the "capstone" experience.

ENGR 410, Engineering Senior Seminar, is a one-credit course that meets once a week during the second semester of the senior year. The course includes a mixture of outside speakers discussing the practice of engineering as well as classes specifically related to the professional experience. For example, the importance of the Fundamentals of Engineering examination and the procedures associated with preparing for the examination are presented in this course. It is important to note, however, that the Fundamentals of Review program is separate from the Engineering Senior Seminar, is presented in the evening and is not awarded any credit.

Table 2.4 Professional Courses

Course Number	Course Title	Credits
ENGR 401	Engineering Senior Seminar	1
ENGR 490	Engineering Design I	3
ENGR 492	Engineering Design II	3
Total Credits		**7**

5. Advanced Mathematics

These courses extend the student's knowledge of mathematics to meet typical requirements needed in an entry-level position and/or to prepare for graduate study. The courses in this category are included in Table 2.5, Advanced Mathematics courses, below.

Table 2.5 Advanced Mathematics Courses

Course Number	Course Title	Credits
MATH 315	Probability and Statistics	3
MATH 317	Differential Equations	3
MATH 330	Engineering Mathematics	3
Total Credits		**9**

6. Core Education Courses

These courses provide the student with the knowledge and skill sets required to appreciate a global perspective of engineering. They also include courses that broaden the horizons of the student and provide opportunities for the student to participate in service learning experiences.

Students studying Engineering at RWU have the advantage of participating in a well-developed and designed University Core Curriculum that directly supports the Engineering Program Objectives and Outcomes and contributes directly to the professional competency of our graduates.

Courses included in this category are required of all students at the university with the exceptions of COMM 210, Introduction to Speech Communication, the business and free electives. The Engineering program faculty have included COMM 210 as part of the Engineering curriculum (under this category) in recognition of the importance of verbal communicative skills to the engineering profession. Table 2.6, Core Education Courses, is presented below.

Table 2.6 Core Education Courses

Course Number	Course Title	Credits
COMM 210	Introduction to Speech Communications	3
CORE 102	History and the Modern World	3
CORE 103	Perspectives in Human Behavior	3
CORE 104	Literature, Philosophy and the Ascent of Ideas	3
CORE 105	The Artistic Impulse	3
CORE 4xx	Core Senior Seminar	3
WTNG 102	Expository Writing	3
WTNG 220	Critical Writing for the Professions	3
	Business elective	3
	Open elective	3
Total Credits		**30**

Major Design Experience

Our students are prepared for engineering practice through a well-planned curriculum that culminates in a major design experience during their senior year of study. The two-semester class, ENGR 490 Engineering Design I (Fall), and ENGR 492 Engineering Design II (Spring) provides experience in the integration of math, science, engineering and computer science principles into a comprehensive engineering client-based design project. An open-ended design problem that emphasizes a multi-disciplinary approach to total system design provides the focus for the two semester course. Incorporated into the design problem are multiple alternative design paths encompassing a number of feasible and acceptable solutions. These solutions are subject to numerous realistic constraints involving performance, economic, social, manufacturability and quality requirements. Multidisciplinary design teams of students with different engineering concentration areas are required to generate alternatives, make practical approximations, perform appropriate analysis to support the technical feasibility of the design and make decisions leading to an optimized system design.

As students refine their design alternatives, they are expected to produce a working prototype. Working closely with an advisor team usually composed of a faculty member knowledge expert, a faculty member project expert, mentors from the project sponsor, and external mentors, student

teams conduct periodic review presentations for their client ensuring the design meets the clients' needs and expectations. The primary goal of the course includes the delivery of a successful project to the client by the end of the second semester course. This is accomplished by each student fully participating in a multi-disciplinary, team-oriented, design project.

The types of projects that the Engineering Design classes undertake are similar to those commonly found in industry. These projects are typically characterized by participation of cross-functional employees working together in sharing a range of specializations (e.g., various disciplines within engineering, writing, science, management, and marketing). In participating in this design experience, students are provided with a forum for the synthesis of knowledge and skills acquired over the course of their college careers, and provided opportunities for the application of these competencies in undertaking a design project sponsored by a client partner.

Other objectives for the two-semester Engineering Design class include the following:

1. Gain practical experience within a design and development team
2. Understand and then transform a client's needs into a tangible project design
3. Understand the formal engineering design process with emphasis on concurrent engineering
4. Practice defined processes and effective team (and client) communication during production, delivery, and sustenance of a product or system
5. Become proficient in preparing and reviewing all components (notes and writings, sketches and drawings; simulations and models; materials selection) related to a completed project design
6. Synthesize information and develop effective communications explaining the results of the design process in informal and formal reports and presentations
7. Learn how to communicate specialized technical information to those with other expertise
8. Recognize value in alternative ways to approaching issues, thinking critically, and problem-solving
9. Experience the value of early starts, careful planning, constant team interaction, and positive interpersonal communications under deadlines
10. Demonstrate the ability to bring a client concept to prototype design under realistic design constraints
11. Participate in a successful Design Showcase event
12. Create the foundation for a successful career experience.

Engineering Program Objectives

The program objectives of the Engineering Program at Roger Williams University are listed in Table 2.7, RWU Engineering Program Educational Objectives. These objectives are published in the Roger Williams University Undergraduate Catalog, on the School of Engineering, Computing and Construction Management's web site and in a number of engineering promotional materials. All incoming freshmen receive bookmarks and wallet size cards listing the Engineering Program's objectives and outcomes.

Table 2.7 RWU Engineering Program Educational Objectives

Objectives – Three to Five Years After Graduation, We Expect Our Graduates To:
1. Possess an inquisitive mind, demonstrate excellence in technical knowledge and skills, achieve success as a practicing engineer or graduate student, and apply the highest ethical standards in all pursuits.
2. Value the concept of, and demonstrate through practice, activities and actions that contribute to continual intellectual growth.
3. Advance the engineering profession by becoming actively involved in professional associations and societies, serving in professional and community volunteer positions, acting as a role model for the future generation of engineers, and assisting the SECCM Engineering Program in achieving its mission and goals.

These three program objectives are consistent with the mission and goals of the School of Engineering, Computing and Construction Management. Table 2.8, Alignment and Mapping of the Engineering Program Objectives to the RWU Mission, Core Values and Goals, illustrates the connection of the Engineering program objectives to the University.

Table 2.8 Alignment and Mapping of the Engineering Program Objectives to the RWU Mission, Core Values and Goals

● = Weak Relationship ● = Moderate Relationship ● = Strong Relationship
blank = No Relationship

RWU Mission, Core Values and Goals	Engineering Program Objectives		
	Inquisitive mind, excellence in technical skills and knowledge, success, high ethical standards	Lifelong intellectual growth	Advance the engineering profession, service, role model, assist SECCM
RWU Mission Statement	●	●	●
RWU Core Values			
Love of learning as an intrinsic value	●	●	●
Preparation for careers and future study	●	●	●
Collaboration of students and faculty in research	●	●	●
Commitment to community service	●	●	●
Appreciation of global perspectives	●	●	●

RWU Mission, Core Values and Goals	Engineering Program Objectives		
	Inquisitive mind, excellence in technical skills and knowledge, success, high ethical standards	Lifelong intellectual growth	Advance the engineering profession, service, role model, assist SECCM
RWU Educational Goals			
Communicate clearly in a variety of formats	●	●	●
Appreciate the ability of the humanities to stir the soul	●	●	●
Advocate effectively through civil discourse	●	●	●
Acquire new information and perspectives through traditional research techniques and the use of information technology	●	●	●
Contribute productively in team projects through leadership and cooperative efforts	●	●	●
Understand how different cultures, philosophies and historical experiences affect the perspectives of others	●	●	●

Relationship between Engineering Curriculum and Engineering Program Educational Objectives

Table 2.9, Curriculum Mapped to Engineering Educational Objectives, presents engineering courses by the categories presented above and states each category's relationship to the engineering program educational objectives.

Table 2.9 Curriculum Mapped to Engineering Educational Objectives
● = Course Supports Specific SECCM Educational Objective

Category of Course	Courses (Department, Number, Title)	Engineering Educational Objective		
		Inquisitive mind, excellence in technical skills and knowledge, success, high ethical standards	Lifelong intellectual growth	Advance the engineering profession, service, role model, assist SECCM
1. General Engineering	ENGR 110 - Engineering Graphics and Design	●		
	ENGR 115 - Computer Applications for Engineering	●		
	ENGR 210 - Engineering Mechanics I	●		
	ENGR 240 - Circuit Theory & Lab	●		
	ENGR 220 - Engineering Mechanics II	●		
	ENGR 260 - Engineering Electronics & Lab	●		
	ENGR 300 - Mechanics of Materials & Lab	●		
	ENGR 305 - Fluid Mechanics & Lab	●		
	ENGR 310 - Materials Science	●		
	ENGR 313 - Structural Analysis	●		
	ENGR 320 - Environmental Engineering	●		
	ENGR 330 - Thermodynamics	●		
	ENGR 335 - Engineering Economic Analysis	●		
2. Basic Math and Science	MATH 213 - Calculus I & Lab	●		
	MATH 214 - Calculus II & Lab	●		
	CHEM 191 - Chemistry I & Lab	●		
	CHEM 192 - Chemistry II & Lab	●		
	PHYS 201 - Physics I & Lab	●		
	PHYS 202 - Physics II & Lab	●		
	MATH 221 - Discrete Mathematics	●		

		Engineering Educational Objective		
3. Engineering Proficiency	ENGR 270 - Digital Systems Design & Lab	●	●	●
	ENGR 314 - Soil Mechanics and Lab	●	●	●
	ENGR 405 - Air Pollution and Control	●	●	●
	ENGR 407 - Solid and Hazardous Waste Mgmt	●	●	●
	ENGR 408 - Water Pollution and Treatment & Lab	●	●	●
	ENGR 409 - Design of Structures	●	●	●
	ENGR 412 - Water Resources Engineering and Lab	●	●	●
	ENGR 413 - Advanced Structural Analysis	●	●	●
	ENGR 415 - Wastewater Treatment and Lab	●	●	●
	ENGR 417 - Groundwater Hydrology	●	●	●
	ENGR 424 - Digital Signal Processing	●	●	●
	ENGR 430 - Special Topics in Engineering	●	●	●
	ENGR 431 - Mechanical Vibrations	●	●	●
	ENGR 433 - Heat Transfer	●	●	●
	ENGR 445 - Dynamic Modeling and Control	●	●	●
	ENGR 450 - Robotics	●	●	●
	ENGR 455 - Data Communications	●	●	●
	ENGR 465 - Network Analysis and Design	●	●	●
	COMSC 110 - Introduction to Computer Science & Lab	●	●	●
	COMSC 111 - Data Structures & Lab	●	●	●
	COMSC 210 - Principles of Computer Organization & Lab	●	●	●
	COMSC 220 - Analysis of Algorithms	●	●	●
	COMSC 230 - Principles of Programming Languages	●	●	●
	CNST 250 -Construction Equipment	●	●	●
	CNST 302 -Surveying and Lab	●	●	●
	CNST 455 -Mechanical and Electrical Design for Buildings	●	●	●
4.Professional Courses	ENGR 401 - Engineering Senior Seminar		●	●
	ENGR 490 - Engineering Design I	●	●	●
	ENGR 492 - Engineering Design II	●	●	●
5. Advanced Mathematics	MATH 315 - Probability & Statistics	●	●	
	MATH 317 - Differential Equations	●	●	
	MATH 330 - Engineering Math	●	●	
6. Core Education	WTNG 102 - Expository Writing	●	●	●
	WTNG 230 - Critical Writing for Professions	●	●	●
	COMM 210 - Introduction to Speech Communications	●	●	●
	CORE 102 - History and the Modern World	●	●	●
	CORE 103 - Perspectives in Human Behavior	●	●	●
	CORE 104 - Literature, Philosophy and the Ascent of Ideas	●	●	●
	CORE 105 - The Artistic Impulse	●	●	●
	CORE 4xx - Core Interdisciplinary Senior	●	●	●

		Engineering Educational Objective		
	Seminar Business elective			

Engineering Program Outcomes

Engineering program outcomes correspond to the knowledge, skills and behavior that are we expect our engineering graduates to possess at the time of their graduation. These outcomes are established and periodically updated based on constituency input. The outcomes for engineering program that we expect our graduates to possess at graduation are:

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 engineering program educational objectives as presented in Table 2.10, Engineering Program Educational Objectives linked to Engineering Program Outcomes.

Table 2.10 Program Educational Objectives linked to Engineering Program Outcomes

● = Weak Relationship
● = Moderate Relationship
● = 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	●	●	●
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 lifelong learning	●	●	●
j. a knowledge of contemporary issues	●	●	●
k. an ability to use the techniques, skills and modern engineering tools necessary for engineering practice	●	●	●

Assigning Metrics to Outcomes

All engineering program outcomes are operationalized through a process where each faculty member analyzes his or her courses and assigns a measure 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-Sarcre et al. al (2000),[3] as well as from each faculty member's own contributions.

The outcomes assessment form was designed using Adobe Acrobat Professional form features. Although the process of filling out each form is somewhat time-consuming for each faculty member, it allows 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 2.11, 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 complete set of these forms for each of a-k outcomes for each of his or her courses.

[1] B. S. Bloom, M. D. Englehart, E. J. Furst, W. H. Hill, and D. R. Krathwohl (1956) *Taxonomy of Educational Objectives: Handbook 1: Cognitive Domain* . New York: Longman.
[2] J. McGourty, M. Besterfield-Sarcre and L. Shuman (1999) "ABET's Eleven Student Learning Outcomes: Have We Considered the Implications?" Proceedings of the American Society for Engineering Education National Conference.
[3] M. Besterfield-Sacre, L. Shuman, H., C. Atman, J. McGourty, R. Miller, B. Olds, and G. Rogers (2000) "Defining the Outcomes: A Framework for EC-2000." IEEE Transactions On Education, Vol. 43, No. 2.

Table 2.11 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? 10%

A – K Outcomes	Are the following outcomes expected in: 0 Engineering Mechanics	What percentage of the 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 2.12 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 that was 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 2.12 Course Mapping to Learning Outcomes

Outcome Courses	a - Apply knowledge of math, science and engr	b - Design and conduct experi-ments, analyze and interpret data	c -Design system, compo-nent or process	d - Function on multi-disciplin-ary teams	e - Identify, formulate and solve engr problems	f – Under-stand profes-sional and ethical behavior	g - Communi-cate effectively	h - Broad education to under-stand impact of engr	I - Ability to engage in lifelong learning	j - Know-ledge of Contem-porary issues	k - Modern engr tools
ENGR 110 Engr Graphics and Design			50%	50%	50%	10%	50%				50%
ENGR 115 Computer Apps for Engr	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%

Outcome Courses	a - Apply knowledge of math, science and engr	b - Design and conduct experi-ments, analyze and interpret data	c -Design system, compo-nent or process	d - Function on multi-disciplin-ary teams	e - Identify, formulate and solve engr problems	f – Under-stand profes-sional and ethical behavior	g - Communi-cate effectively	h - Broad education to under-stand impact of engr	I - Ability to engage in lifelong learning	j - Know-ledge of Contem-porary issues	k - Modern engr tools
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 Engr Economic Analysis	100%	100%		30%	50%	50%	30%	80%	50%	100%	100%
ENGR 401 Engineering Senior Seminar						30%	60%	20%	20%		

Outcome Courses	a - Apply knowledge of math, science and engr	b - Design and conduct experi-ments, analyze and interpret data	c -Design system, compo-nent or process	d - Function on multi-disciplin-ary teams	e - Identify, formulate and solve engr problems	f – Under-stand profes-sional and ethical behavior	g - Communi-cate effectively	h - Broad education to under-stand impact of engr	I - Ability to engage in lifelong learning	j - Know-ledge of Contem-porary issues	k - Modern engr tools
ENGR 405 Air Pollution and Control	100%	30%	30%		100%	10%	30%	20%	10%	40%	50%
ENGR 407 Solid and Hazardous Waste Mgmt	100%	30%			100%	10%	30%	20%	10%	40%	50%
ENGR 408 Water Pollution and Treatment and Lab	100%	30%	50%		100%	10%	30%	20%	10%	40%	50%
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%

Outcome Courses	a - Apply knowledge of math, science and engr	b - Design and conduct experi-ments, analyze and interpret data	c -Design system, compo-nent or process	d - Function on multi-disciplin-ary teams	e - Identify, formulate and solve engr problems	f – Under-stand profes-sional and ethical behavior	g - Communi-cate effectively	h - Broad education to under-stand impact of engr	I - Ability to engage in lifelong learning	j - Know-ledge of Contem-porary issues	k - Modern engr tools
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 Comm.	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%
COMSC 110 Introduction to Computer Science		100%		50%	20%	20%	100%		100%	10%	100%

Outcome Courses	a - Apply knowledge of math, science and engr	b - Design and conduct experi-ments, analyze and interpret data	c -Design system, compo-nent or process	d - Function on multi-disciplin-ary teams	e - Identify, formulate and solve engr problems	f – Under-stand profes-sional and ethical behavior	g - Communi-cate effectively	h - Broad education to under-stand impact of engr	I - Ability to engage in lifelong learning	j - Know-ledge of Contem-porary issues	k - Modern engr tools
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%	

Outcome Courses	a - Apply knowledge of math, science and engr	b - Design and conduct experi-ments, analyze and interpret data	c -Design system, compo-nent or process	d - Function on multi-disciplin-ary teams	e - Identify, formulate and solve engr problems	f – Under-stand profes-sional and ethical behavior	g - Communi-cate effectively	h - Broad education to under-stand impact of engr	I - Ability to engage in lifelong learning	j - Know-ledge of Contem-porary issues	k - Modern engr tools
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%				

Outcome Courses	a - Apply knowledge of math, science and engr	b - Design and conduct experi-ments, analyze and interpret data	c -Design system, compo-nent or process	d - Function on multi-disciplin-ary teams	e - Identify, formulate and solve engr problems	f – Under-stand profes-sional and ethical behavior	g - Communi-cate effectively	h - Broad education to under-stand impact of engr	I - Ability to engage in lifelong learning	j - Know-ledge of Contem-porary issues	k - Modern engr tools
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%	

Metric Goals for Each a-k Engineering Program 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. After completing the various assessment instruments, the determination of whether the outcome has been successfully achieved is evaluated.

