SCHOOL OF COMPUTING & INFORMATION SCIENCES

Annual Assessment Summary 2009-2010
For
Bachelor of Science in Computer Science

Prepared by
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I. INTRODUCTION

This report is prepared in accordance with the Assessment Plan adopted by the School of Computing & Information Sciences (then the School of Computer Science) in spring 2003. Its purpose is to summarize the results of the various assessment mechanisms utilized by the School, and to present the resulting findings and recommendations to the director and faculty of the School.

The objectives of the annual assessment process are to assess the extent to which the outcomes and objectives of the BS in Computer Science program have been met in the period under review, to identify specific areas of the program where a need for improvement is indicated, and to present a set of recommendations for attaining those improvements.

The period under review includes the spring, summer and fall semesters of 2009.

The Assessment Plan is included as Appendix A of this report. The BS Program Objectives and Outcomes document is included as Appendix B.

II. OVERVIEW

The BS in Computer Science program objectives are the overriding goals of the BS program relating to the content, quality and environment of the students' educational experiences in the program. The objectives are broad in nature and define expected general characteristics of the program.

The BS in Computer Science program outcomes are more specific in nature. Each defines a single expected characteristic of a graduate of the BS in Computer Science program and should be observable at the time a student graduates from the program. Each program outcome supports the attainment of one or more of the program objectives.

Additionally, the required and elective courses in the BS in Computer Science curriculum each have a set of course outcomes. The course outcomes identify specific areas of learning and a degree of attainment (mastery, familiarity, awareness) expected of a student completing the course. The course outcomes support attainment of one or more of the program curricular outcomes.

The means of assessment employed by the School of Computing & Information Sciences are specified in the document, Assessment Mechanisms and Procedures, included as Appendix C of this report. These means include student, instructor and alumni surveys, and recommendations from the School's constituent groups.

The Survey instruments are summarized in the following table:

Instrument	**Target**	**Frequency**
Alumni Survey	Program Objectives	Continual
Graduating Student Survey	Program Outcomes	Semester
Student Course Survey	Course Outcomes	Semester
Instructor Course Survey	Course Outcomes	Semester

Recommendations may be received annually from the following groups:

- Industry Advisory Board
- ACM Student Chapter
- Women in Computer Science
- Upsilon Pi Epsilon Honor Society

For administrative purposes, the required and elective courses in the BS in CS major are grouped into five subject areas, Communications & Ethics, Computer Systems, Foundations, Programming, and Software Engineering. Each subject area is managed by a (faculty) Subject Area Coordinator whose duties include evaluation and maintenance of the courses in their subject area, and preparation of an annual report summarizing the responses to both the Instructor and Student Course Outcomes surveys for the period under review. Their observations and recommendations are presented under the relevant headings of the Survey Results section of this report.

III. SURVEY RESULTS

A. **Course Outcomes Survey by Students**

This survey is completed by students in each section of a required or elective CS class. For each course outcome, the student is asked to state the extent to which he agrees or disagrees with each of two assertions:

1: *I believe that this is a valuable outcome for this course*, and

2: *The subject matter of this outcome was covered adequately in class*

To each assertion, the student responds on a 5-point scale as follows:

5: I agree strongly, *4: I agree moderately,*

3: I am not sure whether I agree or disagree,

2: I disagree moderately, *1: I disagree strongly*

For each outcome, a weighted mean of the responses to each question is calculated. The means are provided for each course, cumulatively over all semesters of the calendar year.

Course Number	Abbreviated Course Title	Value of Outcomes	Adequacy of Outcomes	# Responses	
CAP 4770	Introduction to Data Mining				(i)
CDA 4101	Computer Organization	4.12	3.88	18	
CEN 4010	Software Engineering I	4.37	4.25	29	
CEN 4012	SDD Project	5.00	4.80	1	
CEN 4021	Software Engineering II	4.12	3.50	5	
CEN 4023	Component-Based Software				(i)
CGS 1920	Introduction to Computing			61	(ii)
CGS 3092	Ethics & Social Issues	4.69	4.64	63	
CIS 4911	Senior Project	4.50	4.35	2	
CNT 4403	Computer & Network Security				(i)
CNT 4513	Data Communications	4.08	3.87	14	
COP 2210	Computer Programming I	4.51	4.39	67	
COP 3337	Computer Programming II	4.60	4.48	71	
COP 3402	Fundamentals of Computer Sys	4.65	4.71	47	
COP 3530	Data Structures	4.52	4.33	46	
COP 4225	Advanced Unix Programming	4.44	4.33	6	
COP 4226	Advanced Windows Prog.	4.48	4.36	39	
COP 4338	Computer Programming III	4.43	4.33	26	
COP 4520	Intro' to Parallel Computing			1	(iii)
COP 4540	Database Management	4.71	4.43	25	
COP 4555	Principles Programming Lang's	4.36	4.37	27	
COP 4610	Operating Systems Principles	4.36	4.33	20	
COT 3420	Logic for Computer Science	4.17	4.04	29	
	ALL COURSES	**4.49**	**4.38**		(iv)

Table 1: 2009 Value of Course Outcomes & Adequacy of Coverage

Notes for Table 1

Note (i): CAP 4770 Introduction to Data Mining, CEN 4023 Component-Based Software Development, and CNT 4403 Computing and Network Security are List-1 electives of the BS program. None of these courses was offered during 2009.

Note (ii): CGS 1920 Introduction to Computing was first offered in the Fall 2007 semester, and subsequently in both Spring and Fall semesters. This is a 1 credit course and is required of students in all SCIS undergraduate majors. The substantial number of comments and suggestions from students suggest that the course is valued highly by a significant number of students. No statistical data are available for CGS 1920.

Note (iii): One section of COP 4520 Introduction to Parallel Computing was offered in Spring 2009. The course survey was partially completed by only 1 student who did not complete the outcomes survey section.