Table 2.13 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 of 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	Course 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

Table 2.14 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.	Course 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

Table 2.15 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. All 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.	Course Assessment Report Transcript Review
2. 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 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 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

Table 2.16 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.	Course Assessment Report
2. All engineering students will participate in the university CORE sequence and University Senior Integrative Experience.	Transcript Review
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 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 Course Assessment Report

Table 2.17 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 Student Course Survey
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.	Course Assessment Reports Course Binders Senior Design and Construction Showcase

Table 2.18 Outcome "f" Metrics

Outcome f: an understanding of professional and ethical responsibility	
Metrics Associated with Outcome f:	**Where Measured**
1. All graduating seniors will sit for the FE exam.	Fundamentals of Engineering Examination
2. At least 90% of all graduating seniors will attend the 45 hour FE review course.	Fundamentals of 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.	Student Club Activities Report
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

Table 2.19 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 and Construction Showcase Professional Advisory Board Meetings Graduate Employers
2. All seniors will have the opportunity in engineering classes to make an oral presentation at least twice a month in their senior year.	Course Binders Course Assessment Report
3. All freshmen will have the opportunity in engineering classes to make an oral presentation at least once a month.	Course Binders Course Assessment Report
4. At least 85% of 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

Table 2.20 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. All engineering students fulfill the Multidisciplinary Core Education component as well as the Core Concentration component of study to include the Core Senior Seminar.	Transcript Review
2. At least 25% of engineering courses address this outcome.	Course Assessment Report Course Binders

Table 2.21 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 will sit for the FE exam.	Fundamentals of Engineering Exam Results
2. At least 90% of all graduating seniors will attend the 45 hour FE review course.	FE Review Course
3. All seniors will participate in the Senior Design Showcase.	Senior Design and Construction 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

Table 2.22 Outcome "j" Metrics

Outcome j: a knowledge of contemporary issues	
Metrics Associated with Outcome j:	**Where Measured**
1. All 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 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.	Student Exit Survey
4. All engineering students will be exposed to contemporary issues through the Senior Seminar class.	Course Binders
5. All engineering students will participate in the Feinstein Service Learning Requirement of at least 5 hours in the surrounding community.	Transcript Review

Table 2.23 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 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.	Course Assessment Report Course Student Survey Senior Design and Construction Showcase
2. All students participating in the senior design projects will be favorably rated by external mentors and clients.	Senior Design and Construction Showcase Graduate Employers Professional Advisory Board Meetings
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.	Student Exit Survey
4. At least 75% of engineering classes address this outcome.	Course Binders Course Assessment Report

Section
3

Assessment Plan for the Computer Science Program

Introduction

The Computer Science Program is founded on an educational philosophy that encourages exploration and discovery in a dynamic discipline. Students study computer science in an environment which goes beyond disciplinary boundaries and enhances the development of the "whole" person. The curriculum is designed to develop the essential knowledge, skills and abilities needed for professional practice or graduate study. The curricular structure of the program, coupled with the strong influence of the liberal arts, equips our graduates with a "holistic" educational experience that prepares them to succeed in a world characterized by rapidly increasing technology, growing complexity and globalization.

The computer science program is designed to encompass seven functional categories of courses:

- Algorithms
- Data Structures
- Software Design
- Concepts of Programming Languages
- Computer Organization and Architecture
- Mathematics and Science
- General education.

Each of these categories provides the student with an essential component of their overall educational experience. The interleaving of the courses provides a synergistic curriculum that ensures students are prepared for successful computer science practice.

Curricular Functional Design

As discussed above, the computer science curriculum is designed around seven functional categories of courses. Many of the courses are common to most undergraduate computer science programs. The program follows many of the tenets as set forth in the ABET/CAC criteria and the ACM Computing Curriculum 2001. There are a total of 121 credit hours required for the computer science degree broken down as depicted in Table 3.1.

Table 3.1 General Program Breakdown

Category	Credit Hours
Algorithms	10.5
Data Structures	6.5
Software Design	9.5
Programming Languages	7.0
Computer Organization & Architecture	12.5
Computer Science Electives	9.0
Mathematics & Science	32.0
General Education	34.0
Total	121.0

1. Algorithms

These courses focus on the step-by-step process of computing a solution to a problem. These courses cover basic as well as advanced topics. They provide a mix of practical application and theoretical foundations. The data communication course provides the opportunity to consider specialized algorithms. Table 3.2 lists the courses in this category.

Table 3.2 Algorithm Courses

Course Number	Course Title	Core	Adv
COMSC 110	Introduction to Computer Science & Lab	1.5	
COMSC 111	Data Structures & Lab	1.0	
COMSC 210	Principles of Computer Organization & Lab	0.5	
COMSC 220	Analysis of Algorithms		2.0
COMSC 230	Principles of Programming Languages	0.5	
COMSC 240	Theory of Computation	0.5	1.0
COMSC 310	Language Translation and Compiler Design		0.5
COMSC 320	Principles of Operating Systems		0.5
COMSC 492	Integrated Senior Design II		0.5
ENGR 445	Dynamic Modeling and Control		0.5
ENGR 455	Data Communications	0.5	
ENGR 465	Network Analysis and Design	0.5	0.5
Total Credits		**5.0**	**5.5**

2. Data Structures

These courses provide students with the basic, and then advanced, ways in which data are organized to best execute algorithms. The material presented complements the instruction provided in the algorithms courses. Table 3.3 lists the courses within this category.

Table 3.3 Data Structure Courses

Course Number	Course Title	Core	Adv
COMSC 110	Introduction to Computer Science & Lab	0.5	
COMSC 111	Data Structures & Lab	2.0	
COMSC 220	Analysis of Algorithms		1.0
COMSC 240	Theory of Computation		0.5
COMSC 310	Language Translation and Compiler Design		0.5
ENGR 445	Dynamic Modeling and Control		0.5
ENGR 455	Data Communications		0.5
ENGR 465	Network Analysis and Design		1.0
Total Credits		**2.5**	**4.0**

3. Software Design

The courses included in this category build upon almost every other course within the curriculum. The software design thread begins in the introductory courses where students learn the basic skills of computer programming. Through the programming courses covering data structures and algorithms, students begin to understand the development of large scale programs where efficiency becomes a design criterion. Computer science majors are exposed to several languages and the characteristics of programming languages. As part of the design effort students use personal research to find the best association of programming language to the problem they are designing. The students then utilize many of today's professional practices (albeit on a smaller scale) to solve their design problems. Throughout the curriculum there are small group and design experiences for students to draw upon as well. The section on the design experience gives more details into the intent and nature of the curriculum as it applies to developing large scale systems and not just programming large amounts of code. Table 3.4 lists the courses within this category.

Table 3.4 Software Design Courses

Course Number	Course Title	Core	Adv
COMSC 110	Introduction to Computer Science & Lab	0.5	
COMSC 111	Data Structures & Lab	0.5	
COMSC 240	Theory of Computation		0.5
COMSC 310	Language Translation and Compiler Design		0.5
COMSC 490	Integrated Senior Design I	2.0	1.0
COMSC 492	Integrated Senior Design II	1.5	1.0
ENGR 445	Dynamic Modeling and Control		1.0
ENGR 455	Data Communications		1.0
Total Credits		**4.5**	**5.0**

4. Concepts of Programming Languages

These courses provide students with the basic concepts on the development and use of modern programming languages. Students become proficient in the Java language and are exposed to others through the curriculum. Table 3.5 lists these courses.

Table 3.5 Concepts of Programming Language Courses

Course Number	Course Title	Core	Adv
COMSC 110	Introduction to Computer Science & Lab	1.0	
COMSC 111	Data Structures & Lab	0.5	
COMSC 210	Principles of Computer Organization & Lab	0.5	
COMSC 230	Principles of Programming Languages	1.0	1.5
COMSC 310	Language Translation and Compiler Design	0.5	0.5
COMSC 320	Principles of Operating Systems	0.5	
ENGR 270	Digital System Design & Lab		1.0
Total Credits		**4.0**	**3.0**

5. Computer Organization and Architecture Courses

The courses in this category are designed to ensure that students are familiar with the basic hardware which comprises a computer system. Students develop an appreciation for modeling a complex system, developing a circuit, and then how compilers and operating systems link the concept of a program to the physical computer. Students become familiar with underlying structure of the basic computer to the more complex issues facing large-scale distributed systems. Courses are listed in Table 3.6.

Table 3.6 Computer Organization and Architecture Courses

Course Number	Course Title	Core	Adv
COMSC 110	Introduction to Computer Science & Lab	0.5	
COMSC 111	Data Structures & Lab		
COMSC 210	Principles of Computer Organization & Lab	2.0	1.0
COMSC 240	Theory of Computation	0.5	
COMSC 310	Language Translation and Compiler Design		0.5
COMSC 320	Principles of Operating Systems		2.0
ENGR 270	Digital System Design & Lab	3.0	
ENGR 445	Dynamic Modeling and Control		1.0
ENGR 455	Data Communications		1.0
ENGR 465	Network Analysis and Design		1.0
Total Credits		**6.0**	**6.5**

6. Mathematics and Science Courses

These courses provide students with the basic mathematics and science tools required to describe the physical world. Students take a minimum of 17 credit hours of mathematics. The combination of basic and advanced courses extends the student's knowledge of mathematics to meet typical requirements needed in an entry-level position and/or to prepare for graduate study. Students select one of the four two-course science sequences, and an additional 4-credit science course, for a minimum of 12 credit hours. Students have the opportunity to select an additional math course or an additional science course. Students selecting the additional math course complete a minor in mathematics. Students may otherwise select an additional science course thus gaining additional depth in science. The additional depth in science allows students to assume entry level positions in those areas of the sciences which gather, process, and visual large amounts of data (commonly referred to as informatics). The courses in this category are included in Table 3.7.

Table 3.7 Mathematics and Science Courses

Course Number	Course Title	Credits
MATH 213	Calculus I and Lab	4
MATH 214	Calculus II and Lab	4
MATH 221	Discrete Mathematics	3
MATH 2XX	Math elective	3
MATH 3XX	Math elective	3
Science Sequence	Selection of one of four sequences below:	8
BIO 111	Biology I and Lab	
BIO 112	Biology II and Lab	
CHEM 191	Chemistry I and Lab	
CHEM 192	Chemistry II and Lab	
PHYS 201	Physics I and Lab	
PHYS 202	Physics II and Lab	
NATSC 101	Intro to Environmental Science and Lab	
NATSC 104	Principles of Oceanography and Lab	
	Science elective	4
	Additional Math or Science elective	3
Total Credits		**32**

7. General Education Courses

These courses provide the student with the knowledge and skill sets required to appreciate the global, social, and cultural perspectives that transcend their discipline. They also include courses that broaden the horizons of the student and provide opportunities for the student to participate in service learning experiences. Students studying Computer Science at RWU participate in a well-developed and designed University Core Curriculum that directly supports the Computer Science Objectives and Outcomes.

Courses included in this category are required of all students at the university with the exception of COMM 210, Introduction to Speech Communication, COMSC 401, Computer Science Senior Seminar, and three free electives. COMM 210 is part of the computer science curriculum in recognition of the importance of verbal communication skills to the computing profession. COMSC 401, Computer Science Senior Seminar, is included in this category as it supports the transition of students from the academic to professional arena where they will be interacting with others based on a broader range of personal perspectives. Table 3.8, General Education Courses, is presented below.

Table 3.8 General Education Courses

Course Number	Course Title	Credits
COMSC 401	Computer Science Senior Seminar	1
COMM 210	Introduction to Speech Communications	3
CORE 102	History and the Modern World	3
CORE 103	Perspectives in Human Behavior	3
CORE 104	Literature, Philosophy and the Ascent of Ideas	3
CORE 105	The Artistic Impulse	3
CORE 4xx	Core Senior Seminar	3
WTNG 102	Expository Writing	3
WTNG 220	Critical Writing for the Professions	3
	Open electives	9
Total Credits		**34**

Senior Capstone Sequence

The hallmark of the computer science curriculum is a two-semester senior capstone experience that immerses students in a real-world project. Every course in the curriculum provides some aspect of the underlying knowledge students require to meet a real-world computing problem. Students are given the opportunity to put that knowledge to use in solving open-ended problems for clients as part of COMSC490/492 Senior Design I&II. Students form three or four-person teams (with students of other disciplines if possible) and meet their respective client to begin the process of establishing a set of requirements. Using an iterative approach, students analyze the needs of the client and balance them against available resources; including the experience each student brings to the team. Over the course of two semesters students are exposed to almost all aspects of total system development from problem statement through client delivery. Tentative solutions are subject to numerous realistic constraints involving performance, quality, documentation standards and target system integration requirements.

As students refine their design and implementation, they are expected to produce functional prototypes. Student teams conduct frequent review presentations for their client detailing the progress, risks and mitigation strategies and future events leading towards successful completion of the project. The primary goal of the course includes the delivery of a successful project to the client by the end of the second semester course. Other critical goals are the use of a systematic process to bring a project to completion as well as the experiences accrued through reliance on team members other team members.

The types of projects that the teams undertake are similar to those commonly found in industry. They are characterized by reliance on team members as well as the importance of communication skills in dealing with the clients. Projects completed over the most recent years included remote programming of industrial robots, data fusion and visualization, web-based surveys, and autonomous maze solving robotic mice. Several projects have been used as prototypes for further study as commercialized enhancements of their current product lines. Students have presented their work at national conferences, regional competitions, and the Roger Williams University Senior Showcase.

Other objectives for the two-semester Computer Science Capstone Sequence include the following:

1) Understand how a computer information system must fit into an organization or be part a component of a larger system.
2) Understand the importance of a systematic approach in software system production
3) Know how to conduct requirement analysis and develop a software system using object oriented and conventional methodologies.
4) Develop and execute an implementation strategy resulting in the delivery of a satisfactory artifact to a real-world client.
5) Effectively use computer-aided tools to assist in conducting the requirement analysis, design, implementation, testing and delivery of a software system
6) Demonstrate the effective integration of the aforementioned skills (as well as skills developed in other classes) by actively participating as a team member in developing a software system for an open-ended problem with a real client

Computer Science Program Objectives

The program objectives of the Computer Science Program at Roger Williams University are listed below in Table 3.9, RWU Computer Science Program Educational Objectives. These objectives are published in the Roger Williams University Undergraduate Catalog, on the School of Engineering, Computing and Construction Management's web site and in a number of promotional materials.

Table 3.9 RWU Computer Science Program Educational Objectives

Objectives – Three to Five Years After Graduation, We Expect Our Graduates To:
1. Apply disciplinary knowledge and skill to analyze, design, implement, and test solutions to applied problems individually and in diverse teams. Present solutions using the variety of media that best promotes understanding.
2. Continue to grow intellectually and professionally in the computing sciences and appreciate the continuous pursuit of knowledge in other areas of interest.
3. Use knowledge and draw on experiences relevant to current and emerging needs in computing sciences and recognize the social, ethical, and cultural impact of technology in a global setting
4. Serve as an exemplar and ambassador of the RWU Computer Science program, strengthening its tradition of excellence, by becoming active in professional societies and organizations and by volunteering within your community.

These objectives are consistent with the goals of the University. Table 3.10, Alignment and Mapping of the Computer Science Program Objectives to the RWU Mission, Core Values and Goals, illustrates the connection of the Computer Science program objectives to the University.

Table 3.10 Alignment and Mapping of the Computer Science Program Objectives to the RWU Mission, Core Values and Goals

● = Weak Relationship ● = Moderate Relationship ● = Strong Relationship

RWU Core Values, Goals, and Computer Science Program Objectives		CS Program Objectives			
		1	2	3	4
RWU Mission		●	●	●	●
RWU Core Values	Love of learning as an intrinsic value	●	●	●	●
	Preparation for careers and future study	●	●	●	●
	Collaboration of students and faculty in research	●	●	●	●
	Commitment to community service	●	●	●	●
	Appreciation of global perspectives	●	●	●	●
RWU Educational Goals	Communicate clearly in a variety of formats	●	●	●	●
	Appreciate the ability of the humanities to stir the soul	●	●	●	●
	Advocate effectively through civil discourse	●	●	●	●
	Acquire new information and perspectives through traditional research techniques and the use of information technology	●	●	●	●
	Contribute productively in team projects through leadership and cooperative efforts	●	●	●	●
	Understand how different cultures, philosophies and historical experiences affect the perspectives of others	●	●	●	●

Computer Science Program Outcomes

Computer science program outcomes correspond to the knowledge, skills and behavior that are we expect our graduates to possess at the time of their graduation. These outcomes are established and periodically updated based on constituency input. The outcomes for the computer science program are:

a. demonstrated capabilities in abstraction, algorithm analysis, computer theory computer organization and programming language concepts
b. an ability to draw from progressively more complex design-build-test experiences in solving new problems in individual and team settings
c. an ability to apply quantitative math-science-engineering knowledge relevant to specific problems
d. a recognition of the need for, and an ability to engage in lifelong learning
e. an understanding of the impact of CS technologies in applied settings (e.g. cultural, social, ethical)
f. an appreciation of the complexities of designing and implementing a software solution that meets customer requirements
g. an ability to use suitable writing and speaking skills as part of analyzing, designing, implementing, testing and fielding solutions

These program outcomes are related to the educational objectives as presented in Table 3.11.

Table 3.11 Computer Science Program Educational Objectives linked to Computer Science Program Outcomes

● = Weak Relationship ● = Moderate Relationship ● = Strong Relationship

a – g Outcomes	Objectives			
	1	2	3	4
a. demonstrated capabilities in abstraction, algorithm analysis, computer theory, computer organization and programming language concepts	●	●	●	●
b. an ability to draw from progressively more complex design-build-test experiences in solving new problems in individual and team settings	●	●	●	●
c. an ability to apply quantitative math-science-engineering knowledge relevant to specific problems	●	●	●	●
d. a recognition of the need for, and an ability to engage in lifelong learning	●	●	●	●
e. an understanding of the impact of CS technologies in applied settings (e.g. cultural, social, ethical)	●	●	●	●
f. an appreciation of the complexities of designing and implementing a software solution that meets customer requirements	●	●	●	●
g. an ability to use suitable writing and speaking skills as part of analyzing, designing, implementing, testing and fielding solutions	●	●	●	●

Assigning Metrics to Outcomes

The program outcomes are operationalized through a process where faculty members analyze their courses and assign a measure to the amount of material in the course that corresponds to each outcome. This process is supported 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-Sarcre et. al (2000),[3] as well as from each faculty member's own contributions.

While the process of filling out each form is somewhat time-consuming for each faculty member, it allows 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. The initial time for a complete assessment is subsequently recouped by quickly anticipating the impact of change between a courses and/or outcomes.

Tables 3.12 through 3.12g, show the cover page of the outcomes worksheet and operational outcomes. This sample is for the course, COMSC 110, Introduction to Computer Science and Lab. Each faculty member fills out one complete set of these forms for each of a-g outcomes for each of his or her courses.