Note (iv): The cumulative averages reported here (4.49 and 4.38) for ALL COURSES are weighted. The averages reported in prior years are un-weighted averages

Year	Mean Value of Outcomes	Mean Adequacy of Coverage	
2009	4.49	4.38	(weighted)
2008	4.47	4.22	(un-weighted)
2007	4.47	4.21	(")
2006	4.45	4.22	(")
2005	4.45	4.22	(")
2004	4.44	4.28	(")

Table 2: Comparison of Annual Outcomes Ratings, 2004 – 2009

On the 5-point scale, a mean response value of 3.75 from a possible maximum of 5 represents a 75% satisfaction level. This is the threshold value at which SCIS deems a measured item to meet its criteria.

Clearly, the mean *values of the outcomes* of individual courses, as perceived by students, all far exceed the acceptability threshold. Students view the outcomes of all courses as at least highly valuable. SCIS might consider elevating the threshold to 80%, a score of 4.00 from a possible 5.00.

The same can almost be said of students' perceptions of the *adequacy of coverage of the course outcomes*. With a single exception, the means all exceed the 75% expectation, most well over 80%.

- The 3.50 rating of the adequacy of outcomes coverage for CEN 4021 continues the trend observed in 2008 and 2007. It is noted that the rating reported here is for the Spring semester only, as CEN 4021 was not offered in Fall 2009. Additionally, the problem has been addressed by the Undergraduate Committee and corrective action taken by the Undergraduate Program Director during 2009, albeit not in time for the

Spring 2009 offering of CEN 4021. There is a reasonable expectation of marked improvement in this rating for the current Spring 2010 offering. Particular attention must be paid to the ratings for Spring 2010.

- The rating of the adequacy of outcomes coverage for COP 3530 has improved from a failing 3.28 in 2008 to 4.33 in 2009. The ratings in the individual semesters of 2009 are 4.32, 4.00 and 4.52, consistently comfortably above the acceptable level of 3.75, and suggesting that the improvement is sustainable. There is therefore no longer a concern about COP 3530.
- The ratings of *adequacy of coverage of the course outcomes* for only 2 other courses, CDA 4101 (rating 3.88), and CNT 4513 (rating 3.87) fall below 4.00, but are above the minimum acceptable rating of 3.75.

The Subject Area Coordinator reports may contain selections of students' comments and suggestions about individual courses. Any student inputs reported by the Coordinator are documented here, together with the semester-based summary of students' evaluation of the course outcomes. The courses are grouped by subject area.

Subject Area: **Communications & Ethics** (Coordinated by Pat McDermott-Wells)
The Subject Area Coordinator's report is included as Appendix E of this Report.

CGS 3092 Professional Ethics and Social Issues in Computer Science

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	10	4.84	4.62
Fall 09	53	4.28	4.64
Year 2009	63	4.69	4.64

Subject Area: **Computer Systems** (Coordinated by Masoud Sadjadi)
The Subject Area Coordinator's report is included as Appendix F of this Report.

CDA 4101 Structured Computer Organization

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	4	4.11	3.95
Fall 09	14	4.13	3.86
Year 2009	18	4.12	3.88

CNT 4513 Data Communications (previously CEN 4500)

	# Responding	Outcome Value	Coverage Adequacy
Fall 09	14	4.08	3.87
Year 2009	14	4.08	3.87

COP 3402 Fundamentals of Computer Systems

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	22	4.42	4.59
Summer 09	4	4.85	4.95
Fall 09	21	4.85	4.79
Year 2009	47	4.65	4.71

COP 4225 Advanced UNIX Programming

	# Responding	Outcome Value	Coverage Adequacy
Summer 09	6	4.44	4.33
Year 2009	6	4.51	4.39

COP 4226 Advanced Windows Programming

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	9	4.32	4.29
Fall 09	30	4.53	4.38
Year 2009	39	4.48	4.36

COP 4540 Database Management

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	5	4.69	4.03
Fall 09	20	4.71	4.53
Year 2009	25	4.71	4.43

COP 4610 Operating Systems Principles

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	1	4.80	4.00
Summer 09	3	4.73	4.80
Fall 09	16	4.26	4.26
Year 2009	20	4.36	4.33

Subject Area: **Foundations** (Coordinated by Geoff Smith)
The Subject Area Coordinator's report is included as Appendix G to this report.

COT 3420 Logic for Computer Science

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	3	4.08	4.42
Summer 09	3	3.83	4.08
Fall 09	23	4.22	3.99
Year 2009	29	4.17	4.04

COP 4555 Principles of Programming Languages

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	9	4.61	4.69
Fall 09	18	4.23	4.21
Year 2009	27	4.36	4.37

Subject Area: **Programming** (Coordinated by Tim Downey)
The Subject Area Coordinator's report is included as Appendix H of this report

COP 2210 Computer Programming I

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	1	5.00	3.60
Summer 09	4	4.80	4.75
Fall 09	62	4.49	4.37
Year 2009	67	4.51	4.39

COP 3337 Computer Programming II

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	22	4.50	4.61
Summer 09	4	4.82	3.32
Fall 09	45	4.62	4.53
Year 2009	71	4.60	4.48

COP 3530 Data Structures

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	3	4.90	4.52
Summer 09	1	4.71	4.00
Fall 09	42	4.49	4.32
	=======	=======	=======
Year 2009	46	4.52	4.33

COP 4338 Computer Programming III

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	4	4.58	4.70
Summer 09	2	4.42	4.75
Fall 09	20	4.40	4.22
	=======	=======	=======
Year 2009	26	4.43	4.23

Subject Area: **Software Engineering** (Coordinated by Peter Clarke)
The Subject Area Coordinator's report is included as Appendix I of this report.