[1] B. S. Bloom, M. D. Englehart, E. J. Furst, W. H. Hill, and D. R. Krathwohl (1956) *Taxonomy of Educational Objectives: Handbook 1: Cognitive Domain* . New York: Longman.
[2] J. McGourty, M. Besterfield-Sarcre and L. Shuman (1999) "ABET's Eleven Student Learning Outcomes: Have We Considered the Implications?" Proceedings of the American Society for Engineering Education National Conference.
[3] M. Besterfield-Sacre, L. Shuman, H., C. Atman, J. McGourty, R. Miller, B. Olds, and G. Rogers (2000) "Defining the Outcomes: A Framework for EC-2000." IEEE Transactions On Education, Vol. 43, No. 2.

Table 3.12 Sample of Outcomes Worksheet
COMSC110 Introduction to Computer Science & Lab

This course supports the following learning outcomes (S = Strong, M = Moderate, W = Weak, N = Not Measured)

Learning Outcome	Level of Support
Outcome a: demonstrated capabilities in abstraction, algorithm analysis, computer theory, computer organization and programming language concepts.	S
Outcome b: an ability to draw from progressively more complex design-build-test experiences in solving new problems in individual and team settings.	S
Outcome c: an ability to apply quantitative math-science-engineering knowledge relevant to specific problems	W
Outcome d. a recognition of the need for, and an ability to engage in lifelong learning	M
Outcome e. an understanding of the impact of CS technologies in applied settings	M
Outcome f. an appreciation of the complexities of designing and implementing a software solution that meets customer requirements	M
Outcome g. an ability to use suitable writing and speaking skills as part of analyzing, designing, implementing, testing and fielding solutions	M

Table 3.12a Sample of Outcomes Worksheet
COMSC110 Introduction to Computer Science & Lab

Outcome a: demonstrated capabilities in abstraction, algorithm analysis, computer theory, computer organization and programming language concepts.	
At the conclusion of this course, students are expected to:	Covered ?
Analyze and explain the behavior of programs involving various programming constructs	Y
Discuss the importance of algorithms in the problem solving process	Y
Create algorithms for solving problems	Y
Discuss the representation and use of data types and structures	Y
Implement user-defined data types and structures	Y
Compare alternative implementations of data structures with respect to performance	N
Choose the appropriate data structure for modeling a problem	N
Use big O, omega, and theta notation to give asymptotic upper, lower and tight bounds on time and space complexity of algorithms	N
Implement greedy, and divide-conquer algorithms to solve appropriate problems	N
Discuss computational efficiency of sorting, searching, and hashing algorithms	N
Develop deterministic and nondeterministic finite state machines	N
Explain how some problems have no algorithmic solution	N
Determine a language's location in the Chomsky hierarchy (regular, context-free, enumerable, etc)	N
Describe the basic building blocks of computer architecture	Y
Summarize how instructions are represented at the machine level and in the context of a symbolic assembler	Y
Explain the concepts of a memory hierarchy	Y
Explain the process of interrupt processing in IO and data transfers	N
Describe the evolution of operating systems from batch systems to multi-user systems	N
Compare and contrast various ways of structuring an operating system such as object-oriented, modular, micro-kernel, layered	N
Explain the different states a task passes through and the data structures required for managing task	N
Compare and contrast various scheduling algorithms for operating systems	N
Evaluate trade-offs in terms of memory size and processor speed	N
Evaluate tradeoffs between different programming paradigms	Y
Describe the phases of program translation from source code to executable code and the files produced by these phases	Y
Explain how abstraction mechanisms support the creation of reusable software components	Y
Other (explain)	N

Table 3.12b Sample of Outcomes Worksheet
COMSC110 Introduction to Computer Science & Lab

Outcome b: an ability to draw from progressively more complex design-build-test experiences in solving new problems in individual and team settings.	
At the conclusion of this course, students are expected to:	Covered?
Solve problems with very specific, defined requirements using specified tools	Y
Solve problems with specific requirements by selecting from among a set of tools	N
Define the requirements for an open problem and select appropriate tools	N
Identify where a previous solution can be extended to support a more complex problem	Y
Select appropriate sub-programs from a range of existing solutions to solve a new problem	Y
Modify existing code to provide a base solution for a new problem	Y
Describe a solution to a problem in terms of programmatic sub-units and how those sub-units interact for a complete solution	Y
Research existing solutions or case studies to find similarities among previous problems and the current problem	N
Work within a team to solve a problem	Y
Identify behaviors and skills that support team effectiveness	Y
Distinguish effective team processes relative to ineffective team processes	Y
Recognize differences in interpersonal styles	Y
Describe how differences in interpersonal style impact team behavior and performance	Y
Effectively construct solutions that integrate seemingly contrary positions	N
Help clarify conflicts regarding roles and responsibilities	Y
Assess team member(s) in terms of strengths and weaknesses as they pertain to a specific problem	Y
Perform a self-assessment in terms of strengths and weaknesses as they pertain to a specific problem	N
Other (explain)	N

Table 3.12c Sample of Outcomes Worksheet
COMSC110 Introduction to Computer Science & Lab

Outcome c: an ability to apply quantitative math-science-engineering knowledge relevant to specific problems	
At the conclusion of this course, students are expected to:	Covered?
Recognize relationships among independent and dependent variables	Y
Describe the mathematical and physical significance of functions, derivatives, and integrals	N
Explain the role of mathematics as a tool for modeling systems	Y
Apply mathematical principles to attain a solution to a model equation	Y
Apply concepts of discrete mathematics to solve problems	N
Evaluate validity of a mathematical model by comparing model-generated results with relevant empirical data	N
Describe fundamental scientific principles in chemical, physical, and/or biological processes and systems	N
Identify which fundamental scientific and engineering principles govern the performance of a system or process	N
Apply engineering science principles relevant to circuit design	N
Analyze data using statistical concepts	N
Account for variation between model predictions and process or system performance	N
Other (explain)	N

Table 3.12d Sample of Outcomes Worksheet
COMSC110 Introduction to Computer Science & Lab

Outcome d. a recognition of the need for, and an ability to engage in lifelong learning	
At the conclusion of this course, students are expected to:	Covered?
Demonstrate awareness of what they learn through life	Y
Identify the tools needed in order to conduct research and develop independent learning skills	Y
Explain how awareness of what has been learned will enhance research and independent learning skills	Y
Apply what has been learned to an actual project	Y
Examine what has been learned and relate it to project outcomes	Y
Begin the process of articulating a life-long learning plan	N
Define the elements of a learning plan	N
Recognize the value of joining a professional organization	N
Other (explain)	N

Table 3.12e Sample of Outcomes Worksheet
COMSC110 Introduction to Computer Science & Lab

Outcome e. an understanding of the impact of CS technologies in applied settings	
At the conclusion of this course, students are expected to:	Covered?
Identify significant trends in the history of the computing field	Y
Compare daily life before and after the advent of personal computers and the internet	Y
Describe positive and negative ways in which computing alters the modes of interaction between people	Y
Interpret the social context of a particular implementation	N
Identify various stakeholders and obligations to them	N
Specify strengths and weaknesses of various professional codes	Y
Identify ethical issues that arise in software development and determine how to address them technically and ethically	Y
Analyze a global computing issue	N
Discuss the role of software piracy on software developers	Y
Distinguish between patent, copyright, and trade secret protection	N
Summarize the legal basis for right to privacy and freedom of expression	N
Explain the advantages and disadvantages of free expression in cyberspace	Y
Describe trends in privacy protection as exemplified in technology	Y
Other (explain)	N

Table 3.12f Sample of Outcomes Worksheet
COMSC110 Introduction to Computer Science & Lab

Outcome f. an appreciation of the complexities of designing and implementing a software solution that meets customer requirements	
At the conclusion of this course, students are expected to:	Covered?
Discuss the properties of good software design	N
Create and specify the software design for a software product	Y
Conduct software reviews using appropriate guidelines	N
Select an appropriate set of tools to support development of a software product	Y
Explain the software development cycle and its phases including deliverables	Y
Explain the role of process maturity models	N
Compare and contrast various software development models	N
Apply key elements and methods for elicitation and analysis to produce a set of requirements for a software project client	N
Use a common method to model and specify the requirements for a software project	Y
Conduct a review of the requirements with the client	N
Distinguish between validation and verification	N
Create, evaluate, and implement a test plan for a software project	Y
Identify issues associated with following a software project model and present those issues to the client	N
Estimate the impact of a change request and present the basis for making (or not making) changes to the client	Y
Work as a member of a team in maintaining documented evidence of the entire software development process from initial requirement generation to final project delivery to a client.	Y
Other (explain)	N

Table 3.12g Sample of Outcomes Worksheet
COMSC110 Introduction to Computer Science & Lab

Outcome g. an ability to use suitable writing and speaking skills as part of analyzing, designing, implementing, testing and fielding solutions	
At the conclusion of this course, students are expected to:	Covered?
Develop an agenda for an oral presentation	Y
Present information in an oral presentation using appropriate media support	Y
Adjust the style and content of an oral presentation to account for varying levels of technical background of the recipients	N
Present a series (as part of a team) of oral briefings through the life cycle development of a long-term project	N
Use a combination of oral and writing presentations to inform a client of the status of a project	Y
Develop a written agenda for a meeting	N
Conduct a meeting following a written agenda	N
Develop a written project plan	Y
Produce reports describing the progress of a project in relation to an existing plan	Y
Prepare a report detailing the result of research on a topic	Y
Prepare an oral summation of a report or research endeavor that was conducted over an extended period	Y
Write summaries of other detailed reports or projects	N
Other (explain)	N

Table 3.13, Course Mapping to Computer Science Outcomes, shows the result of the faculty assessment of how 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 that was discussed in the previous section. Only the required courses have information provided. This ensures that every student, regardless of elective choices, meets the same level of expectation with regards to the program outcomes. Core concentration and core specialization courses outcomes forms are filled out by the Computer Science Program Coordinator in collaboration with faculty members teaching these courses based on a review of course material as well as personal interviews.

Table 3.13 Course Mapping to Computer Science Outcomes
(S = Strong, M = Moderate, W = Weak, N = Not Measured)

Course	Outcome						
	a	**b**	**c**	**d**	**e**	**f**	**g**
COMSC 110 Introduction to Computer Science and Lab	S	S	W	M	M	M	M
COMSC 111 Data Structures and Lab	S	S	W	M	W	S	S
COMSC 210 Principles of Computer Organization and Lab	S	S	W	M	W	W	M
COMSC 220 Analysis of Algorithms	S	S	W	S	M	S	S
COMSC 230 Principles of Programming Languages	S	S	W	S	W	S	M
COMSC 240 Theory of Computation	S	S	M	S	W	W	W
COMSC 310 Compiler and Language Translation	S	M	W	M	W	W	M
COMSC 320 Principles of Operating Systems	S	S	W	S	M	W	S
COMSC 490 Integrated Senior Design I	M	M	S	S	S	S	S
COMSC 492 Integrated Senior Design II	S	S	M	M	M	S	S
ENGR 270 Digital System Design and Lab	S	M	S	W	W	M	W
ENGR 445 Dynamic Modeling and Control	S	M	S	W	W	W	W
ENGR 455 Data Communications	S	S	S	W	M	M	W
ENGR 465 Network Analysis and Design	S	S	S	S	M	M	W
MATH 213 Calculus I	W	W	S	M	N	N	N
MATH 214 Calculus II	W	W	S	M	N	N	N
MATH 221 Discrete Mathematics	S	W	S	M	N	N	N
MATH 2XX Elective	Varies		S	Varies			
MATH 3XX Elective	Varies		S	Varies			
Two Course Sequence of: BIO 111 Biology I and Lab BIO 112 Biology II and Lab CHEM 191 Chemistry I and Lab CHEM 192 Chemistry II and Lab PHYS 201 Physics I and Lab PHYS 202 Physics II and Lab NATSC 101 Introduction to Environmental Science and Lab NATSC 104 Principles of Oceanography and Lab	N	M	S	S	N	N	N
Science Elective (4 credit hour)	N	M	S	S	N	N	N
Math (above 200 level) or Science Elective (3 credit hour)	Varies		S	M	N	N	N
COMSC 401 Computer Science Senior Seminar	N	N	W	S	S	W	M
COMM 210 Introduction to Speech Communications	N	N	M	M	M	W	S
CORE 102 History of the Modern World	N	N	N	S	S	M	S
CORE 103 Perspectives in Human Behavior	N	N	N	S	S	S	S
CORE 104 Literature, Philosophy and the Ascent of Ideas	N	N	N	S	S	S	S
CORE 105 The Artistic Impulse	N	N	N	S	S	M	S
CORE 4xx Core Senior Seminar	N	N	N	S	S	M	S
WTNG 102 Expository Writing	N	N	N	M	W	W	S
WTNG 220 Critical Writing for the Professions	N	N	N	S	W	W	S

Metric Goals for Each a-g Computer Science Program Outcome

After reviewing operational zed learning objectives for each a-g outcome, school and program 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. After completing the various assessment instruments, the determination of whether the outcome has been successfully achieved is evaluated.

Table 3.14 Outcome "a" Metrics

Outcome a: demonstrated capabilities in abstraction, algorithm analysis, computer theory computer organization and programming language concepts	
Metrics Associated with Outcome a:	**Where Measured**
At least 70% of all computer science courses will address this outcome.	Course Binders Operationalized Outcomes Review
For each required computer science course with a prerequisite covering the above topics, at least 75% of the students who have C or better in the prerequisite course pass the course on the first attempt.	Transcript Review
Faculty report no systemic deficiencies in student learning attributable to prerequisite courses.	Course Assessment Report
Senior computer science students report proficiency achieved in their ability to identify, formulate and solve computational 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 Skills Survey Student Exit Survey Course Student Survey
At least 85% of all alumni rate their preparation by RWU for the workplace in the ability to apply knowledge of the above topics as good to excellent.	Alumni Survey Graduate Employers

Table 2.14 Outcome "b" Metrics

Outcome b: an ability to draw from progressively more complex design-build-test experiences in solving new problems in individual and team settings	
Metrics Associated with Outcome b:	**Where Measured**
All senior computer science students participate in the Design and Construction Showcase where their work is evaluated by mentors, potential employers and faculty.	Student Competitions and Conferences Course Assessment Report Senior Design and Construction Showcase Student Exit Survey
All courses at the 200 level have at least one group project.	Course Binder Course Assessment Report
All courses above the 200 level show an increasing emphasis on project work (team or individual).	Course Binder Course Assessment Report
Course projects increase in complexity, building on information learned in earlier aspects of the course	Course Binder
At least 80% of all graduating seniors will report that their team skills have improved from benchmarked data collected at the beginning of their senior year to ending data collected at graduation.	Student Course Survey Student Exit Survey
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 Graduate Employers

Table 2.15 Outcome "c" Metrics

Outcome c: an ability to apply quantitative math-science-engineering knowledge relevant to specific problems	
Metrics Associated with Outcome c:	**Where Measured**
For each required 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
At least 95% of students are evaluated by sponsors as completely fulfilling the math-science-engineering component of senior design capstone project requirements.	Senior Design and Construction Showcase Project Client Report
Faculty report no systemic deficiencies in student learning in math-science-engineering courses.	Course Assessment Reports
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 on a 5 point scale	Senior Skills Survey Student Course Survey Student Exit Survey
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 Graduate Employers

Table 2.16 Outcome "d" Metrics

Outcome d: a recognition of the need for, and an ability to engage in lifelong learning	
Metrics Associated with Outcome d:	**Where Measured**
All graduating seniors will engage in a significant research effort as part of a required computer science course.	Course Binder
Some seniors will participate in a research effort of the quality suitable for presentation at an external conference.	Independent Study Courses Student Competitions and Conferences Course Binder
All seniors will participate in the Senior Design Showcase.	Senior Design and Construction Showcase Transcript Review Course Binder
At least 75% of surveyed alumni indicate participation in professional training, professional societies or a graduate school since graduating from RWU.	Alumni Survey Graduate Employers
At least 70% of our present students indicate that they will attend graduate school in the future.	Student Exit Survey

Table 2.17 Outcome "e" Metrics

Outcome e: an understanding of the impact of CS technologies in applied settings (e.g. cultural, social, ethical)	
Metrics Associated with Outcome e:	**Where Measured**
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 Binder Course Assessment Report
At least 50% of all computer science students will be members of a professional society	Student Skills Survey Student Exit Survey
All computer science students fulfill the Multidisciplinary Core Education component as well as the Core Concentration component.	Transcript Review
At least 25% of computer science courses address this outcome	Operational Outcomes Forms Course Binder
All of computer science students will be exposed to contemporary issues through the Multidisciplinary Core Education component as well as the Senior Multidisciplinary Core course	Course Binder University Catalog Student Exit Survey
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.	Student Exit Survey Student Skills Survey
All of computer science students will be exposed to contemporary issues through the Senior Seminar class.	Course Student Survey Course Binder
All seniors report that they have successfully integrated aspects their computer science and CORE curriculum culminating in the design of their senior capstone project. Success is defined of at least a score of 4 on a 5 point scale.	Student Exit Survey
At least 85% of alumni report their RWU experience prepared them for real-world incidents involving the above topics	Alumni Survey Graduate Employer

Table 2.18 Outcome "f" Metrics

Outcome f: an appreciation of the complexities of designing and implementing a software solution that meets customer requirements	
Metrics Associated with Outcome f:	**Where Measured**
All seniors will actively participate in a senior project as part of a team to meet a requirement established by an external client	Course Binder Project Client Report
Students will conduct research utilizing professional society current journals to support their senior design project	Course Binder Course Student Survey
Students will demonstrate an understanding of professional and ethical responsibility as it pertains to their specific project	Project Client Report Student Skill Survey Course Student Survey
Students will present material to their sponsors and respond to changing requirements	Project Client Report
Students will develop a plan for completing their project, map it a defined software product development life cycle then track their progress against their plan	Project Client Report Course Student Survey Course Binder
All students will successfully demonstrate their ability to use the techniques, skills and modern computing tools necessary for computer science practice through the year-long senior capstone project.	Project Client Report Student Skill Survey
All students participating in the senior design projects will be favorably rated by external mentors and clients.	Project Client Report Student Peer-Evaluations
Senior students report proficiency achieved in their ability to analyze, design, build, test and implement a project to client specifications. 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 Skills Survey Student Exit Survey Project Client Report
Employers indicate recent graduates were able to be integrated into teams on active projects	Graduate Employers

Table 2.19 Outcome "g" Metrics

Outcome g: an ability to use suitable writing and speaking skills as part of analyzing, designing, implementing, testing and fielding solutions	
Metrics Associated with Outcome g:	**Where Measured**
Computer Science courses will have at least one oral presentation per course	Course Binder
All seniors will have the opportunity in to make at least two oral presentations a semester as part of their senior project.	Course Binder Course Assessment Report
At least 85% of all mentors and potential employers agree that graduating seniors possess the ability to communicate effectively.	Graduate Employers Project Client Report
Seniors will present written reports detailing progress on their design project	Project Client Report
Seniors will present senior projects in written, oral, or poster form during the Senior Showcase	Project Client Report Senior Design and construction Showcase Student Peer Review
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	Student Skill Survey Student Exit Survey
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 Graduate Employers
Employers will report graduates meet acceptable performance criteria in oral and written communications	Graduate Employers

Section
4

Assessment Plan for the Construction Management Program

Introduction

The Construction Management Program focuses on providing the student both the “soft” collaborative skills and the “hard” technical skills to prepare the graduate to lead and manage a construction project. The construction graduate will work closely with owners, architects, engineers, and trade contractors throughout the entire design-build process. Graduates will typically take responsibility for the budgeting, scheduling and control of the construction operation. Construction careers are broadly diversified with our graduates finding employment in the principle industry sectors to include: residential, commercial building, heavy highway and industrial. Every construction management graduate also earns a Business minor.