CEN 4010 Software Engineering I

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	5	4.83	4.77
Summer 09	9	4.54	4.41
Fall 09	15	4.12	3.96
	=======	=======	=======
Year 2009	29	4.37	4.25

Suggestions (Students): CEN 4010:

- The student suggestions were generally positive with respect to the course instructors.
- Several students stated that the workload for the course was too much, particularly the documentation for the project.
- Several students stated that taking a Database course and a Windows Programming course would better prepare them for this class. This has been a recurring concern for several years.
- Students from Computer Engineering stated that they were ill-prepared for the course. That is they lack experience in Programming and Databases.
- One student stated that they learnt a lot in other courses but was not prepared to implement the type of system required for this class.
- One student stated that the class should cover testing frameworks before the implementation phase of the project.

CEN 4012 Software Design and Development Project (Renumbered from CEN 4015)

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	1	5.00	4.80
Year 2009	1	5.00	4.80

CEN 4021 Software Engineering II

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	5	4.12	3.50
Year 2009	5	4.12	3.50

Suggestions (Students): CEN 4021

- A student stated that this course should not be taken with graduate students, since they have a better understanding of the material.
- A student stated that the class should be taught twice a week (75minutes) and not once (150 minutes).
- A student complained that too much time was spent on documentation and not enough on coding. The student also stated that there should be a prerequisite class that teaches UML.
- One student stated that the model-driven software development (MDSD) approach was very different and that the professor should stress the importance of reading the book. In addition, the class notes were too abstract and more time should be spent on examples

CIS 4911 Senior Project (Capstone).

	# Responding	Outcome Value	Coverage Adequacy
Fall 09	2	4.50	4.35
Year 2009	2	4.50	4.35

B. Course Outcomes Survey by Instructors

This survey is completed by each instructor of a required or elective CS course section.

- The Instructor separately rates the individual course outcomes in respect of two criteria
  - Appropriateness: *Essential* *Appropriate* *Inappropriate*
  - Coverage: *Extensive* *Adequate* *Not Enough* *Not At All*
- The Instructor separately rates the course prerequisites in respect of two criteria
  - Relevance: *Irrelevant* *Incidental* *Useful* *Highly Useful*
  - Student Mastery: *Non-existent* *Deficient* *Adequate* *Good*
- The Instructor rates the students' overall preparation for taking the course
  - Student Preparation: *Non-existent* *Deficient* *Adequate* *Good*
- In addition, the Instructor may append general comments and suggestions specific to each course prerequisite or outcome.

These responses, comments and suggestions from the Instructor surveys, together with the data from the Student Course Outcomes surveys, form the basis of the Subject Area Coordinators' reports. The recommendations of the Subject Area Coordinators are presented in this section. **In some instances, the recommendations may reference the Student Outcomes Survey responses reported in the previous section.**

Subject Area: **Communications & Ethics** (Reported by Pat McDermott-Wells)
The Subject Area Coordinator's report is included as Appendix E of this Report.

CGS 3092 Professional Ethics and Social Issues in Computer Science

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	63	4.69	4.64

SAC Recommendation CGS 3092: *Consider replacing this course with the proposed Technology in the Global Arena course. The proposed course addresses the requirement to add globalization to the major. However, the proposed course must be 3 credits to meet the globalization requirement.*

COM 3011 Business and Professional Communication
ENC 3211 Report and Technical Writing
Note: *COM 3011 and ENC 3211 are taught by other instructional units and consequently are not subject to the School's assessment mechanisms.*

Subject Area: **Computer Systems** (Reported by Masoud Sadjadi)
The Subject Area Coordinator's report is included as Appendix F of this Report.

CDA 4101 Structured Computer Organization

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	18	4.12	3.88

SAC Recommendation re CDA 4101: **None**.

CNT 4513 Data Communications (previously CEN 4500)

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	14	4.08	3.87

SAC Recommendation re CNT 4513: *I recommend no changes to the syllabus and outcome of this course. I recommend the textbook to remain the same as before. However, this is the third year that we have seen the problem with mixed students' preparation and unless the two group of students, namely, IT and CS students, are not separated, the problem with remain in the future. One solution is to develop another course for the IT students that builds on their background, does not include extensive analytic questions, and does not require extensive programming experience.*

COP 3402 Fundamentals of Computer Systems

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	47	4.65	4.71

SAC Recommendation re COP 3402: **None**.

COP 4225 Advanced UNIX Programming

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	6	4.51	4.39

SAC Recommendation re COP 4225: **None**.

COP 4540 Database Management

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	25	4.71	4.43

SAC Recommendation re COP 4540: **None**.

COP 4610 Operating Systems Principles

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	20	4.36	4.33

SAC Recommendation re COP 4610: *I recommend replacing the forth outcome of this course, namely, "Be Familiar with Disc Allocation and Arm Scheduling Algorithms" with a more general scheduling algorithm. The changes to the other outcomes that were made last year seem to be appropriate. Also, it is helpful for the computer engineering students to have taken more programming courses before taking this class.*

COP 4226 Advanced Windows Programming

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	39	4.48	4.36

SAC Recommendation re COP 4226: *I recommend no changes to this course. Last year, this course went through some major changes and all the changes seem to be appropriate based on the feedback by the professor and the students who took the survey. However, the changes were not reflected on the course appraisal form, which should be fixed for next year. Also, it is helpful for the computer engineering students to have taken more programming courses before taking this class.*

CEN 4023 Windows Component Technology
This course was not offered during 2009

Subject Area: **Foundations** (Reported by Geoff Smith)
The Subject Area Coordinator's report is included as Appendix G to this report.

COT 3420 Logic for Computer Science

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	29	4.17	4.04

SAC Recommendation re COT 3420: **None**.

COP 4555 Principles of Programming Languages

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	27	4.36	4.37

SAC Recommendation re COP 4555: **None**.

MAD 2104 Discrete Mathematics
MAD 3305 Graph Theory
MAD 3401 Numerical Analysis
MAD 4203 Introduction to Combinatorics
MHF 4302 Mathematical Logic
Note: *MHF 4302, and the courses with MAD prefix, are taught by the Mathematics department and consequently are not subject to the School's assessment mechanisms.*

Subject Area: **Programming** (Reported by Tim Downey)
The Subject Area Coordinator's report is included as Appendix H of this report

COP 2210 Computer Programming I

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	67	4.51	4.39

SAC Recommendation COP 2210: *Since this course is primarily for computer science majors we should require a passing grade in college algebra. Please note that this recommendation was made last year also. Programming I instructors should be strongly encouraged to cover all of the objectives for Programming I, especially Strings and ArrayLists.*

COP 3337 Computer Programming II

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	71	4.60	4.48

SAC Recommendation COP 3337: *Programming II instructors should be strongly encouraged to cover all of the objectives for Programming II, especially Stacks & Queues and the Java Collections.*

COP 3530 Data Structures

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	46	4.52	4.33

SAC Recommendation COP 3530: *Despite the evident lack of prerequisite preparation for some of the students in the course, COP-3530 is still meeting the objectives, according to appraisals from the follow-up course COP-4338 Programming III. The outcomes for the course should be reevaluated; instructors should be strongly encouraged to cover all of the objectives.*

COP 4338 Computer Programming III

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	26	4.43	4.23

SAC Recommendation COP 4338: *This course seems to be fulfilling its task of preparing students for the Operating Systems course and teaching some C and C++ along the way. The Reflection outcome is not being covered anymore, but the outcomes for the course do not reflect this. The outcomes should be brought in alignment with the course.*

Subject Area: **Software Engineering** (Reported by Peter Clarke)
The Subject Area Coordinator's report is included as Appendix I of this report.

CEN 4010 Software Engineering I

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	29	4.37	4.25

SAC Recommendation CEN 4010:

1. There is a need to have students take a programming course that contains web-based programming and working with databases before taking CEN 4010. This issue is still of some concern since students continue to raise it during the class surveys. The recommendation is to either change the class projects to use the knowledge gained in the prerequisite courses or keep the current class projects and provide the students with the opportunity to gain the prerequisite knowledge in other courses. The current projects used in the CEN 4010 classes are the type of projects being developed in industry e.g., web-based applications that use server technology.
2. The results from the student surveys for CEN 4010 showed that the adequacy of the text book is once again an area of concern. There has also been a drop in the quality of the course delivery by the instructors. It is recommended that the course coordinator meet with the instructors in software engineering to look into these issues.

CEN 4012 Software Design and Development Project (Renumbered from CEN 4015)

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	1	5.00	4.80

SAC Recommendation re CEN 4012: **None**.

CEN 4021 Software Engineering II

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	5	4.12	3.50

SAC Recommendation re CEN 4021: **None**.

CIS 4911 Senior Project (Capstone).

	# Responding	Outcome Value	Coverage Adequacy
Year 2009	2	4.50	4.35

SAC Recommendation re CIS 4911: **None**.

C. Program Outcomes Survey by Graduating Students

The Program Outcomes Survey is completed by students in the semester in which they expect to graduate. The student is asked to rate each of the program outcomes in respect of two criteria, attainment and relevance.

Attainment: *This program outcome has been met for me personally*

5: I agree strongly	*2: I disagree somewhat*
4: I agree moderately	*1: I disagree moderately*
3: I agree somewhat	*0: I disagree strongly*

Relevance: *How meaningful do you consider this outcome to be for you personally?*

5: Extremely meaningful	*2: Somewhat meaningless*
4: Moderately meaningful	*1: Moderately meaningless*
3: Somewhat meaningful	*0:Extremely meaningless*

The combined responses for Spring, Summer and Fall, 2009 are shown in Appendix D. The response rate to this survey, 13, is improved over 2008, but still should be higher. This situation therefore still merits attention.

Summary of responses: Graduating Student Survey Spring 09 Summer 09 Fall 09
13 Respondents

Educational Program Outcomes	*Outcome Attainment*		*Perceived Relevance*	
	Average	*Percentage*	*Average*	*Percentage*
a: Proficiency in foundation areas	4.31	86.20	4.31	86.20
b: Proficiency in core areas	4.38	87.60	4.46	89.20
c: Proficiency in problem solving	4.08	81.60	4.46	89.20
d: Proficiency in a programming language	4.15	83.00	4.77	95.40
e: Understanding of social & ethical issues	4.15	83.00	4.23	84.60
f: Ability to work cooperatively	4.08	81.60	4.54	90.80
g: Effective communication skills	4.38	87.60	4.69	93.80
h: Understanding the scientific method	4.00	80.00	4.00	80.00
i: Familiarity with the arts, humanities, etc	3.38	67.60	3.69	73.80
j: Experience state of the art computing facilities	3.85	77.00	4.62	92.40
	====	====	====	====
a - j: All Program Educational Outcomes	4.08	81.52	4.38	87.54
	====	====	====	====

Table 3: Attainment & Relevance of Program Educational Outcomes - 2009

Educational Program outcomes relating to Computer Science curriculum
(*a: CS foundation areas b: CS core areas c: problem solving d: programming languages*)

The outcomes in this group are perceived by students as having very high relevance, with scores in the range 86.20% to 95.40%. Students rate their attainment in these outcome areas between high, 81.60%, and very high 87.60%. Both relevance and attainment are rated well in excess of the minimum acceptable level of 75%.