The construction management program is designed to encompass six functional categories of courses:

- General Education
- Mathematics and Science
- Business and Management
- Construction Science
- Construction
- Other program specific courses

Each of these categories provides the student with an essential component of their overall educational experience and ensures that students are prepared for construction management practice as required by our accrediting body.

Curricular Functional Design

As discussed above, the construction management curriculum is designed around six functional categories of courses. Each of these functional categories is discussed below.

1. **General Education**

   It is important that every Constructor's education include appropriate courses in communications, social sciences, and the humanities. This content should reflect the needs of the construction industry as well as the philosophy of the educational institution. Construction is concerned with people and their relationships. Thus, the ability to communicate, both orally and in writing, and the understanding of human behavior are essential assets to the constructor.

Table 4.1 General Education Courses

Course Number	Course Title	Credits
COMM 210	Intro to Speech Communications	3
CORE 102	History and the Modern World	3
CORE 103	Human Behavior	3
CORE 104	Lit Phil & Ascent of Ideas	3
CORE 105	Artistic Impulse	3
WTNG 102	Expository Writing	3
WTNG 220	Critical Writing for the Professions	3
Total Credits		**21**

2. Mathematics and Science

It is essential that every Constructor possess a well-developed concept of mathematics and physical science. Construction is in part a technical process that can be best controlled by applying the principles of mathematics, statistics, and computer science. Furthermore, an understanding of the behavior of the materials, equipment, and methods used in construction requires knowledge of the laws of physics, chemistry, geology, and environmental sciences. Basic scientific, quantitative, and qualitative topics, which provide a foundation for subsequent technical subjects, are to be considered in this category.

Table 4.2 Mathematics and Science Courses

Course Number	Course Title	Credits
CORE 101	Science/Tech & Lab	4
MATH 124	Basic Statistics	3
MATH 207	Applied Calculus	3
PHYS 201	Physics I and Lab	4
Total Credits		**14**

3. Business and Management

The Constructor is a manager. To be an effective manager, the Constructor must know how to manage the principal resources of the industry, i.e., people and money. The Constructor should have a broad understanding of the fundamentals of the free enterprise system, accounting, finance, business regulations, contract law, labor law, and marketing. This category involves fundamental courses to provide a foundation for contemporary business practices appropriate to applications in construction. No specific number of semester hours or subject areas are required, however, eighteen semester hours are required in this category.

Table 4.3 Business and Management

Course Number	Course Title	Credits
ACCTG 101	Accounting I: Financial	3
ECON 102	Principles of Microeconomics	3
MGMT 200	Management Principles	3
MRKT 200	Marketing Principles	3
PLS 221	Law of Contracts	3
	Business Management Elective	3
Minimum Total Credits		**18**

4. Construction Science

The Constructor must have an understanding of the contribution of the design disciplines' processes. The Constructor must be able to communicate with the design professionals and should be capable of participating during the planning phase of design-build projects. Construction sciences and architectural or engineering design topics selected to facilitate communications with the design disciplines and to solve practical construction problems are included in this category.

Table 4.4 Construction Science

Course Number	Course Title	Credits
CNST 116	Computer Applications in Construction	1
CNST 130	Plans, Specifications and Building Codes	3
CNST 200	Construction Methods and Materials and Lab 1	4
CNST 201	Construction Methods and Materials and Lab 2	4
CNST 250	Construction Equipment	3
CNST 302	Surveying and Lab	4
CNST 304	Structures II	3
CNST 455	Mechanical and Electrical Design for Buildings	3
ENGR 210	Engineering Mechanics I	3
Total Credits		**28**

5. Construction

The construction curriculum category is of vital importance in a quality construction curriculum. Courses should include both office and field activities and include the effective management of personnel, materials, equipment, costs, and time. All types of construction should be included. Curricula topics should address the constructor's role as a member of a multi-disciplinary team, the assessment of project risk, and the alternate methods that can be used to structure the owner-designer-constructor team. Course work will examine the various roles and responsibilities of project participants throughout a project's life and the creative ways that project teams can be assembled. Fundamental topics to provide an appropriate combination of breadth and depth in current construction industry practice are to be considered in this category. These topics should develop skills that will facilitate advancement of the individual in the construction profession. Construction courses should be presented in a manner that encourages problem definition and solution, creativity, communication, evaluation, and continuous learning. The knowledge, understanding, and skills gained from prerequisite courses should be integrated and utilized in subsequent courses.

Table 4.5 Construction

Course Number	Course Title	Credits
CNST 100	Introduction to Construction. Management	3
CNST 116	Computer Applications in Construction	2
CNST 260	Construction Estimating and Scheduling	3
CNST 321	Advanced Building Estimating	3
CNST 450	Construction Planning and Scheduling	3
CNST 455	Construction Project Management and Lab	4
CNST 475	Construction Project Control	3
CNST 480	Construction Management Capstone	3
PLS 436	Construction Law	3
Total Credits		**27**

6. Other Program Requirements

The Roger Williams University Core Concentration involves the a five-course exploration of one liberal arts discipline unrelated to the major. Construction management students select their core concentration from 21 different fields of study. This requirement ensures that students graduate with significant knowledge of at least two fields; that of the major and that of the core concentration.

Table 4.6 Other Program Requirements

Course Number	Course Title	Credits
	Core Concentration	18
Total Credits		**18**

Construction Management Program Educational Objectives

The program objectives of the Construction Management Program at Roger Williams University are listed in Table 4.7, RWU Construction Management Program Educational Objectives. These objectives are published in the Roger Williams University Undergraduate Catalog, on the School of Engineering, Computing and Construction Management's web site and in a number of Construction Management promotional materials. All incoming freshmen receive bookmarks listing the Construction Management Program's objectives and outcomes.

Table 4.7 RWU Construction Management Program Educational Objectives

Objectives – Three to Five Years After Graduation, We Expect Our Graduates To:
1. Demonstrate exemplary technical knowledge and skills while achieving success as a practicing constructor and leader, and always displaying the highest standards of ethical conduct.
2. Value the concept of life-long learning and continue to grow intellectually while keeping informed of new concepts and developments in the construction process.
3. Advance the construction management profession by becoming actively involved in professional associations and societies, serving in professional and community volunteer positions, and acting as a role model for the future generation of constructors and the Roger Williams University Construction Management students.

These three program objectives are consistent with the mission and goals of the School of Engineering, Computing and Construction Management. Table 4.8, Alignment and Mapping of the Construction Management Educational Program Objectives to the RWU Mission, Core Values and Goals , illustrates the connection of the Construction Management program objectives to the University.

Table 4.8 Alignment and Mapping of the Construction Management Program Educational Objectives to the RWU Mission, Core Values and Goals

● = Weak Relationship ● = Moderate Relationship ● = Strong Relationship
blank = No Relationship

RWU Mission, Core Values and Goals	Construction Program Objectives		
	Technical knowledge, success as a practicing constructor and leader, display the highest standards of ethical conduct	Lifelong learning	Advance the construction management profession, service, role model, assist SECCM
RWU Mission Statement	●	●	●
RWU Core Values			
Love of learning as an intrinsic value	●	●	●
Preparation for careers and future study	●	●	●
Collaboration of students and faculty in research	●	●	●
Commitment to community service	●	●	●
Appreciation of global perspectives	●	●	●
RWU Educational Goals			
Communicate clearly in a variety of formats	●	●	●
Appreciate the ability of the humanities to stir the soul	●	●	●
Advocate effectively through civil discourse	●	●	●
Acquire new information and perspectives through traditional research techniques and the use of information technology	●	●	●
Contribute productively in team projects through leadership and cooperative efforts	●	●	●
Understand how different cultures, philosophies and historical experiences affect the perspectives of others			

Construction Management Program Outcomes

Construction Management program outcomes correspond to the knowledge, skills and behavior that are we expect our construction graduates to possess at the time of their graduation. These outcomes are established and periodically updated based on constituency input. The outcomes for construction management program that we expect our graduates to possess at graduation are:

a. an ability to apply knowledge of mathematics and science to typical Construction Management tasks
b. effective research and problem solving skills applied to typical Construction Management tasks
c. an ability to plan, organize and control a construction project
d. an ability to lead and/or function as a member of a team
e. students will experience and educationally benefit from quality facilities and equipment, strong industry support, and comprehensive extra-curricular activities
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of construction 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.

These program outcomes are related to the construction management program educational objectives as presented in Table 4.9, Construction Management Educational Objectives linked to Construction Management Program Outcomes.

Table 4.9 Construction Management Program Educational Objectives linked to Program Outcomes

● = Weak Relationship
● = Moderate Relationship
● = Strong Relationship

a – j Outcomes	Technical knowledge, success as a practicing constructor and leader, display the highest standards of ethical conduct	Lifelong learning	Advance the construction management profession, service, role model, assist SECCM
a. an ability to apply knowledge of mathematics and science to typical construction management tasks	●	●	●
b. effective research and problem solving skills applied to typical construction management tasks	●	●	●
c. an ability to plan, organize and control a construction project	●	●	●
d. an ability to lead and/or function as a member of a team	●	●	●
e. students will experience and educationally benefit from quality facilities and equipment, strong industry support, and comprehensive extra-curricular activities	●	●	●
f. an understanding of professional and ethical responsibility	●	●	●
g. an ability to communicate effectively	●	●	●
h. the broad education necessary to understand the impact of construction 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	●	●	●

Curriculum Matrices

The following two tables, Tables 4.10 and 4.11, map the CM curriculum to ACCE-mandated Core Subject Area Topical Content and to Program Outcomes, respectively.

Metric Goals for Each a-j Construction Management Program Outcome

After reviewing operationalized learning objectives for each a-j outcome, construction management 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. After completing the various assessment instruments, the determination of whether the outcome has been successfully achieved is evaluated.

Table 4.12 Outcome "a" Metrics

Outcome a: an ability to apply knowledge of mathematics and science to typical Construction Management tasks	
Metrics Associated with Outcome a:	**Where Measured**
1. Construction students pass rate of the AC exam meets or exceeds the national average	Associate Constructor Exam
2. For each required construction 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 and science to solve construction problems. Proficiency is defined as a score of 1 or 2 on a 5 point scale where 1 means proficiency achieved and 5 means proficiency not achieved.	Course Student Survey Student Exit Survey
4. At least 95% of students are evaluated by jurors as completely fulfilling the senior capstone project requirements.	Capstone Project Juror Evaluations
5. Faculty report no systemic deficiencies in student learning in basic construction courses	Course 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 and science as good to excellent.	Alumni Survey

Table 4.13 Outcome "b" Metrics

Outcome b: effective research and problem solving skills applied to typical Construction Management tasks	
Metrics Associated with Outcome b:	**Where Measured**
1. All construction students will successfully complete applications in coursework involving research aspects and problem solving techniques. 2. At least 10% of all construction students will participate in a student competition where their ability to research and solve problems and will be externally judged and assessed. 3. All graduating seniors report that they have achieved proficiency in the ability to apply knowledge of mathematics, science and construction to solve construction problems. Proficiency is defined of at least a score of 1 or 2 on a 5 point scale where 1 means proficiency achieved and 5 means proficiency not achieved. 4. At least 85% of all alumni rate their preparation by RWU for the workplace in the ability research and solve problems	Transcript Review Course Assessment Report Student Competitions and Conferences Student Exit Survey Alumni Survey

Table 4.14 Outcome "c" Metrics

Outcome c: an ability to plan, organize and control a construction project	
Metrics Associated with Outcome c:	**Where Measured**
1. All construction students participate in a Capstone Project Class that involves a semester long industry sponsored project that demonstrates their ability to **successfully** plan, organize and control a project. 2. All senior Construction students participate in the Design and Construction Showcase where their work is evaluated by mentors, potential employers and faculty. 3. At least 75% of construction students will have accepted a job offer or have been accepted to graduate school before the conclusion of Spring semester of the senior year. 4. 100% of those graduates that were seeking employment will have a job within 6+/- months of graduation.	Capstone Project Juror Evaluations Transcript Review Course Assessment Report Senior Design and Construction Showcase Graduate Employers Senior Job Placement Survey Alumni Survey

Table 4.15 Outcome "d" Metrics

Outcome d: an ability to lead and/or function as a member of a team	
Metrics Associated with Outcome d:	**Where Measured**
1. All construction students participate as a team member as they complete their Capstone project. Each team member brings different construction experiences to the project.	Transcript Review Capstone Project Juror Evaluations
2. 100% of all Construction students will participate in the university CORE sequence and University Senior Integrative Experience.	Transcript Review
3. At least 50% of graduating CM students will attain practical construction management employment prior to graduation.	Ahlborg Internship Coordinator Report
4. At least 50% of construction courses will give students the opportunity to work on collaborative team projects.	Course Binders Course Assessment Report
5. At least two student-led teams will participate in the Associated Schools of Construction Region 1 student competition.	Student Competitions and Conferences

Table 4.16 Outcome "e" Metrics

Outcome e: students will experience and educationally benefit from quality facilities and equipment, strong industry support, and comprehensive extra-curricular activities.	
Metrics Associated with Outcome e:	**Where Measured**
1. Students will favorably rate university facilities, equipment and administrative support. 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
2. Industry will support (financially and as visiting lecturers) the CM lecture series.	Student Club Activities Report
3. Industry will host at least 5 student and faculty requested field trips.	Student Club Activities Report Professional Advisory Board
4. Industry will regularly attend (over 75%) Professional Advisory Board meetings and serve on board assigned sub-committees as requested.	Student Club Activities Report
5. The CM club will sponsor a program lecture series and coordinate a variety of activities such as site visitations and/or community service.	Student Competition and Conferences
6. The CM Program will sponsor a minimum of 2 student led ASC Region 1 competition teams.	

Table 4.17 Outcome "f" Metrics

Outcome f: an understanding of professional and ethical responsibility	
Metrics Associated with Outcome f:	**Where Measured**
1. All graduating seniors will sit for the Associate Constructor exam.	Associate Constructor Exam
2. At least 90% of all graduating seniors will attend the 45 hour AC review course.	Associate Constructor Exam Review Course
3. All students will develop and present a case that focuses on professional and ethical responsibility.	Course Binders
4. At least 25% of all construction management classes will address, and students will demonstrate an understanding of professional and ethical responsibility.	Course Binders Course Student Survey
5. At least 50% of construction management students will have held a construction related summer position, internship or co-op, or construction management work study related position by the time of graduation.	Senior Exit Survey Ahlborg Internship Coordinator Report

Table 4.18 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 and Construction Showcase Professional Advisory Board Meetings Graduate Employers
2. All seniors will have the opportunity in construction classes to make an oral presentation at least twice a month in their senior year.	Course Binder Course Assessment Report
3. All freshmen will have the opportunity in construction classes to make an oral presentation at least once a month.	Course Binder Course Assessment Report
4. All graduates will produce an acceptable senior capstone oral report as evaluated by external and internal review.	Course Assessment Report 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

Table 4.19 Outcome "h" Metrics

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

Table 4.20 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 will sit for the AC exam.	Associate Constructor Exam
2. At least 90% of all graduating seniors will attend the 45 hour AC exam review course.	Associate Constructor Exam Review Course
3. All of seniors will participate in the Senior Design and Construction Showcase.	Senior Design and Construction 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

Table 4.21 Outcome "j" Metrics

Outcome j: a knowledge of contemporary issues	
Metrics Associated with Outcome j:	**Where Measured**
1. All construction management students will be exposed to contemporary issues through the Multidisciplinary Core Education component as well as the Senior Multidisciplinary Core course	Course Binder
2. At least 20% of construction courses will address this outcome.	Course Binder 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.	Student Exit Survey
4. All construction management students will be exposed to contemporary issues through the Senior Seminar class.	Course Binder Course Assessment Report
5. All construction management students will participate in the Feinstein Service Learning Requirement of at least 5 hours in the surrounding community.	Transcript Review

Section 5

Evaluation Instruments

Introduction

This section of the plan contains several examples of our assessment tools. These tools were discussed in previous portions of this document.

Contents

Engineering Senior Exit Survey

School of Engineering, Computing and Construction Management

This survey allows our seniors to provide feedback on SECCM programs and activities. The survey is conducted during a student's last semester at Roger Williams University. It is very important to our accreditation efforts that we continually assess our programs and activities to assure that we are providing you with the education and skills necessary for success in today's workplace. We are also very interested in your input on how we can make our programs and activities even better. We take your input very seriously and thank you once again for assisting us in continuing our tradition of excellence.

1. Can you specifically name any courses and/or instructors at Roger Williams University, either in the SECCM or outside the School that you feel have prepared you well for your eventual career?

1. Course: _____ Instructor: _____

2. Course: _____ Instructor: _____

3. Course: _____ Instructor: _____

4. Course: _____ Instructor: _____

2. Alternatively, can you specifically name any courses and/or instructors at Roger Williams University, either in the SECCM or outside the School that you feel did not contribute any benefit to your eventual career?

1. Course: _____ Instructor: _____

2. Course: _____ Instructor: _____

3. Course: _____ Instructor: _____

4. Course: _____ Instructor: _____

3. Overall, on a scale of 1 to 10 where 1 means totally unprepared, and 10 means totally prepared, how well would you say that your education at Roger Williams University has prepared you to enter the workforce or to begin graduate school?

Totally Unprepared 1 2 3 4 5 6 7 8 9 10 **Totally Prepared**

4. Looking back over your college career at RWU, what have been the three most significant experiences/activities/encounters that have most impacted your development as a person while at RWU? Why?

Experience	Why?
1.	
2.	
3.	

5. Were there any activities, programs or courses that were not offered at Roger Williams University that would have better prepared you for the future?

1. ☐ Yes—> Can you give some examples?_____

_____

2. ☐ No

6. This section asks you to rate how well we have done in providing you with the education and experiences that contribute to developing proficiency in a number of areas. For the following outcome areas, please rate the topics on a scale of 1 to 5, where 1 means proficiency has been achieved and 5 means proficiency has not been achieved.