Educational Program outcomes relating to work environment skills
(*e: social & ethical, f: ability to work cooperatively, g: effective communication skills*)

The outcomes in this group are perceived by students as having very high relevance, scoring in the range 84.60% to 93.80%. Students rate their attainment in these outcome areas between high, 81.60%, and very high, 87.60%. Both relevance and attainment are rated well in excess of the minimum acceptable level of 75%. It may be instructive to note that the relevance of communication and cooperative skills are rated by students at higher levels than the CS curricular outcomes.

Program outcomes relating to non-computer science curriculum
(*h: understanding the scientific method, i: familiarity with the arts & humanities*)

Students perceive the relevance of their understanding of the scientific method at a high level, 80.00%. Their attainment of this outcome is rated at an identical high level.

Student perception of the relevance, and their attainment, in the outcome relating to the arts and humanities are rated below the acceptability level of 75.00%. This lower rating contrasts markedly with the other curricular outcomes, and seems consistent from year to year, with the exception of 2008 (see the following table).

Year	Perceived Attainment	Perceived Relevance	Number of Respondents
2009	67.60	73.80	13
2008	90.00	90.00	4
2007	78.40	68.40	12
2006	60.00	75.60	9

Table 4: Historical Student Ratings of Outcome i

Outcome j: Experience state-of-the-art computing facilities

The disparity between perceived relevance of this outcome, 92.40%, and its attainment, 77.00%, has been consistent from year to year. This has been addressed by faculty action during 2009, but the adopted change in the wording of outcome j is not yet reflected in the surveys. It will be important to pay close attention to the responses to the modified outcome during the next 2 assessment cycles.

Outcome k: Success in applying for CS-related entry-level positions

The relevance of this outcome k is rated at 80%, a high level. The data from the survey on attainment of this outcome are highly encouraging, but inconclusive. Of 13 students completing this survey, 10 had applied for employment at the time of the survey. Of these 10 applicants, 4 reported having received at least 2 “good” offers, while 1 applicant reports a single “suitable” offer. The remaining 5 applicants were still awaiting job offers, and none had been totally rejected. It would be helpful to discover their success, or failure, one month after graduation.

We repeat our opinion from the reports of the two preceding years, "*This evidence suggests that our students are employable when just out of school, but the timing of the exit survey is probably too early to allow a complete assessment.*" It is essential to put in place a system of tracking a statistically meaningful proportion of our recent graduates.

Outcome l: Success in admission to graduate school

The relevance of this outcome has an extremely high rating of 96.00%, but the available data are insufficient to allow any meaningful inference about attainment of the outcome. Of the 2 respondents who applied for admission to graduate programs, one had been accepted at a primary choice school, while the other's applications were still pending.

Overall Student Satisfaction

Table 3 (above) includes the averages of response ratings for outcomes a through j. Our graduating students continue to perceive our program outcomes to have very high relevance, 87.54%, and rate their attainment of these outcomes at a high level, 81.52%.

When the relevance of the outcomes relating to CS-curricular areas, outcomes *a* .. *e*, are rated separately, those outcomes score very high at 4.45 or 89.0%. The relevance of the outcomes relating to non-CS curricular areas, outcomes *f* .. *i*, are rated at the high level of 4.13 or 82.6%.

D. Program Objectives Survey by Alumni

The Program Objectives of the School's BS in Computer Science program are:

1. *To provide our graduates with a broad-based education that will form the basis for personal growth and life-long learning.*
2. *To provide our graduates with a quality technical education that will equip them for productive careers in the field of Computer Science.*
3. *To provide our graduates with the communication skills and social and ethical awareness requisite for the effective and responsible practice of their professions.*
4. *To prepare students for BS level careers or continued graduate education.*
5. *To maintain a diverse student population and actively promote an environment in which students from all groups, including the traditionally under-represented, may successfully pursue the study of Computer Science.*
6. *To maintain a qualified and dedicated faculty who actively pursue excellence in teaching.*

The Alumni survey of the school's program objectives was initiated in 2004, and has been available on a continuing basis.

Alumni responding to the survey are asked to rate the contribution of their broad educational experience at FIU to their personal growth, capacity for life-long learning, communication skills, social and ethical awareness, career preparation, and preparation for graduate study. They rate their preparation, on graduation, in the major areas of the BS-CS curriculum, and rate the Computer Science faculty on each of four criteria. Alumni rate the School's environment in terms of the diversity of the student population, its agency in the student's personal growth and social awareness, and promotion of tolerance and a healthy learning environment. The respondents also provide "overall" ratings of each of these criteria, their FIU educational experience, the CS faculty, the student's preparation at graduation, and the school's diversity and learning environment. Finally the alumni responding to the survey provide an overall rating of their attainment of the School's program Objectives.

Responses to the survey questions are on a the following scale

4: excellent, 3: good, 2: satisfactory, 1: poor and 0: unsatisfactory

Current SCIS policy sets an acceptability threshold of a 75% level of attainment on all program outcomes and objectives. For the Alumni Survey of Program Objectives, this translates to a minimum acceptable average rating of 3.00 from a possible 4.00 on all surveyed items.

The table below summarizes the responses to the Alumni Survey in each of 3 survey periods, 1) the inception period 02/11/04 to 03/18/04, 2) the second period 03/19/04 to 02/28/07, and 3) the current period from 05/26/07 to the present. The data are shown separately for each period and accumulated from inception to the end of the period.