Proficiency Areas	**Proficiency Achieved**				**Proficiency Not Achieved**
1. an ability to apply the knowledge of mathematics, science, and engineering to solve engineering problems	1	2	3	4	5
2. an ability to design and conduct experiments	1	2	3	4	5
3. an ability to analyze and interpret data	1	2	3	4	5
4. 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	1	2	3	4	5
5. an ability to function on multi-disciplinary teams	1	2	3	4	5
6. an ability to identify, formulate and solve engineering problems	1	2	3	4	5
7. an understanding of professional and ethical responsibility	1	2	3	4	5
8. an ability to communicate effectively	1	2	3	4	5
9. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	1	2	3	4	5
10. a recognition of the need for, and an ability to engage in life-long learning	1	2	3	4	5
11. a knowledge of contemporary issues	1	2	3	4	5
12. an ability to use the techniques, skills and modern engineering tools necessary for engineering practice	1	2	3	4	5
13. effective leadership skills	1	2	3	4	5

7. For the following items, please assess the quality of the RWU program, services or individual on a scale of 1 to 5 where 1 means extremely high quality and 5 means extremely low quality.

Programs/Services/Individuals	**Extremely High Quality**				**Extremely Low Quality**
a. SECCM laboratory equipment	1	2	3	4	5
b. Advising on course selection or academics	1	2	3	4	5
c. Advising on career or future in SECCM	1	2	3	4	5
d. Advising on career or future through the Career Center	1	2	3	4	5
e. Courses in your major	1	2	3	4	5
f. University core courses	1	2	3	4	5
g. University core concentration courses	1	2	3	4	5
h. Printed information about the major	1	2	3	4	5
i. Helpfulness of the SECCM office staff	1	2	3	4	5
j. Faculty	1	2	3	4	5
k. Admissions office	1	2	3	4	5
l. Registrar's office	1	2	3	4	5
m. Bookstore	1	2	3	4	5
n. University computer facilities	1	2	3	4	5
o. SECCM computer facilities	1	2	3	4	5
p. Health center	1	2	3	4	5

Programs/Services/Individuals	Extremely High Quality				Extremely Low Quality
q. Career center	1	2	3	4	5
r. SECCM engineering laboratories	1	2	3	4	5

7. What would you say is the greatest strength of the Engineering Program? Why?

_____

_____

8. And what would you say is the area that needs the most improvement in the Engineering? Why?

_____

_____

9. Have you taken the FE exam?

1. ☐ Yes 2. ☐ No

10. Please tell us something about yourself.....

Major: ☐ Engineering ☐ Environmental Engineering

Are you male or female? 1. ☐ Male 2. ☐ Female What is your GPA? _____

How many job offers have you received?_____

Have you accepted a job offer? If yes, with what company or organization?_____

Do you have a forwarding address? If not, what is your permanent address?

Name: _____

Address:_____

City:_____ State: _____ Zip:_____

Email: _____ Phone: _____

Thank you so much for taking the time to fill out this survey. Your responses are very important to us. Please feel free to contact either Associate Dean, Linda A. Riley at (401) 254-3896 (lriley@rwu.edu) or Dean Robert Potter at (401) 254-3498 (bobpotter@rwu.edu) to discuss this survey or any aspect of your program at RWU. When you finish this survey, please return to Marygrace.

Please keep in touch!!

Computer Science Senior Exit Survey

School of Engineering,Computing and Construction Management

This survey allows you to provide us feedback on SECCM programs and activities. It is very important to our accreditation efforts that we continually assess our programs and activities to assure that we are providing our students with the education and skills necessary for success in today's workplace. We are also very interested in your input on how we can make our programs and activities even better. We take your input very seriously and thank you once again for assisting us in continuing our tradition of excellence.

1. Can you specifically name any courses and/or instructors at Roger Williams University, either in the SECCM or in other departments at RWU that you feel have prepared you well for your eventual career?

1. Course: _____ Instructor: _____

2. Course: _____ Instructor: _____

3. Course: _____ Instructor: _____

4. Course: _____ Instructor: _____

2. Alternatively, can you specifically name any courses and/or instructors at Roger Williams University, either in the SECCM or in other departments at RWU that you feel did not contribute any benefit to your eventual career?

1. Course: _____ Instructor: _____

2. Course: _____ Instructor: _____

3. Course: _____ Instructor: _____

4. Course: _____ Instructor: _____

3. Overall, on a scale of 1 to 10 where 1 means totally unprepared, and 10 means totally prepared, how well would you say that your education at Roger Williams University has prepared you to enter the workforce or to begin graduate school?

Totally Unprepared 1 2 3 4 5 6 7 8 9 10 **Totally Prepared**

4. Looking back over your college career at RWU, what have been the three most significant experiences/activities/encounters that have impacted your development as a person while at RWU? Why?

Experience	Why?
1.	
2.	
3.	

5. Were there any activities, programs or courses that were not offered at Roger Williams University that would have better prepared you for the future?

1. ☐ Yes—> Can you give some examples?_____

2. ☐ No

6. This section asks you to rate how well we have done in providing you with the education and experiences that contribute to developing proficiency in a number of areas. For the following outcome areas, please rate the topics on a scale of 1 to 5, where 1 means proficiency has been achieved and 5 means proficiency has not been achieved.

Proficiency Areas	**Proficiency Achieved**				**Proficiency Not Achieved**
1. demonstrated capabilities in abstraction, algorithm analysis, computer theory computer organization and programming language concepts	1	2	3	4	5
2. an ability to draw from progressively more complex design-build-test experiences in solving new problems in individual and team settings	1	2	3	4	5
3. an ability to apply quantitative math-science-engineering knowledge relevant to specific problems	1	2	3	4	5
4. a recognition of the need for, and an ability to engage in lifelong learning	1	2	3	4	5
5.an understanding of the impact of CS technologies in applied settings	1	2	3	4	5
6. an appreciation of the complexities of designing and implementing a software solution that meets customer requirements	1	2	3	4	5
7. an ability to use suitable writing and speaking skills as part of analyzing, designing, implementing, testing and fielding solutions	1	2	3	4	5

7. For the following items, please assess the quality of the RWU program, services or individual on a scale of 1 to 5 where 1 means extremely high quality and 5 means extremely low quality.

Programs/Services/Individuals	**Extremely High Quality**				**Extremely Low Quality**
a. SECCM laboratory equipment	1	2	3	4	5
b. Advising on course selection or academics	1	2	3	4	5
c. Advising on career or future in SECCM	1	2	3	4	5
d. Advising on career or future through the Career Center	1	2	3	4	5
e. Courses in your major	1	2	3	4	5
f. University core courses	1	2	3	4	5
g. University core concentration courses	1	2	3	4	5
h. Printed information about the major	1	2	3	4	5
i. Helpfulness of the SECCM office staff	1	2	3	4	5
j. Faculty	1	2	3	4	5
k. Admissions office	1	2	3	4	5
l. Registrar's office	1	2	3	4	5
m. Bookstore	1	2	3	4	5
n. University computer facilities	1	2	3	4	5
o. SECCM computer facilities	1	2	3	4	5
p. Health center	1	2	3	4	5
q. Career center	1	2	3	4	5
r. SECCM construction management laboratories	1	2	3	4	5

8. What would you say is the greatest strength of the Computer Science Program? Why?

_____

_____

9. And what would you say is the area that needs the most improvement in the Computer Science Program? Why?

_____

_____

What is your GPA? _____

How many job offers have you received?_____

Have you accepted a job offer? If yes, with what company or organization?_____

Have you been accepted to graduate school? ☐ 1. Yes, Where_____ ☐ 2. No

Do you have a forwarding address? If not, what is your permanent address?

Name: _____

Address:_____

City:_____ State: _____ Zip:_____

Email: _____ Phone: _____

Thank you so much for taking the time to fill out this survey. Your responses are very important to us. Please feel free to contact either Associate Dean, Linda A. Riley at (401) 254-3896 (lriley@rwu.edu) or Dean Robert Potter at (401) 254-3498 (bobpotter@rwu.edu) to discuss this survey or any aspect of your program at RWU. When you finish this survey, please return to Marygrace.

Please keep in touch!!

Construction Management Senior Exit Survey

School of Engineering,Computing and Construction Management

This survey allows our seniors to provide feedback on SECCM programs and activities. The survey is conducted during a student's last semester at Roger Williams University. It is very important to our accreditation efforts that we continually assess our programs and activities to assure that we are providing you with the education and skills necessary for success in today's workplace. We are also very interested in your input on how we can make our programs and activities even better. We take your input very seriously and thank you once again for assisting us in continuing our tradition of excellence.

1. Can you specifically name any courses and/or instructors at Roger Williams University, either in the SECCM or outside the School that you feel have prepared you well for your eventual career?

1. Course: _____ Instructor: _____

2. Course: _____ Instructor: _____

3. Course: _____ Instructor: _____

4. Course: _____ Instructor: _____

2. Alternatively, can you specifically name any courses and/or instructors at Roger Williams University, either in the SECCM or outside the School that you feel did not contribute any benefit to your eventual career?

1. Course: _____ Instructor: _____

2. Course: _____ Instructor: _____

3. Course: _____ Instructor: _____

4. Course: _____ Instructor: _____

3. Overall, on a scale of 1 to 10 where 1 means totally unprepared, and 10 means totally prepared, how well would you say that your education at Roger Williams University has prepared you to enter the workforce or to begin graduate school?

Totally Unprepared 1 2 3 4 5 6 7 8 9 10 **Totally Prepared**

4. Looking back over your college career at RWU, what have been the three most significant experiences/activities/encounters that have most impacted your development as a person while at RWU? Why?

Experience	Why?
1.	
2.	
3.	

5. Were there any activities, programs or courses that were not offered at Roger Williams University that would have better prepared you for the future?

1. ☐ Yes—> Can you give some examples?_____

_____

2. ☐ No

6. This section asks you to rate how well we have done in providing you with the education and experiences that contribute to developing proficiency in a number of areas. For the following outcome areas, please rate the topics on a scale of 1 to 5, where 1 means proficiency has been achieved and 5 means proficiency has not been achieved.

Proficiency Areas	**Proficiency Achieved**				**Proficiency Not Achieved**
1. management skills needed for leadership positions in the construction industry	1	2	3	4	5
2. technical skills needed for leadership positions in the construction industry	1	2	3	4	5
3. skills required to successfully plan, organize and control a construction project	1	2	3	4	5
4. strong research and problem solving skills	1	2	3	4	5
5. creation of my own personal leadership style	1	2	3	4	5
6. strong interpersonal skills	1	2	3	4	5
7. an understanding of professional and ethical responsibility	1	2	3	4	5
8. an appreciation for the culture and society in which construction exists	1	2	3	4	5
9. strong oral and written communication skills	1	2	3	4	5
10. an ability to use the techniques, skills and modern tools necessary for construction practice	1	2	3	4	5
11. effective leadership skills	1	2	3	4	5

7. For the following items, please assess the quality of the RWU program, services or individual on a scale of 1 to 5 where 1 means extremely high quality and 5 means extremely low quality.

Programs/Services/Individuals	**Extremely High Quality**				**Extremely Low Quality**
a. SECCM laboratory equipment	1	2	3	4	5
b. Advising on course selection or academics	1	2	3	4	5
c. Advising on career or future in SECCM	1	2	3	4	5
d. Advising on career or future through the Career Center	1	2	3	4	5
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f. University core courses	1	2	3	4	5
g. University core concentration courses	1	2	3	4	5
h. Printed information about the major	1	2	3	4	5
i. Helpfulness of the SECCM office staff	1	2	3	4	5
j. Faculty	1	2	3	4	5
k. Admissions office	1	2	3	4	5
l. Registrar's office	1	2	3	4	5
m. Bookstore	1	2	3	4	5
n. University computer facilities	1	2	3	4	5
o. SECCM computer facilities	1	2	3	4	5
p. Health center	1	2	3	4	5
q. Career center	1	2	3	4	5
r. SECCM construction management laboratories	1	2	3	4	5

7. What would you say is the greatest strength of the Construction Management Program? Why?

_____

_____

8. And what would you say is the area that needs the most improvement in the Construction Management? Why?

_____

_____

9. Have you taken the CPC exam?

1. ☐ Yes 2. ☐ No

10. Did you participate in an Internship experience? 1. ☐ Yes —> Did you find this experience valuable?

☐ Yes ☐ No

2. ☐ No

Are you male or female? 1. ☐ Male 2. ☐ Female What is your GPA? _____

How many job offers have you received?_____

Have you accepted a job offer? If yes, with what company or organization?_____

Do you have a forwarding address? If not, what is your permanent address?

Name: _____

Address:_____

City:_____ State: _____ Zip:_____

Email: _____ Phone: _____

Thank you so much for taking the time to fill out this survey. Your responses are very important to us. Please feel free to contact either Associate Dean, Linda A. Riley at (401) 254-3896 (lriley@rwu.edu), Dean Robert Potter at (401) 254-3498 (bobpotter@rwu.edu) or Professor Frederick Gould (fgould@rwu.edu) (401) 254-3725 to discuss this survey or any aspect of your program at RWU. When you finish this survey, please return to Marygrace.

Please keep in touch!!

School of Engineering, Computing and Construction Management

MEMORANDUM

To: SECCM Faculty

From: Bob Potter, Dean

Subject: Course Assessment Reports

1. Course assessment is the process of measuring and evaluating the performance of a course against published course and program standards. Integral to the process is the identification and implementation of strategies designed to improve the course performance. The primary vehicle for executing this process in the School of Engineering, Computing and Construction Management is the course assessment report.

2. The course assessment report is prepared each semester for each course taught. These reports should be completed as soon as possible after the completion of the semester. The reports, along with the program assessment reports (also prepared for each course) will be discussed as part of the semi-annual planning and assessment meeting. In the meeting, the responsible faculty member will present his/her course assessment and recommendations for change to the faculty.

3. The enclosure describes the course proposal format with minimum requirements.

Encl - as

SECCM Course Assessment Report Content and Format Guidance

1. General Content: Each course assessment report will consist of three sections: the course description, the course assessment, and the course recommendations. Minimum content requirements for each section are provided below. Responsible faculty members may include additional data as desired.

2. Course Description:

    a. The verbatim course **catalog description**
    b. **Enrollment numbers** by semester for the past five semesters
    c. **Course objectives** for current term
    d. **Textbook** (with bibliographical data)
    e. Course **administration handouts** (grading policy, open book policy, etc.)
    f. Course **syllabus** with **topic summary**.

3. Course Assessment:

    a. **Narrative assessment:** Describes the conduct of the course during the previous semester and the efficacy with which the course objectives were satisfied. The narrative should include specific comments regarding the efficacy of all significant changes adopted as a result of the previous course assessments.
    b. **Course objectives evaluation matrix:** Reflects the students' evaluations of how well the course objectives were satisfied. Use the following scale: 1 = unsatisfactory; 2 = marginal; 3 = satisfactory; 4 = excellent.
    c. **Program objective (Engineering & Computer Science)/goal (Construction Management) evaluation matrix:** Reflects the students' evaluation of how well the course supported the program objectives/goals. Use the following scale: 1 = no support; 2 = weak support; 3 = moderate support; and, 4 = strong support.
    d. **Program outcomes (Engineering & Computer Science)/objectives (Construction Management) evaluation matrix:** Reflects the students' evaluation of how well the course supported the program outcomes/goals. Use the following scale: 1 = no support; 2 = weak support; 3 = moderate support; and, 4 = strong support.
    e. **Student course critique summary** supported by course end critique results and course – specific survey utilities. Include supporting data in an appendix as appropriate.
    f. Course **incoming/outgoing QPA statistics** by semester for the past five semesters.
    g. Course **average time data by semester** for the past five semesters plus **time data by lesson** for the most recently completed semester.

ENGR 330 Thermodynamics
Course Assessment Report
Fall 2004

Prepared by R. Potter
January 12, 2005

1. Course Description:

   a. Catalog Description: Examines the transfer of heat into mechanical energy. Properties of ideal gases, steam and other mediums are discussed in the context of thermodynamic processes. The development and application of the first and second laws of thermodynamics are investigated. Power cycles, to include the Rankine, Otto, Diesel, and Brayton cycles, as well as the Vapor compression Refrigeration cycle are presented in depth. Psychrometric analysis and total air conditioning are also examined. 3.0 Credit Hours

      LESSONS: 42 @ 55 min (3 Attendances/week)

   b. Enrollment Numbers

      Fall semester, AY 04-05: 22

   c. Course Objectives

      (1) Apply the conservation of mass, conservation of energy, and the second law of thermodynamics to a closed system.
      (2) Apply the conservation of mass, conservation of energy, and the second law of thermodynamics to an open system.
      (3) Apply thermodynamic properties and equations of state for an ideal gas, steam and refrigerants.
      (4) Analyze the common ideal power generation power cycles including the Rankine, Otto, Diesel, Brayton and their respective actual cycles.
      (5) Analyze the ideal and actual vapor compression refrigeration cycles.
      (6) Analyze an air-water vapor mixture as it applies to total air conditioning.

   d. Textbook: Thermodynamics An Engineering Approach, 4th ed., Cengal, Yunus A. and Boles, Michael A. New York: McGraw-Hill Company, Inc., 2002.

   e. Administrative Handouts: See Enclosure 1.

   f. Course Syllabus: See Enclosure 2.

2. Course Assessment

   Narrative Assessment: Student performance this year was the poorest (on average) I have experienced in Thermodynamics at RWU. Homework completion rates lagged behind other years and several of the students were exceptionally difficult to motivate. Initial enrollment was 26 students, but four students dropped the course before the drop deadline when it was apparent that they were not going to pass. Even so, one student failed the course.

Student assessments of course objectives, while numerically acceptable, were lower than in proceeding years. This was the first year for student assessment of the revised Engineering Program Educational Objectives so no comparison is possible. In general, the students did feel the course contributed to the satisfaction of the Program Educational Objectives.

There were no significant course changes that could serve as a possible source of explanation for the observations noted above.

a. Course Objective Efficacy Matrix

The following table presents survey results indicating the instructor and student assessment of the satisfaction of the course objectives. See scale below.