			Period 1	Period 2		Current	
			2/11/04 to 3/18/04	**3/19/04 to 2/28/07**	**2/11/04 To 2/28/07**	**5/26/07 to 11/23/09**	**2/11/04 to 11/23/09**
			=====	=====	=====	=====	=====
			65	**60**	**125**	**13**	**138**
			=====	=====	=====	=====	=====
Survey	**BS-CS Program Objective & Area**						
Item #	**#**	**Area**					
		Educational Experience					
1	1	Capacity for Personal Growth	3.31	3.40	3.35	3.38	3.36
2	1	Capacity for Life-Long learning	3.40	3.50	3.45	3.31	3.43
3	3	Communication Skills	2.82	3.00	2.90	3.00	2.91
4	3	Social & Ethical Awareness	2.88	3.02	2.94	3.15	2.96
5	4	Preparation for Career in CS	3.11	3.27	3.18	3.15	3.18
6	4	Preparation for Graduate Study	3.02	3.15	3.08	3.00	3.07
		Faculty & Instruction					
7	6	Faculty Expertise	3.37	3.43	3.40	3.23	3.38
8	6	Dedication to Teaching	3.09	3.27	3.18	3.08	3.17
9	6	Mentorship	2.78	2.77	2.78	2.92	2.79
10	6	Instructional Capability	3.25	3.25	3.25	2.92	3.22
		Preparation on Graduation					
11	2,4	Computer Programming	3.32	3.42	3.37	3.08	3.34
12	2,4	Systems Development	2.66	2.98	2.82	2.77	2.81
13	2,4	Data Structures & Algorithms	3.17	3.42	3.29	3.46	3.30
14	2,4	Architecture & Organization	2.94	2.95	2.94	3.00	2.95
		Diversity & Environment					
15	5	Diversity of Student Population	3.32	3.53	3.42	3.46	3.43
16	5	Agency for Personal Growth	2.94	3.17	3.05	3.31	3.07
17	5	Agency for Social Awareness	2.80	3.08	2.94	3.08	2.95
18	5	Healthy Learning Environment	3.20	3.33	3.26	3.00	3.24
		Overall Ratings					
19	1,3	Educational Experience	3.09	3.22	3.15	3.17	3.15
20	6	Faculty & Instruction	3.12	3.18	3.15	3.04	3.14
21	2,4	Preparation upon Graduation	3.02	3.19	3.10	3.08	3.10
22	5	Diversity & Environment	3.07	3.28	3.17	3.21	3.17
		Overall, All Objectives					
23	all	BS-CS Program Objectives	3.08	3.22	3.14	3.13	3.14

Table 5: Alumni Survey of BS-CS Program Objectives

Table 5, above, summarizes the responses to this survey as of December 2009. The table shows the weighted averages of the responses to each survey item, as a raw score from a maximum of 4

Table 6, below, provides a quick comparison of the "overall" ratings of the BS-CS Program Objectives over the immediately preceding 5 years.

Year	FIU Educational Experience	Faculty & Instruction	Preparation At Graduation	Diversity & Environment	Satisfaction With BS_CS
	Objectives 1, 3	**Objective 6**	**Objectives 2, 4**	**Objective 5**	**ALL Objectives**
2009	78.75	78.50	77.50	79.25	78.50
2008	79.00	78.75	77.50	79.50	78.75
2007	79.00	78.75	77.50	79.50	78.75
2006	78.75	78.75	77.75	79.25	78.85
2005	78.75	79.00	77.50	79.25	78.75

Table 6: Comparison of Overall Ratings, 2005 - 2008

We conclude that overall, the BS-CS program objectives continue to be met at somewhat better than acceptable levels. Nonetheless, the Table 5 data do indicate some program areas that may merit attention. It must be noted the number responding to the Alumni Survey during the current review period is only 13 of the total number of 138 respondents since inception. Accordingly, it would be prudent to be guardedly optimistic about upward trends during the period, while acting to arrest any apparent downward trends.

Observation AS-03

Survey Item #3: *Please rate how your educational experience at FIU contributed to the development of your communication skills*. The cumulative rating 2.91/4.00 (72.75%) continues to be below the 75% expectation. However, the rating in the current period is maintained at an acceptable 3.00/400 (75%), the same level as for the preceding period.

Observation AS-04

Survey Item #4: *Please rate how your educational experience at FIU contributed to your awareness of social and ethical responsibility.* The cumulative rating 2.96/4.00 (74.00%) continues to be below the 75% expectation. However, there is an upward trend continuing over each of the review periods, 2.88, 2.94, 2.96. Indeed, the responses for the current review period averaged a very good 3.15/4.00 (78.75%).

Observation AS-09

Survey Item #9: *Please rate the mentorship (guidance, counseling) provided by our faculty.* The cumulative rating of 2.79/4.00 (69.75%) continues to be the lowest rated criterion of the Alumni Survey. At the same time, the rating for the current period shows a strong improvement to 2.92/4.00 over the 2.78 and 2.77 ratings for the preceding survey periods.

Observation AS-10

Survey Item #10: *Please rate the overall instructional capability of our faculty.* Although the cumulative rating 3.22/4.00 (80.50%) remains high, the rating in the current review period has alarmingly decreased to 2.92/4.00 (73.00%) from 3.25/4.00 (81.25%) in each of the preceding review periods.

Observation AS-11

Survey Item #11: *Please rate the quality of your preparation upon graduation in Computer Programming.* While the cumulative rating 3.34/4.00 (83.50%) remains very high, the rating in the current review period shows marked decline to 3.08/4.00 (77.00%) from 3.42/4.00 (85.50%) in the second review period, and 3.32/4.00 (83.00%) in the inception period.

Observation AS-12

Survey Item #12: *Please rate the quality of your preparation upon graduation in Systems Development.* Both the cumulative rating, 2.81/4.00 (70.25%), and the period rating, 2.77/4.00 (69.25%), remain below the minimum acceptability level of 75.00 %. There is no improvement over the ratings of the preceding review periods.

Observation AS-14

Survey Item #14: *Please rate the quality of your preparation upon graduation in Computer Architecture and Organization.* The cumulative rating has improved marginally to 2.95/4.00 (73.75%), due to an improvement of the current period rating to the minimally acceptable 3.00/4.00 (75.00%) for the first time in any of the review periods.

Observation AS-18

Survey Item #18: *Please rate the extent to which SCS promoted a healthy learning environment.* Although at the minimally acceptable level of 3.00/4.00 (75.00%), the rating of this item shows a marked decline in the current review period from 3.33/4.00 (83.25%) in the preceding review period, and 3.20 (80.00%) in the inception period.

IV. RECOMMENDATIONS FROM OTHER CONSTITUENTS

Attainment of the School's Objectives is promoted by the activities of the SCIS Industry Advisory Board (SCIS-IAB) and its student organizations, ACM FIU Student Chapter, Women in Computer Science (WICS), and Upsilon Pi Epsilon Honor Society (FIU UPE).

SCIS-IAB	: http://www.cis.fiu.edu/iab/	2009 Report: Appendix M
ACM FIU	: http://users.cis.fiu.edu/~acm/	2009 Report: Appendix J
FIU WICS	: http://www.cis.fiu.edu/wics/	2009 Report: Appendix K
FIU UPE	: http://www.cis.fiu.edu/upe/	2009 Report: Appendix L

As noted on the WICS web page, WICS has been "in hiatus" during a major portion of 2009, probably due in large part to missing the tremendous energy of the faculty sponsor, Dr. Ana Pasztor who has been on leave.

There are no program-specific recommendations from the constituent organizations.

V. ASSESSMENT

In Section III of this report, the data from the various survey instruments were presented and summarized. The recommendations of the Subject Area Coordinators were also presented in Section III alongside the supporting data from the relevant courses. The recommendations from other constituent groups were presented in Section IV.

In this Section V, the data from the various surveys are interpreted in the specific contexts of the BS-CS Program Outcomes and Program Objectives. Conclusions are drawn based on the interpretation of the data, and provide the basis for recommendations by the Assessments Coordinator.

	Course Outcomes By Students			**Program Outcomes Exit Survey**			**Program Objectives Alumni Survey**
Score	**Assertion**		**Score**	**Assertion**		**Score**	**Rating**
5	I agree strongly		5	I agree strongly		4	Excellent
4	I agree moderately		4	I agree moderately		3	Good
3	I am not sure		3	I agree somewhat		2	Satisfactory
2	I disagree moderately		2	I disagree somewhat		1	Poor
1	I disagree strongly		1	I disagree moderately		0	Unsatisfactory
			0	I disagree strongly			

Table 7: Comparison of Survey Response Structures

The response structures of the various surveys are summarized and compared in Table 7. Some short-comings are apparent in the survey structures:

1. The Course Outcomes surveys are scored on a 1 to 5 scale, while the Exit and Alumni surveys are scored on base-0 scales. This difference creates an apparent bias in the Course Outcome scores, and makes comparison between related items from the Course Outcomes survey and the other surveys problematic at best.
2. In the Exit Survey, the distinction between the responses *"I agree somewhat"* and *"I disagree somewhat"* is unclear.
3. The Exit Survey employs a 6-point scale, while the other surveys use 5-point scales.
4. In the Alumni Survey, the distinction between responses "Poor" and "Unsatisfactory" is unclear, and one could reasonably invert the order of these responses.

AC Recommendation 1: *The response structures of the SCIS assessment surveys should be modified as summarized in the following table*:

	Course Outcomes By Students			**Program Outcomes Exit Survey**			**Program Objectives Alumni Survey**
Score	**Assertion**		**Score**	**Assertion**		**Score**	**Rating**
5	I agree strongly		5	I agree strongly		5	Excellent
4	I agree moderately		4	I agree moderately		4	Very Good
3	I am not sure		3	I am not sure		3	Good
2	I disagree moderately		2	I disagree moderately		2	Fair
1	I disagree strongly		1	I disagree strongly		1	Poor

Table 8: Recommended Survey Response Structures

A. Program Outcomes

The principal means of assessing the relevance and degree of attainment of the program's outcomes is the Program Outcomes Survey (or Exit Survey) completed by students in the semester in which they graduate. In addition, the Course Outcomes Survey by Students and by the Course Outcomes Survey by Instructors both provide additional indicators of the curriculum-specific program outcomes. The responses to these three surveys have been reported and analyzed under the corresponding headings in section III of this report. In this section, we summarize the findings and recommendations from those surveys.

Course Outcomes Survey by Students

In at least 2 previous assessment reports, Subject Area Coordinators and the Assessments Coordinator have expressed concern about low participation by students in the on-line Course Outcomes surveys. The administrative decision to complete the surveys in class using SCIS NetBooks appears to have had a strong positive impact on the responses rates to these surveys. So far, the NetBooks have been used in one semester only, Fall 2009.

	CDA 4101	CEN 4010	CGS 3092	COP 2210	COP 3337	COP 3402	COP 3530	COP 4226	COP 4338	COP 4540	COP 4555	COP 4610	COT 3420
2008	*9*	*25*	*57*	*42*	*21*	*19*	*19*	*12*	*17*	*10*	*18*	*11*	*5*
2009	*18*	*29*	*63*	*67*	*71*	*47*	*46*	*39*	*26*	*25*	*27*	*20*	*29*

Table 9: Number of Respondents to Student Course Outcomes Surveys, 2008 & 2009

The survey participant data reported above are raw numbers, not percentages, and the increases from 2008 to 2009 may be due in part to increased course registrations. Also, not all surveyed classes are represented in Table 6. However, comparison of the numbers of Fall 2009 responses with the numbers of responses in Spring 2009 (see Section III A) suggest strongly that utilizing the NoteBooks is the principal catalyst for the improvement in response rates. In any event, the increased survey participation allows greater confidence that the survey data are representative and meaningful.

The overall annual course outcomes ratings, averaged over all sections of all courses, are at very high levels (See Table 1).

Perceived value of the outcomes: 4.49 from a maximum of 5, or 89.8%
Perceived adequacy of coverage: 4.38 from a maximum of 5, or 87.6%

These data indicate that students currently in the BS-CS program believe that, overall, the courses have very valuable content, and that the content of the courses is well delivered.