Course Objective	Instructor Evaluation*	Student Evaluation*
Apply the conservation of mass, conservation of energy, and the second law of thermodynamics to a closed system.	4.00	3.61
Apply the conservation of mass, conservation of energy, and the second law of thermodynamics to an open system	4.00	3.61
Apply thermodynamic properties and equations of state for an ideal gas, steam and refrigerants.	4.00	3.44
Analyze the common ideal power generation power cycles including the Rankine, Otto, Diesel, Brayton and their respective actual cycles.	4.00	3.67
Analyze the ideal and actual vapor compression refrigeration cycles.	4.00	3.39
Analyze an air-water vapor mixture as it applies to total air conditioning.	3.50	3.28

*Scale: 0 = unsatisfactory; 1 = marginal; 2 = satisfactory; 3 = good; and 4 = excellent.

b. Engineering Program Educational Objectives

The following table presents survey results indicating the instructor and student assessment of degree to which the course supported the Engineering Program Educational Objectives. See scale below. This is the first year for the revised program objectives.

*Scale: 0 = unsatisfactory; 1 = marginal; 2 = satisfactory; 3 = good; and 4 = excellent

Engineering Program Educational Objectives	Faculty Evaluation	Student Evaluation
1. Graduates possess an inquisitive mind, demonstrate excellence in technical knowledge and skills, achieve success as a practicing engineer or graduate student, and apply the highest ethical standards in all pursuits.	4.00	3.56
2. Graduates value the concept of, and demonstrate through practice, activities and actions that contribute to continual intellectual growth.	4.00	3.56
3. Graduates advance the engineering profession by becoming actively involved in professional associations and societies, serving in professional and community volunteer positions, acting as a role model for the future generation of engineers, and assisting the SECCM Engineering Program in achieving its mission and goals.	3.00	3.28

c. Engineering Program Outcomes

The following table presents survey results indicating the instructor and student assessment of degree to which the course supported the Engineering Program Outcomes. See scale below.

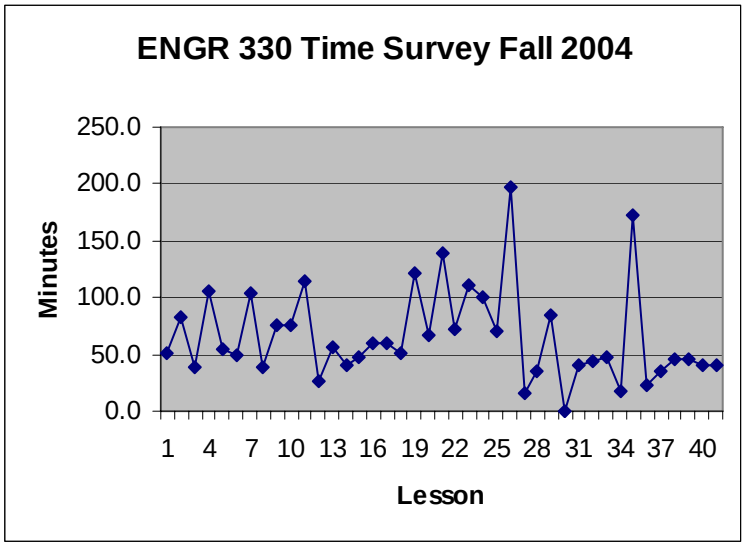
*Scale: 0 = unsatisfactory; 1 = marginal; 2 = satisfactory; 3 = good; and 4 = excellent.

Engineering Program Educational Outcomes	Faculty Evaluation	Student Evaluation
a. Student ability to apply knowledge of mathematics, science, and engineering	3.75	3.76
b. Student ability to design and conduct experiments, as well as to analyze and interpret data	3.00	3.18
c. Student 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	3.00	2.94
d. Student ability to function on multi-disciplinary teams	2.50	3.35
e. Student ability to identify, formulate and solve engineering problems	4.00	3.71
f. Student understanding of professional and ethical responsibility	3.00	3.41
g. Student ability to communicate effectively	3.50	3.47
h. Student understanding of the impact of engineering solutions in a global, economic, environmental, and societal context	3.50	3.12
i. Student a recognition of the need for, and an ability to engage in lifelong learning	3.50	3.53
j. Student knowledge of contemporary issues	3.50	3.00
k. Student to use the techniques, skills and modern engineering tools necessary for engineering practice	3.50	3.65

d. Course Incoming/Outgoing GPA Statistics

Semester	Number of Students	Incoming GPA	Outgoing GPA	Delta (+/-)
Fall 2001	21	2.879	2.730	-0.149
Fall 2002	20	2.925	2.917	-0.0085
Fall 2003	21	3.011	3.207	+0.196
Fall 2004	22	2.896	2.651	-0.245

e. Average Time Data



Semester	Average Time/Lesson (min)
Fall 2001	81.9
Fall 2002	78.6
Fall 2003	60.7
Fall 2004	64.4

3. Course Recommendations

While no significant changes are proposed at this time, I do intend to introduce more outside reading and writing assignments in order to provide more historical and current context for the subject material.

Enclosure 1 – Administrative Handouts
Enclosure 2 – Course Syllabus
Enclosure 3 – RWU Course Survey Summary, Fall 2004

Minutes
SECCM Assessment and Planning Meeting
Tuesday, 29 August 2006
1:00-5:00 pm

In Attendance:
Dean Robert Potter
Associate Dean Linda Riley
Assistant to the Dean Marygrace Staton
Laboratory Manager James Dorothy
Faculty:
Professor Khalid Al-Hamdouni
Professor Antoine Ataya
Assistant Professor Chunyan Bai
Associate Professor Anthony Ruocco
Associate Professor Janet Baldwin
Assistant Professor Ilyas Bhatti
Assistant Professor Gilbert Brunnhoeffer
Professor Frederick Gould
Professor Ram Gupta
Associate Professor Matthew Stein
Assistant Professor Charles Thomas

1. Welcome and Introductions
   a. Ilyas Bhatti, Assistant Professor (Construction Management), was welcomed.
   b. Also noted was the addition of Jim Diggins, Adjunct Professor (Construction Management).
   c. Jim Brunnhoeffer was congratulated on his move to tenure track.
   d. Enrollment overview – the new student total is approximately one hundred.
2. Review of Summer Activities
   a. Facilities upgrade
      1) All computers in SE 206 and SE 205 have been replaced and are now state-of-the art.
      2) Twelve or more computers have been added in SE 204 which provides much needed additional workspace.
      3) SE 124 is now a "Smart Classroom". The screen moves up and down automatically. The device will be unlocked from 8 a.m. – 10 p.m. The activation code is 3245.
      4) SE 201 is "Semi-Smart Classroom". It has a computer projector and DVD/VCR capability.
      5) A 46" plasma screen and furniture for the vestibule is forthcoming. Eight tables, 32 chairs, 2 sofas, a loveseat, and 2 display cases have been ordered for the wireless "internet café". The plasma screen can run announcements and messages, and it can also be used as a projector screen.
      6) SE 132 has been updated to include TV/VCR/DVD installation.
      7) Faculty computers should be installed within the next week.
      8) Office and vestibule painting was done during the summer.
      9) The carpet and furniture was cleaned and the chairs in the computer lab were cleaned as well.
   b. ABET accreditation status – We have not yet heard officially from ABET. We were told that, as a result of unforeseen work conditions and scheduling conditions, they were behind in notifications. They did use our report as a model along with two other schools to create a combined template available to other schools.
   c. ACCE accreditation status – We received a report on the issues to which we had responded. All of the issues had been fully addressed on our part except for the size of the building or the timetable on when we were going to get a bigger building.

d. Development of a written assessment plan – We are in the process of writing an assessment plan which will be out to faculty in a PDF file. The plan is to present instruction and then assess how that instruction is working. The question is: Are our students satisfying the outcomes which we have specified in terms of their education and their ability? This will be a formal plan on how we will do this (assessment) on a recurring basis.

e. Outreach activities – Linda and Bob met throughout the summer with the Ahlborgs, Bob Carlson, Larry Gemma, and Bob McGinness from Auburn University. The meetings gave us a chance to learn what potential employers think of our product and to listen to their advice, and also to listen to what is new in the industry. We will be following up with these outreach activities.

3. Fall schedule update – We have made some changes to the course schedule over the summer. Faculty members were reminded to return the Skill Competency Reports on courses they are able to teach outside of their normal scope. We need to anticipate possible faculty shifting beginning next semester with Janet's scheduled sabbatical.
4. Disability Support Services Update - Laura Choiniere and Lisa Bauer spoke on the issues of students with disabilities. They distributed the necessary paperwork which needs to be completed in order to ensure that students with disabilities have physical and academic access to the educational experience.
5. Faculty Development Plan – The purpose of the faculty development plan is to facilitate faculty success. What do faculty anticipate doing in the upcoming year? Faculty do not have to do this contractually, but it is encouraged so faculty know whether or not they are on track for promotion and tenure. It provides an opportunity for a dialog between the faculty and dean and for immediate feedback. Ram Gupta would like to propose some way to quantify the merit pay issue within the SECCM.
6. Service Opportunity openings to faculty are as follows:
   a. SECCM Academic Standards Committee Chair – Tony Ataya
   b. Engineering Student Club Faculty Advisor – Charlie Thomas
   c. Construction Management Student Club Faculty Advisor – Ilyas Bhatti
   d. Core Curriculum Committee – Tony Ruocco
   e. Faculty Senate
      1) Academic Standards Committee – Tony Ataya
      2) Faculty Development Committee – Ram Gupta
      3) Steering Committee – Matt Stein
      4) University Life Committee – Tony Ruocco
      5) Admissions/Enrollment Committee – Jim Brunnhoeffer

      (Note: Khalid Al-Hamdouni has volunteered to continue to serve on the University Sabbatical Committee for one more year (06-07)) with no objections from the faculty.
7. Housekeeping Reminders
   a. Course Administrative Instructions and Course Syllabus must include the following:
      1) Course objectives clearly shown
      2) Learning objectives listed for every lesson
      3) Reading assignments listed for every lesson
      4) Exam dates and major requirements listed with date

      The policy on disability and support services is in the Catalog and, therefore, does not have to be listed on the syllabi.
   b. Course assessment report preparation (memorandum) – Program assessment forms will not be continued. The Dean reads all course assessment reports; they are the best way to analyze the building block of our curriculum.
   c. Advisement Standards – Faculty were advised not to allow students to enroll in courses without first having met the course prerequisite. Other advisement reminders included keeping:
      1) Neatly annotated advisement worksheet (for appropriate catalog)

2) Clear notes of conversations/agreements
3) A copy of completed and signed registration slip
4) The latest degree audit enclosed
5) NO EXCEPTIONS to math prerequisites without Dean/Associate Dean approval (in writing)
6) Math every semester until math requirements are met.

8. Fall Activities – were reviewed.
   a. Class Start - 30Aug
   b. Spring Teaching Schedule - 5 Sep
   c. Meet Your Advisor – 2:00 p.m. in SE 124 - 6 Sep
      Five minute introduction and then faculty will meet with new advisees.
   d. Open House - 24 Sep and 5 Nov
      Linda Riley will take the Open House in September and Bob Potter will take the November Open House. Please inform Linda if you are interested in the September session. We will have an idea of the numbers in a week or two.
   e. Alumni and Family Weekend - 20-22 Oct
9. Budget Activities
   a. Faculty lines - 1 Sep
      1) Associate Dean (if Linda Riley moves to faculty)
      2) Construction Management
   b. CAPEX Budget - 29 Sep
      We have had success in obtaining equipment in the past. Faculty were asked to submit requests for capital equipment of $2000 or more (for one item or a group of items totaling $2000).
10. Course and Program Assessment (spring 2006)
    a. Review of assessment instruments
       1) Spring course survey evaluation results:
          All faculty have received their individual course evaluation results in comparison with the results of the School and of the University. For the first time, this past spring 2006 semester, we have experienced a dip in the School averages. Faculty were asked to look over their own evaluations and to use them as they see appropriate.There is some value to keeping things fresh and, in response to this, we have come up with the course skill matrix (Assessment of Teaching Competency Areas). How can we provide people with new opportunities to teach different courses to invigorate and excite their instruction?
       2) Senior exit survey results (L. Riley):
          Three program reports are available as well as the full analysis of the survey in general. Computer Science results were totally different than the Engineering and Construction Management results in the areas evaluated as successful or where we needed work. In general, students felt well prepared when they leave the School. The areas consistently remarked on which needed work are the computer lab, project space, the University core courses, and the core specialization. We have addressed those areas this summer with the computer facilities. The defining moment or experiences the seniors have had while at the University that they have taken with them involved sports or team projects or competitions. Instructors or classes that have prepared them the most involved senior advanced level courses and the classes which didn't contribute to their degree in either C.M. or Engineering were the core courses. The Engineers had an average of 8.10 on a 10 point scale of preparedness; the C.M.'s had an average of 8.27 on a 10 point scale. There is no issue that we need to address that is seen as consistently poor. Overall, students had high praise of the faculty for the education that they received and for their overall experience at the University. In addressing the student exit survey concerns about the computers in the student project room, this summer we equipped the room with ten new state of the art

computers imaged the same as those in the computer lab. The Project Room is now on the same computer replacement schedule as the Computer Lab. Also, in response to students' concerns, wireless internet accessibility is now available in various rooms and in the vestibule, which can now also be used as another gathering space.

3) Alumni survey preliminary results (L. Riley):
   As part of our assessment plan for the school we conduct our alumni survey every two years. This past summer we updated the survey and sent it out to 200 of our graduates. Although we are still receiving the results we do have a preliminary take on it. We have had a better response rate than in the past because we have a better database. The preliminary results of factors impacting our graduates' success are: communication skills, speaking skills, teamwork ability, and problem-solving skills.
4) Employment summary (L. Riley):
   Construction Managers have received an average of three job offers while Engineers have received an average of two. The average starting salaries for Construction Managers, including benefits, is $53,000, and the average for Engineers is $49,000. All graduates are employed. Both groups of graduates as well as employers have emphasized the value of taking the FE and CPC exams, which is a mandatory requirement of our seniors.
5) FE Exam results:
   Seventy one to seventy two percent of engineering students passed the FE exam this year. That is almost 9% lower than last year. However, the national pass average was down this year as well. For April, the percentage of first-time test takers nationally in all modules was in the low 70's. Copies of the results will be given to faculty. We also received a report on our graduates who had previously passed the FE and had gone on to take the PE exam. This report indicated that five out of six of our graduates who went on to take the PE exam passed the exam.
6) CPC Exam results:
   Although we have not yet received the official results of the CPC exam, based on student responses, anticipated results seem disappointing. In response to the disappointing CPC test results we are modifying the way the preparatory course is going to be presented. This year, the courses covered will begin earlier and they will be expanded. We know the areas of deficiency and we will stress our review course in those areas, and also change the material in order to obtain better results. On a positive note, we have two students who passed every single area of the exam, one in the 98th percentile. Taking and passing the exam becomes a valuable tool for graduates to use in gaining employment. Faculty will receive copies of the official report once we receive it.
7) Course/program assessment reports review and discussion:
   Faculty comments included: (A. Ruocco) The CS courses are transitioning to an every other year offering. They will need to be adjusted based on the math proficiency of the students. (F. Gould) Students enrolled in the Capstone course work on real projects which are industry sponsored. Each year there is a struggle to get the sponsors to come in to serve as critics at the group presentations. It was suggested to take the students to the sponsors rather than try to get the industry offices to come to the University. (L. Riley) Students have an aversion to tinkering in lab or in prototype development. Linda asked the faculty to consider incorporating more hands-on experiments or open ended design problems in other courses so that students gain more experience.

b. Status of current curriculum changes:
   The four curriculum changes are in currently front of the Curriculum Committee. Once approved, we can then advertise them.

1) AY0506-1: Create an Engineering core concentration
2) AY0506-2: Create an Engineering minor
3) AY0506-3: Create a Computer Science core concentration
4) AY0506-4: Create a Computer Science minor

c. Proposed curriculum changes:
Tony Ruocco explained the two proposed curriculum changes, both of which involve computer science majors. These changes are internal (SECCM) changes which do not affect any other segment of the University.
1) AY0607-1 (T. Ruocco) – Replaces Physics 201/202 with a variety of other courses
2) AY0607-2 (T. Ruocco) – Remove the required math minor in order to allow students more flexibility in selecting courses.

A vote was taken. Curriculum change AY 0607-1 passed unanimously.
Curriculum change AY 0607-2 passed unanimously.

d. Proposals for discussion/further study:
1) Development of a graduate program in building sciences – The format of a Master's degree in Construction has been considered. We are now in the process of developing the program framework. The program will most likely be fed by graduates from Construction Management, Architecture, Business, and Civil Engineering. A meeting will be held once the framework is put together.
2) Addition of a computer science course to the engineering curriculum – The abilities of our students need to be addressed – discussion is deferred to a future time.

e. Concern: Adequacy of MATH 207, Applied Calculus, for ENGR 210:
The Math faculty argue that MATH 207 has a different focus than MATH 213 and does not prepare a student adequately for MATH 214. The CM program adopted MATH 207 in place of MATH 213 which involves an absence of some material that the Engineers are seeing. Janet (Baldwin) is not concerned with the absence of theory (such as Matrices) and the emphasis on solving problems.

f. General Discussion – All material covered. No further discussion.

Roger Williams University
Learning to Bridge the World

Student Evaluation of Teaching

Marking Instructions

- PLEASE USE A NO. 2 PENCIL OR BLUE OR BLACK INK PEN ONLY.
- ERASE MARKS COMPLETELY TO CHANGE.
- MAKE NO STRAY MARKS.
- ENTER THE 5 DIGIT COURSE SECTION SYNONYM.
- FILL IN THE YEAR.
- FILL IN THE SEMESTER.
- FILL RESPONSE POSITION COMPLETELY AND CORRECTLY.

CORRECT MARK ● INCORRECT MARKS ✓ X ◉ Ø

Course Synonym	Year	Semester
0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	Fall ○ Spring ○

1. **What is your class level?**
   ○ Freshman ○ Sophomore ○ Junior ○ Senior ○ Graduate ○ Non-Degree

2. **Which one of the following best describes how this course fits into your educational plan?**
   ○ Major requirement or elective within major field ○ Core Curriculum requirement
   ○ Required course outside of major field ○ Free Elective

(4) Strongly Agree
(3) Agree
(2) Neither agree nor disagree
(1) Disagree
(0) Strongly Disagree

3.	My professor displays a clear understanding of course topics.	0 1 2 3 4
4.	My professor has an effective teaching style.	0 1 2 3 4
5.	My professor is well prepared for class.	0 1 2 3 4
6.	My professor displays enthusiasm when teaching.	0 1 2 3 4
7.	This course has challenged me to think.	0 1 2 3 4
8.	My professor makes good use of examples and illustrations.	0 1 2 3 4
9.	My professor is available for consultation.	0 1 2 3 4
10.	Assignments and tests are returned quickly enough to benefit me.	0 1 2 3 4
11.	My professor affords students the opportunity to ask questions in class.	0 1 2 3 4
12.	Lectures and discussions are relevant.	0 1 2 3 4
13.	Grades are assigned impartially.	0 1 2 3 4
14.	My professor communicates effectively.	0 1 2 3 4
15.	In this course I have been motivated to learn.	0 1 2 3 4
16.	I am free to express and explain my views in class.	0 1 2 3 4
17.	The syllabus has clearly stated objectives.	0 1 2 3 4
18.	The stated objectives of this course have been achieved thus far.	0 1 2 3 4
19.	Exams accurately reflect materials and skills covered in this course.	0 1 2 3 4
20.	My professor attempts to create a classroom environment conducive to learning.	0 1 2 3 4
21.	Overall, this course is educationally valuable.	0 1 2 3 4
22.	Overall, this professor is an effective teacher.	0 1 2 3 4

Please provide all written comments on the back of this page. →

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Roger Williams University
Learning to Bridge the World

Student Evaluation of Teaching Comment Sheet

Please use a pen.

1. **What did you like best about the delivery of the course material?**

2. **What did you like least about the delivery of the course material?**

3. **What suggestions do you have for improving the delivery of the course material?**

4. **Other comments:**

18. How long did it take you to find your first position after graduating from Roger Williams University? (If you received the job offer for your first position while still at Roger Williams University, please record 0 months below.)

_____(RECORD IN MONTHS)

19.Did you pursue graduate studies after graduating from Roger Williams University?

1. Yes—> Where? _____

   Did you receive a degree? Yes —> What field?_____
   No–-> What field are you studying?_____

2. No

20. How many positions have you held since graduating from Roger Williams University?_____Positions

21. Of these positions, how many were directly related to the education received in the Engineering Program at Roger Williams University?_____Positions

22 .Do you have any suggestions related to the Engineering Program that will help us better prepare our students for the workplace?

_____

_____

_____

_____

23. Would you like to play a role in assuring we achieve the highest standards of excellence in our Engineering Program?

1. Yes—> How would you like to participate? Please check all that apply.
   a. Serve as a guest speaker in classes
   b. Host facility tour/s at your organization
   c. Provide internships/cooperative experiences for students
   d. Serve on our engineering advisory board
   e. Sponsor competition teams such as the concrete canoe or steel bridge team
   f. Provide senior capstone design projects
   g. Offer professional development workshops for students
   h. Other _____
2. No, not at this time

Name: _____

Address:_____

City:_____ State: _____ Zip:_____

Email: _____ Phone: _____

Thank you so much for taking the time to fill out this survey. Your responses are very important to us. Please feel free to contact either Associate Dean, Linda A. Riley at (401) 254-3896 (lriley@rwu.edu) or Dean Robert Potter at (401) 254-3498 (bobpotter@rwu.edu) to discuss this survey or any aspect of the Engineering Program.

General Engineering Alumni Assessment Survey

School of Engineering, Computing and Construction Management

This survey allows our graduates to provide feedback on SECCM programs and activities. It is very important to our accreditation efforts that we continually assess our program to assure that we are providing students with the education and skills necessary for success in today's workplace. We take your input very seriously and thank you once again for assisting us in continuing our tradition of excellence.

1. Can you specifically name any courses and/or instructors at Roger Williams University, either in engineering or outside the School, that prepared you particularly well for your career?

1. Course: _____ Instructor: _____
2. Course: _____ Instructor: _____
3. Course: _____ Instructor: _____
4. Course: _____ Instructor: _____

2. Overall, on a scale of 1 to 10 where 1 means totally unprepared, and 10 means totally prepared, how well would you say that your education in Engineering at Roger Williams University prepared you for your career?

Totally Unprepared	1	2	3	4	5	6	7	8	9	10	**Totally Prepared**

3. According to importance, what are the three most significant factors for success in your career? What is the first most important factor? Why? What is the second most important factor? Why? And the third? Why?

Success Factors	Why?
1.	
2.	
3.	

4. Were there any activities, programs or courses that were not offered when you attended Roger Williams University that would have better prepared you for the workforce and your career?

1. Yes—> Can you give some examples?_____

   _____

2. No

5. The following questions ask you about how important certain topics and skills are **to your success in the workplace.** For the following questions, please rate the following topics on a scale of 1 to 5, where 1 means not important to your success and 5 means extremely important to your success in the workplace.

Factors Impacting Success	**Not Important At All**				**Extremely Important**
a. Oral communication	1	2	3	4	5
b. Written communication	1	2	3	4	5
c. Interpersonal skills	1	2	3	4	5
d. Lifelong learning	1	2	3	4	5
e. Multi-disciplinary teamwork	1	2	3	4	5
f. Ethics and professional behavior	1	2	3	4	5
g. Registration as a Professional Engineer	1	2	3	4	5
h. Ability to apply technical knowledge	1	2	3	4	5
i. Ability to design and construct experiments	1	2	3	4	5
j. Ability to analyze and interpret data	1	2	3	4	5
k. Problem solving skills	1	2	3	4	5
l. Research skills	1	2	3	4	5
m. Effective leadership skills	1	2	3	4	5
n. Understanding the societal context of engineering	1	2	3	4	5
o. Ability to design a system to meet desired needs	1	2	3	4	5
p. Ability to use the most current engineering tools and techniques	1	2	3	4	5
q. Knowledge of contemporary issues and how they affect engineering	1	2	3	4	5

6. Now for the same topics, please rank on a 1 to 5 scale how well your education at Roger Williams University prepared you for each of the following areas. For these questions, 1 means no preparation at all and 5 means your education at Roger Williams University prepared you extremely well for these areas.

Factors Impacting Success	**No Preparation At All**				**Prepared Extremely Well**
a. Oral communication	1	2	3	4	5
b. Written communication	1	2	3	4	5
c. Interpersonal skills	1	2	3	4	5
d. Lifelong learning	1	2	3	4	5
e. Multi-disciplinary teamwork	1	2	3	4	5
f. Ethics and professional behavior	1	2	3	4	5
g. Registration as a Professional Engineer	1	2	3	4	5
h. Ability to apply technical knowledge	1	2	3	4	5
i. Ability to design and construct experiments	1	2	3	4	5
j. Ability to analyze and interpret data	1	2	3	4	5
k. Problem solving skills	1	2	3	4	5
l. Research skills	1	2	3	4	5
m. Effective leadership skills	1	2	3	4	5
n. Understanding the societal context of engineering	1	2	3	4	5
o. Ability to design a system to meet desired needs	1	2	3	4	5
p. Ability to use the most current engineering tools and techniques	1	2	3	4	5
o. Ability to design a system to meet desired needs	1	2	3	4	5
p. Ability to use the most current engineering tools and techniques	1	2	3	4	5
q. Knowledge of contemporary issues and how they affect engineering	1	2	3	4	5

7. Are you a member of any professional associations?

1. Yes—> Which ones?_____
2. No

8. Have your received, or are you in the process of pursuing any special licenses or certifications?

1. Yes—> Which ones?_____
2. No

9. Approximately how many continuing education courses, workshops or seminars have you taken since graduating from Roger Williams University?_____

What were the names of some of the courses, workshops or seminars that you found most valuable?

_____

_____

10. Are you presently employed?

1. Yes—> And is that full time or part time? _____
2. No—> Are you presently looking for employment?
   Yes—> Skip to question 18
   No—> Skip to question 18.

11. What is the title of your position?_____

12. Who is your present employer?_____

13. How long have you worked for your present employer?_____

14. In your present job, how many individuals do you supervise?_____

15. Also in your present job, do you participate on any multi-disciplinary teams?

1. Yes—> What disciplines are represented on these projects or teams?

   _____

2. No

16. Would you please briefly describe your primary responsibilities in your job?

_____

_____

17. Is an engineering degree required for your present position?

1. Yes 2. No

ROGER WILLIAMS UNIVERSITY
SCHOOL OF ENGINEERING, COMPUTING AND CONSTRUCTION MANAGEMENT (SECCM)

CONSTRUCTION MANAGEMENT PROFESSIONAL ADVISORY BOARD MEETING MINUTES

DATE: March 29, 2006

TIME: 8:00 a.m. to 10:00 a.m.

Board Members Present:
Robert Bolton, Arden Engineering
Mark Hashway, O.Ahlborg & Sons, Inc.
Thomas Comella, Gilbane Building Co.
Randy Pitts, Tishman Construction Company
Steven Eustis, Beacon/Skanska Constr. Company
Francis Madigan, F.W. Madigan
John Bulman, Little, Medeiros, Kinder, Bulman &Whitney
Bill Hertel, Mastors & Servant
Peter Holden, Brown University

RWU Members Present:
Frederick Gould (Chairman)
Marygrace Staton, Dean's Assistant
Khalid Al-Hamdouni, CM Faculty
Jim Brunnhoeffer, CM Faculty
Megan Banville, CM Club, student

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1. Introductions

New Advisory Board members were introduced.

2. Program Update

a. Competition Teams Success!

Fred discussed the upcoming ASC/AGC National Student Competition from April 4-7, 2006. This year we won two categories within our region, Commercial Build and Design Build, so we will be sending 12 students and 2 faculty to the National Student Competition in Dallas.

b. CM Club President: Meghan Banville

Meghan Banville, the CM Club President, spoke on club activities, including the speaker series, the RI Young Contractors Forum, involvement with the Massachusetts AGC, and community service initiative. She also mentioned a career workshop which is being planned for Monday, April 17, 2006, from 6-8 p.m. at the SECCM Building. She requested volunteers from the CM Advisory Board to assist in preparing students for interviews and to critique their resumes. Finally, Megan mentioned her new duties to both the SECCM and to the Office of Alumni Relations in developing an accurate and dependable database of SECCM alum;

c. SECCM Student Senior Project Showcase

Fred Gould announced the Design Project Showcase and Career Fair set to occur on Wednesday, April 4, and invited the Advisory Board to attend.

d. Faculty Search Update

An offer has been made to the number one CM faculty candidate. Arrangements have been made for one other interview and campus visit. We have two faculty positions to fill for the fall 2006 semester

e. Capstone Presentations

C M Capstone Presentations will be held on May 10, 2006 from 2-5 p.m. Board members are invited to attend and view these senior presentations. These capstone presentations serve as one of many assessment measures for our program. Fred agreed to provide a copy of the critique form that he uses to evaluate these presentations to the board.

f. Graduate Program Update

The CM graduate program has been placed on hold because Professor Zeljko Torbica has left Roger Williams for a position in industry. Once his replacement has been hired we will be able to, once again, focus on the development of a graduate program.

g. AC Review Course: Dr. Brunnhoeffer

Jim Brunnhoeffer spoke on the Certified Professional Constructor exam which will be held on Saturday, April 1, 2006. We have offered a preparatory course for the last eight weeks, three hours per session. Next year we are scheduled to offer this review course through Massachusetts AGC in the fall and again in the spring, most likely on Sundays. Next year's course will more closely parallel the study CD and feedback we receive from our students. We encourage all seniors to take the course, and pay their application fees.

h. Schedule Fall meeting

The fall meeting will be scheduled for Wednesday, October 4, 2006. A request was made to change the time to 7:00 a.m. Confirmation will be sent to the Advisory Board. Next fall's meeting may be held in the new Dining Commons.

i. Other

By-laws and committee structure was discussed. Fred Gould will forward copies of the by-laws, as new members were unfamiliar with their content. Now that our sub-committees have been in place for a couple of years it is important that both committees begin to accomplish their stated short and long term goals.

3. Standing Committee Meetings:

The Academic and Development standing committees met for the remainder of the meeting.

The next CM Advisory Board meeting is scheduled for October 4, 2006 at 7:00 a.m. in the Library Board Room

The meeting adjourned at approximately 10:00 a.m.

ENGR 490 Skills Inventory

School of Engineering, Computing and Construction Management

This survey allows our senior design students to self-assess their preparation for the workplace or for graduate study. The results from this survey will be used to refine the Engineering Design class content as well as assist individual students with the development of a personal plan for closing knowledge and skill gaps.

1. In your opinion, what courses have you taken here at Roger Williams University, either in engineering or outside the School, that you feel have prepared you particularly well for your career or for graduate study?

a. Course: _____ Why: _____
b. Course: _____ Why: _____
c. Course: _____ Why: _____
d. Course: _____ Why: _____

2. Overall, on a scale of 1 to 10 where 1 means totally unprepared, and 10 means totally prepared, how well do you think that your education in Engineering at Roger Williams University will prepare you for your career?

Totally Unprepared 1 2 3 4 5 6 7 8 9 10 **Totally Prepared**

3. According to importance, what do you think will be the three most significant factors for success in your career? What do you think will be the first most important factor? Why? The second most important factor? Why? And the third? Why?

Success Factors	Why?
1.	
2.	
3.	

4. What are top three areas of skill or knowledge development either in engineering or outside of engineering where you feel that you need more preparation before formally entering the workplace or going to graduate school?

a. Top area _____
b. Second area _____
c. Third area _____

5. What specific technical/computational tools do you feel that you need more exposure to?

_____

6. Are you planning on attending graduate school? Yes No

7. Have you worked in an engineering position either in a co-op, internship or summer employment at any time over the past four years? Yes No

8. What do you feel are your three greatest "soft" skill strengths?
a. _____ b. _____ c. _____

9. What do you feel are your three greatest "technical" skill strengths?
a. _____ b. _____ c. _____

10. The following questions ask how important you feel certain topics and skills will be **to your success in the workplace.** For the following questions, please rate the following topics on a scale of 1 to 5, where 1 means you think that the topic will not be important to your success and 5 means the topic will be extremely important to your success in the workplace.

Factors Impacting Success	**Not Important At All**				**Extremely Important**
a. Oral communication	1	2	3	4	5
b. Written communication	1	2	3	4	5
c. Interpersonal skills	1	2	3	4	5
d. Lifelong learning	1	2	3	4	5
e. Multi-disciplinary teamwork	1	2	3	4	5
f. Ethics and professional behavior	1	2	3	4	5
g. Registration as a Professional Engineer	1	2	3	4	5
h. Ability to apply technical knowledge	1	2	3	4	5
i. Ability to design and construct experiments	1	2	3	4	5
j. Ability to analyze and interpret data	1	2	3	4	5
k. Problem solving skills	1	2	3	4	5
l. Research skills	1	2	3	4	5
m. Effective leadership skills	1	2	3	4	5
n. Understanding the societal context of engineering	1	2	3	4	5
o. Ability to design a system to meet desired needs	1	2	3	4	5
p. Ability to use the most current engineering tools and techniques	1	2	3	4	5
q. Knowledge of contemporary issues and how they affect engineering	1	2	3	4	5

11. Now for the same topics, please rank on a 1 to 5 scale how well your education at Roger Williams University has prepared you to this point for each of the following areas. For these questions, 1 means no preparation at all and 5 means your education at Roger Williams University up to this point has prepared you extremely well for these areas.

Factors Impacting Success	**No Preparation At All**				**Prepared Extremely Well**
a. Oral communication	1	2	3	4	5
b. Written communication	1	2	3	4	5
c. Interpersonal skills	1	2	3	4	5
d. Lifelong learning	1	2	3	4	5
e. Multi-disciplinary teamwork	1	2	3	4	5
f. Ethics and professional behavior	1	2	3	4	5
g. Registration as a Professional Engineer	1	2	3	4	5
h. Ability to apply technical knowledge	1	2	3	4	5
i. Ability to design and construct experiments	1	2	3	4	5
j. Ability to analyze and interpret data	1	2	3	4	5
k. Problem solving skills	1	2	3	4	5
l. Research skills	1	2	3	4	5
m. Effective leadership skills	1	2	3	4	5
n. Understanding the societal context of engineering	1	2	3	4	5
o. Ability to design a system to meet desired needs	1	2	3	4	5
p. Ability to use the most current engineering tools and techniques	1	2	3	4	5
o. Ability to design a system to meet desired needs	1	2	3	4	5
p. Ability to use the most current engineering tools and techniques	1	2	3	4	5
q. Knowledge of contemporary issues and how they affect engineering	1	2	3	4	5

12. Is there anything else you would like to add with respect to your education here are Roger Williams University? If so, please use an additional sheet to write your answer.

School of Engineering, Computing, and Construction Management

Job Placement Survey

This purpose of this survey is to assess how well we assist our graduates in preparing for finding a job. This information is very important to our process of continually improving our program and services. We take your input very seriously and thank you once again for assisting us in continuing our tradition of excellence. The information you provide will remain confidential.

1. What are your after-graduation plans?

    1. I have accepted a position with a company or organization.
        1a. What company or organization did you accept a position with?
        Name of Company_____
        Address _____
        1b. What is the title of the position you accepted?_____
        1c. Please check all of the following that were included in your starting compensation package.
            1. Health Insurance
            2. Dental Insurance
            3. Life Insurance
            4. 401 Type Plan —> What is the company contribution percentage?
            5. Signing Bonus —> How much was the bonus? _____
            6. Profit Sharing
            7. Company Stock Options
            8. Yearly Bonus —> Can you estimate the average yearly bonus?
            9. Salary —>What is your starting salary?_____
            10. Other_____

    2. I am going to graduate school. —> Where will you be attending? _____
        What will you be studying?_____

    3. I am still searching for a job.
    4. I am taking some time off from work and school.
        4a. Do you plan to look for a job in the next 12 months? Yes No

2. Which of the following resources or services did you use at Roger Williams University
    1. Assistance with preparing my resume
    2. Mock interviews
    3. Assistance with negotiating my salary package
    4. Assistance with interviewing tips
    5. On campus interviewing
    6. Hawk Hunt
    7. Referrals by faculty or staff
    8. Assistance locating potential employers not associated with RWU
    9. Career fairs
    10. Other _____

3. How many job interviews have you had in the past six months? _____

4. How many resumes did you send out to companies or organizations?_____

5. What was the primary method you used to identify job prospects?_____

6. What/who was your primary resource for the job search process?_____

7. Are there any activities, programs, courses or services at RWU that would have better prepared you for seeking and finding employment?

1. Yes—> Can you give some examples?_____

_____

2. No

8. Overall, on a scale of 1 to 10 where 1 means totally unprepared, and 10 means totally prepared, how well would you say that RWU prepared you for the job search process?

Totally Unprepared	1	2	3	4	5	6	7	8	9	10	**Totally Prepared**

9. Do you have any suggestions for how we can improve the job search process for our graduates?

_____

_____

_____

_____

10. What is your major?
    1. Engineering
    2. Environmental Engineering
    3. Computer Science
    4. Construction Management

Name: _____

Address: _____

City:_____ State: _____ Zip:_____

Email: _____ Phone:_____

Thank you so much for taking the time to fill out this survey. Your responses are very important to us. Please feel free to contact either Associate Dean, Linda A. Riley at (401) 254-3896 (lriley@rwu.edu) or Dean Robert Potter at (401) 254-3498 (bobpotter@rwu.edu) to discuss this survey or any aspect of this survey or your program at RWU.

CURRICULUM OUTLINE/ADVISING WORKSHEET
B.S. in ENGINEERING

Student _____

Advisor _____

Fall 2005

First Year (16 credits) - Fall

(3)	COMM 210	Intro to Speech Comm	_____
(3)	CORE 102	Hist/Modern World	_____
(3)	ENGR 110	Engr Graph & Design	_____
(4)	MATH 213	Calculus I & Lab	_____
(3)	WTNG 102	Expository Writing	_____

First Year (17 credits) - Spring

(3)	CORE 103	Human Behavior	_____
(3)	ENGR 115	Computer Apps for Engr	_____
(4)	MATH 214	Calculus II & Lab	_____
(4)	PHYS 201	Physics I & Lab	_____
(3)	WTNG 220	Critical Writing/Prof	_____

Second Year (17 credits) - Fall

(4)	CHEM 191	Chemistry I & Lab	_____
(3)	CORE 104	Lit Phil & Ascent of Ideas	_____
(3)	ENGR 210	Engineering Mechanics I	_____
(3)	MATH 317	Differential Equations	_____
(4)	PHYS 202	Physics II & Lab	_____

Second Year (17 credits) - Spring

(4)	CHEM 192	Chemistry II & Lab	_____
(3)	CORE 105	Artistic Impulse	_____
(3)	ENGR 220	Engineering Mechanics II	_____
(4)	ENGR 300	Mechanics of Mat & Lab	_____
(3)	MATH 315	Probability & Statisitcs	_____

Third Year (16 credits) - Fall

(4)	ENGR 240	Circuit Theory & Lab	_____
(3)	ENGR 313	Structural Analysis	_____
(3)	ENGR 330	Thermodynamics	_____
(3)	ENGR 335	Engineering Econ Anal	_____
(3)	MATH 330	Engineering Math	_____

Third Year (14 credits) - Spring

(4)	ENGR 260	Engr Electronics & Lab	_____
(4)	ENGR 305	Fluid Mechanics & Lab	_____
(3)	ENGR 310	Material Science	_____
(3)	_____	Engineering Elective	_____

Fourth Year (15 credits) - Fall

(3)	CORE	Core Senior Seminar	_____
(3)	ENGR 320	Environmental Engr	_____
(3)	ENGR 490	Engineering Design I	_____
(3)	_____	Business Elective	_____
(3)	_____	Engineering Elective	_____

Fourth Year (13 credits) - Spring

(1)	ENGR 401	Engr Senior Seminar	_____
(3)	ENGR 492	Engineering Design II	_____
(3)	_____	Engineering Elective	_____
(3)	_____	Engineering Elective	_____
(3)	_____	Elective	_____

Total: 125 Semester Credit Hours Minimum

Note: Engineering electives must be taken from courses with an ENGR or ENVR prefix. With permission of the advisor, engineering elective courses may be taken from courses with a CNST or COMSC prefix. If student is pursuing a minor, the minor worksheet should be completed and attached. Business elective must be BUSN 100, Enterprise, MGMT 100, Management Principles, or MRKT 100, Marketing Principles.

Engineering Program Composition (125 credit hours)

Engineering Science and Design Program (62 credits):		**Credits**	**Semester**	**Grade**
ENGR 110	Engineering Graphics and Design	(3 credits)	_____	_____
ENGR 115	Computer Applications for Engineering	(3 credits)	_____	_____
ENGR 210	Engineering Mechanics I	(3 credits)	_____	_____
ENGR 220	Engineering Mechanics II	(3 credits)	_____	_____
ENGR 240	Circuit Theory & Lab	(4 credits)	_____	_____
ENGR 260	Engineering Electronics & Lab	(4 credits)	_____	_____
ENGR 300	Mechanics of Materials & Lab	(4 credits)	_____	_____
ENGR 305	Fluid Mechanics & Lab	(4 credits)	_____	_____
ENGR 310	Material Science	(3 credits)	_____	_____
ENGR 313	Structural Analysis	(3 credits)	_____	_____
ENGR 320	Environmental Engineering	(3 credits)	_____	_____
ENGR 330	Thermodynamics	(3 credits)	_____	_____
ENGR 335	Engineering Economic Analysis	(3 credits)	_____	_____
ENGR 401	Engineering Senior Seminar	(1 credit)	_____	_____
ENGR 490	Engineering Design I	(3 credits)	_____	_____
ENGR 492	Engineering Design II	(3 credits)	_____	_____
_____	Engineering Elective	(3 credits)	_____	_____
_____	Engineering Elective	(3 credits)	_____	_____
_____	Engineering Elective	(3 credits)	_____	_____
_____	Engineering Elective	(3 credits)	_____	_____

Mathematics Program (17 credits): (Serves as core concentration.)

MATH 213	Calculus I & Lab	(4 credits)	_____	_____
MATH 214	Calculus II & Lab	(4 credits)	_____	_____
MATH 315	Probability and Statistics	(3 credits)	_____	_____
MATH 317	Differential Equations	(3 credits)	_____	_____
MATH 330	Engineering Mathematics	(3 credits)	_____	_____

Science Program (16 credits):

CHEM 191	Chemistry I & Lab	(4 credits)	_____	_____
CHEM 192	Chemistry II & Lab	(4 credits)	_____	_____
PHYS 201	Physics I & Lab	(4 credits)	_____	_____
PHYS 202	Physics II & Lab	(4 credits)	_____	_____

Humanities Program (30 credits):

_____	Business Elective	(3 credits)	_____	_____
COMM 210	Introduction to Speech Communications	(3 credits)	_____	_____
CORE 102	History and the Modern World	(3 credits)	_____	_____
CORE 103	Perspectives in Human Behavior	(3 credits)	_____	_____
CORE 104	Literature, Philosophy, and the Ascent of Ideas	(3 credits)	_____	_____
CORE 105	Aesthetics in Context: The Artistic Impulse	(3 credits)	_____	_____
CORE ___	Core Interdisciplinary Senior Seminar	(3 credits)	_____	_____
WTNG 102	Expository Writing	(3 credits)	_____	_____
WTNG 220	Critical Writing for the Professions	(3 credits)	_____	_____
_____	Elective	(3 credits)	_____	_____

CURRICULUM OUTLINE/ADVISING WORKSHEET
ENGINEERING MINORS

Student _____

Advisor _____

Fall 2005

CIVIL ENGINEERING MINOR:		**Credits**	**Semester**	**Grade**
ENGR 314	Soil Mechanics & Lab	(4 credits)	_____	_____
ENGR 409	Design of Structures	(3 credits)	_____	_____
ENGR 412	Water Resources & Lab	(4 credits)	_____	_____
ENGR 415	Wastewater Treatment & Lab	(4 credits)	_____	_____

And one course from the following list:

ENVR 413	Advanced Structural Analysis	(3 credits)	_____	_____
ENGR 417	Groundwater Hydrology	(3 credits)	_____	_____
ENGR 430	Special Topics (Civil related)	(3 credits)	_____	_____
ENGR 431	Mechanical Vibrations	(3 credits)	_____	_____
ENVR 410	Solid and Hazardous Waste Management	(3 credits)	_____	_____
ENVR 411	Water Pollution and Treatment & Lab	(4 credits)	_____	_____
CNST 250	Construction Equipment	(3 credits)	_____	_____
CNST 302	Surveying I and Lab	(4 credits)	_____	_____
CNST 455	Mechanical and Electrical Design for Buildings	(3 credits)	_____	_____

COMPUTER ENGINEERING MINOR:		**Credits**	**Semester**	**Grade**
COMSC 110	Introduction to Computer Science I & Lab	(4 credits)	_____	_____
COMSC 111	Data Structures & Lab	(4 credits)	_____	_____
ENGR 270	Digital Systems Design & Lab	(4 credits)	_____	_____
ENGR 424	Digital Signal Processing	(3 credits)	_____	_____
MATH 221	Discrete Mathematics	(3 credits)	_____	_____

And one course from the following list:

COMSC 210	Principles of Computer Organization & Lab	(4 credits)	_____	_____
COMSC 220	Algorithms and Data Structures	(3 credits)	_____	_____
COMSC 230	Principles of Programming Languages	(3 credits)	_____	_____
ENGR 430	Special Topics (Computer related)	(3 credits)	_____	_____
ENGR 450	Robotics	(3 credits)	_____	_____

ELECTRICAL ENGINEERING MINOR:		**Credits**	**Semester**	**Grade**
ENGR 270	Digital System Design & Lab	(4 credits)	_____	_____
ENGR 424	Digital Signal Processing	(3 credits)	_____	_____
ENGR 445	Dynamic Modeling and Control	(3 credits)	_____	_____
ENGR 450	Robotics	(3 credits)	_____	_____

And one course from the following list:

ENGR 430	Special Topics (Electrical related)	(3 credits)	_____	_____
ENGR 455	Data Communications	(3 credits)	_____	_____
ENGR 465	Network Analysis and Design	(3 credits)	_____	_____

CURRICULUM OUTLINE/ADVISING WORKSHEET
ENGINEERING MINORS

Student _____

Advisor _____

Fall 2005

ENVIRONMENTAL ENGINEERING MINOR:		**Credits**	**Semester**	**Grade**
ENGR 314	Soil Mechanics & Lab	(4 credits)	_____	_____
ENGR 412	Water Resources & Lab	(4 credits)	_____	_____
ENVR 411	Water Pollution and Treatment & Lab	(4 credits)	_____	_____

And two courses from the following list:

ENGR 405	Air Pollution and Control	(3 credits)	_____	_____
ENVR 410	Solid and Hazardous Waste Management	(3 credits)	_____	_____
ENGR 415	Wastewater Treatment & Lab	(4 credits)	_____	_____

MECHANICAL ENGINEERING MINOR:		**Credits**	**Semester**	**Grade**
ENGR 330	Thermodynamics	(3 credits)	_____	_____
ENGR 433	Heat Transfer	(3 credits)	_____	_____
ENGR 445	Dynamic Modeling and Control	(3 credits)	_____	_____
ENGR 450	Robotics	(3 credits)	_____	_____

And one course from the following list:

ENGR 431	Mechanical Vibrations	(3 credits)	_____	_____
ENGR 430	Special Topics (Mechanical related)	(3 credits)	_____	_____
CNST 455	Mechanical and Electrical Design for Buildings	(3 credits)	_____	_____

Academic Evaluation

Student.....:
Program.....: B.S. in Engineering (UGDP.ENGR.270.BS)
Catalog.....: 2002
Ant Completion Date: 05/06
Email Address.....:

Advisor: Mr. Robert O'Neill,

****

Credit totals preceding requirements below denote coursework in progress or completed for the requirement, not remaining credits needed.

****

Credits earned in WTNG 101 (Practicum in Writing) and MSK 107 (Intermediate Algebra) do not count towards graduation; therefore, those courses do not appear on this evaluation.

****

Program Status: In Progress

	Required	Current..... Earned	Remaining	Anticipated(*)..... Additional	Remaining
Institutional Credits:	45.00	96.00	0.00	17.00	0.00
Institutional GPA....:	2.000	3.379	Met		
Credits:	124.00	100.00	24.00	17.00	7.00
GPA....:	2.000	3.379	Met		

(*) Anticipates completion of in-progress and registered courses

==========

Statuses: W=waived, C=Complete, I=In progress, N=Not started
P=Pending completion of unfinished activity

==========

I) 1: Engineering Program
Credits: 117
Complete all 8 subrequirements:
C) A: First Year- Fall
> Group 1: Complete one course from Core 102 - Core 105
> Group 2: Complete courses as listed.
Credits: 16
C) Group 1
CORE.104..... 02/FA B 3
C) Group 2
Credits: 13
ENGR.110..... 02/FA A 3
ENVR.101..... 02/FA A- 3
MATH.213..... 02/FA C+ 4
WTNG.102..... 02/FA B 3

C) B: First Year- Spring
> Group 1: Complete one course from Core 102 - Core 105
> Group 2: Complete courses as listed.
Credits: 17
C) Group 1
CORE.105..... 03/SP B 3
C) Group 2
Credits: 14
ENGR.115..... 03/SP A- 3
MATH.214..... 03/TR T 4
PHYS.201..... 03/SP A 4
WTNG.230..... 03/SP B 3

C) C: Second Year- Fall
> Group 1: Complete one course from Core 102 - Core 105.
> Group 2: Complete courses as listed.
Credits: 17
C) Group 1
CORE.102..... 03/FA B+ 3
C) Group 2
Credits: 14
CHEM.191..... 03/FA B- 4
ENGR.210..... 03/FA A 3
MATH.317..... 03/FA B 3
PHYS.202..... 03/FA B- 4

C) D: Second Year- Spring
> Group 1: Complete one course from Core 102 - Core 105.
> Group 2: Complete courses as listed.
Credits: 17
C) Group 1
CORE.103..... 04/SP A 3
C) Group 2
Credits: 14
CHEM.192..... 04/SP C+ 4
ENGR.220..... 04/SP A 3
ENGR.300..... 04/SP A 4
MATH.315..... 04/SP C 3

C) E: Third Year- Fall
> Complete both groups.
> Group 1: Complete courses as listed.
> Group 2: Complete a 3 credit Math Elective from level 200 or
> higher.
Credits: 16
C) Group 1
Credits: 13
ECON.335..... 04/FA A 3
ENGR.240..... 04/FA B 4
ENGR.313..... 04/FA A 3
ENGR.330..... 04/FA A 3
C) Group 2
MATH.330..... 04/FA B+ 3

C) F: Third Year- Spring
> Complete both groups.
> Group 1: Complete courses as listed.
> Group 2: Complete a 3 credit Engineering Elective. The
> Engineering Elective must be taken from courses with an
> ENGR or ENVR prefix. With advisor's permission, engineering
> elective courses may be taken from courses with a CNST or
> COMSC prefix.
Credits: 14
C) Group 1
Credits: 11
ENGR.260..... 05/SP A 4
ENGR.305..... 05/SP B+ 4
ENGR.310..... 05/SP A- 3
C) Group 2
ENGR.409..... 05/SP A 3

P) G: Fourth Year- Fall
> Complete all four groups.
> Group 1: Complete courses as listed.
> Group 2: Complete Core Interdisciplinary Senior Seminar.
> Choose from the following courses: CORE 440, CORE 441,
> CORE 442, CORE 443, CORE 444, CORE 445, CORE 446, CORE 447,
> CORE 448, CORE 449, CORE 450, or complete a RWU 4 week or
> longer study abroad.
> Group 3: Complete a 3 credit Business Elective.
> Group 4: Complete a 3 credit Engineering Elective. The
> course must have an ENGR or ENVR prefix. With advisor's
> permission, engineering elective courses may be taken
> from courses with a CNST or COMSC prefix.
Credits: 16
P) Group 1
Credits: 6
COMM.210..... 05/FA ___ (3) *PR
ENGR.490..... 05/FA ___ (3) *PR
P) Group 2
CORE.445..... 05/FA ___ (3) *PR
C) Group 3
MGMT.100..... 05/SP A- 3
P) Group 4
CNST.302..... 05/FA ___ (4) *PR

I) H: Fourth Year- Spring
> Complete all three groups.
> Group 1: Complete courses as listed.
> Group 2: Complete 6 elective credits in Engineering. The
> courses must have an ENGR or ENVR prefix. With advisor's
> permission, engineering electives may be taken from
> courses with a CNST or COMSC prefix.
> Group 3: Complete 3 elective credits.
Credits: 4
N) Group 1
ENGR.401_____ 1 course needed
ENGR.492_____ 1 course needed
I) Group 2
ENGR.412..... 05/FA ___ (4) *PR
_____ 2 credits needed
N) Group 3
_____ 3 credits needed

==========

C) 2: Feinstein Service Learning
> Complete the Feinstein Service Learning Requirement.
FSL.999..... 04/SL SL 0

==========

W) 3: Core Concentration- Undeclared
!! Exception
core was declared

==========

I) 4: Civil Engineering Minor
Credits: 11
Complete both subrequirements:
I) A: Required Courses
> # GROUP.ID 4266;

```
      >     Take ENGR.314 ENGR.409 ENGR.412 ENGR.415;
          Credits: 7
           ENGR.314_____________________________________________ 1 course needed
           ENGR.409..... 05/SP    A         3
           ENGR.412..... 05/FA    ___ (     4) *PR
           ENGR.415_____________________________________________ 1 course needed

   P) B: Elective Course
      > Complete one of the following courses: ENGR 413, ENGR 417,
      > ENGR 430, ENGR 431, ENVR 410, ENVR 411 (and lab), CNST 250,
      > CNST 302 (and lab), or CNST 455.
           CNST.302..... 05/FA    ___ (     4) *PR
================================================================================
I) 5: Mathematics Minor
   Credits: 17
   Complete both subrequirements:
   C) A: Calculus Courses
         Credits: 8
          MATH.213..... 02/FA    C+        4
          MATH.214..... 03/TR    T         4

   I) B: Math Electives
      > Complete four additional Mathematics courses at the 200
      > level or above.
         Credits: 9
          MATH.317..... 03/FA    B         3
          MATH.315..... 04/SP    C         3
          MATH.330..... 04/FA    B+        3
          _____________________________________________________ 1 course needed
================================================================================
C) 6: Core Concentration in Mathematics
      > Complete both groups.
      > Group 1: Complete courses as listed.
      > Group 2: Complete three additional mathematics courses
      > numbered above 200, at least one of which must be at the
      > 300-level or above.
      Credits: 17
      C) Group 1
         Credits: 8
          MATH.213..... 02/FA    C+        4
          MATH.214..... 03/TR    T         4
      C) Group 2
         Credits: 9
          MATH.317..... 03/FA    B         3
          MATH.315..... 04/SP    C         3
          MATH.330..... 04/FA    B+        3
================================================================================
OTHER COURSES:                  Registered  Earned
                                   Credits Credits
MATH.213L..... 02/FA    L         0.00    0.00
PHYS.201L..... 03/SP    L         0.00    0.00
CHEM.191L..... 03/FA    L         0.00    0.00
PHYS.202L..... 03/FA    L         0.00    0.00
CHEM.192L..... 04/SP    L         0.00    0.00
ENGR.300L..... 04/SP    L         0.00    0.00
ENGR.240L..... 04/FA    L         0.00    0.00
ENGR.305L..... 05/SP    L         0.00    0.00
ENGR.260L..... 05/SP    L         0.00    0.00
```

ENGR.412L..... 05/FA 0.00 (0.00) *PR
CNST.302L..... 05/FA 0.00 (0.00) *PR
(Credits in parentheses are anticipated earned)

This document is provided for your information. It is your responsibility to verify the accuracy and notify the Registrar's office of any discrepancy.

This document is unofficial unless otherwise noted.

NOTES

*PR Preregistered - The course has not yet started