In Note (i) to Table 1 of Section III A, it is documented that three List-1 elective courses were not offered during 2009:

CAP 4770 Introduction to Data Mining
CEN 4023 Component-Based Software Development
CNT 4403 Computer & Network Security

These courses were also not offered during 2008. Students ought to be able to anticipate that advertised courses will be offered at least once during their Junior and Senior years.

AC Recommendation 2: *CAP 4770, CEN 4023 and CNT 4403 should be removed from the published list of CS List-1 elective courses*.

AC Recommendation 3: *New and/or experimental advanced CS courses should be added to the published list of List-1 CS electives only if offered on a 2nd occasion, and when there is reasonable expectation of being able to offer such courses on a sustained schedule. If offered on an ad-hoc schedule, such a course may still qualify for List-1 elective credit, even though it is not included in the published list.*

Student concerns have been taken into account and factored into the Coordinators' recommendations in Section III B. There are no additional recommendations based on student concerns. However, at the advanced level, CEN 4010, COP 4226, COP 4610, there increasingly seems to be some unpreparedness of some students for the courses at this level. Some of the SAC recommendations are restated in part here.

- CEN 4010: *"There is a need to have students take a programming course that contains web-based programming and working with databases before taking CEN 4010."*
- COP 4226, CEN 4010: *"Also, it is helpful for the computer engineering students to have taken more programming courses before taking this class."*

When viewed in the additional context of some comments from CS graduates responding to the Alumni Survey (see paragraph B Program Objectives below), it is apparent that some adjustment in the prerequisite chain and/or curriculum may be indicated. This will be addressed in paragraph B following.

Except where noted in the Subject Area Coordinator reports, course instructors' ratings and recommendations are under-represented in the assessment process.

AC Recommendation 4: *Responses to four of the five criteria of the Course Outcomes Survey by Instructors are on a 4-point scale, while a fifth is on a 3-point scale. All scales should be standardized to either 3 or 4 points, and converted to a numeric score. The scores for these criteria may then be averaged automatically over all sections of a course offered during the review period, and included into the (SAC) coordinators' reports.*

Program Outcomes Survey by Graduating Students (Exit Survey)

The increased number of exit survey respondents, 13 compared to 4 in the previous year, is very welcomed. It is easy to attribute this increase to the strategy of conducting the survey during normal class meetings. It is certainly possible, and desirable, to raise the number of responses closer to the number of graduating students, approximately 50+ in any calendar year.

		Outcome Attainment		*Perceived Relevance*	
Year	Respondents	*Average*	*Percentage*	*Average*	*Percentage*
2009	13	4.08	81.52	4.38	87.54
2008	4	4.48	89.50	4.75	95.00
2007	12	4.07	81.34	4.52	90.34
2006	9	4.13	82.68	4.32	86.44

Table 10: Comparison of student Ratings of BS-CS Program Outcomes

Table 10 shows that the 2009 students' responses provide ratings at levels comparable with the ratings of 2006 and 2007. The 2008 ratings are elevated, but possibly are not meaningful because of the very small number or responses.

The 2009 aggregate rating of the BS-CS program outcomes, as measured by the Exit Survey, all exceed the minimum acceptable rating of 75%. The ratings indicate that the value of BS-CS Program Outcomes are perceived by students to have very high value, averaging 87.54%, and are thought to be realized at a high level, averaging 81.52%.

Recommendations to strengthen the assessment of BS-CS program outcomes were presented in the 2009 Assessment Report, and were adopted by the Undergraduate Committee, but have not yet been implemented:

- To incorporate Senior Project assessment into the annual BS-CS assessment process,
- To consider adopting an "embedded question" strategy as part of the annual BS-CS assessment process,
- To amend the documents governing the annual assessment process to incorporate these additional mechanisms, Senior Project assessment and Embedded Question assessment.

AC Recommendation 5: *The modifications to the BS-CS assessment process adopted in the previous assessment cycle should be implemented in time for utilization beginning no later than the Spring 2010 semester.*

AC Recommendation 6: *SCIS should set a goal of obtaining responses to the exit survey from at least 50% of the students graduating in any semester, and should implement strategies to accomplish and maintain that goal.*

Assessment of individual BS-CS Program Outcomes

Program Outcome a: *Demonstrate proficiency in the foundation areas of Computer Science including mathematics, discrete structures, logic and the theory of algorithms.*

Indicators

- Graduating Student rating. Value: 4.31/5.00 (86.2%) Attainment: 4.31/5.00 (86.2%)
- COT 3420 Student ratings. Value: 4.17/5.00 (83.4%) Coverage: 4.04/5.00 (80.8%)
- COP 4555 Student ratings. Value: 4.36/5.00 (87.2%) Coverage: 4.37/5.00 (87.4%)

Conclusions

This program outcome is perceived by graduating students as having very high value, 86.2% rating. Attainment of this outcome is also rated very highly by graduating students at 86.2%. Individual course indicators are high (83.4%) or very high (87.4%). However, two important core courses in this subject area, MAD 2104 Discrete Mathematics and MAD 3512, are taught by Mathematics Department faculty, and are not included in the assessment process.

Overall rating

Value of outcome: **very high**. Attainment of outcome: **high**.

AC Recommendation 7: *SCIS should implement on-line student course outcome survey instruments for MAD 2104 and MAD 3512, and with the cooperation of the Mathematics department, administer the surveys in all sections of MAD 2104 and MAD 3512.*

Program Outcome b: *Demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems.*

Indicators:

- Graduating Student rating. Value: 4.46/5.00 (89.2%) Attainment: 4.38/5.00 (87.6%)
- COP 3530 Student ratings. Value: 4.17/5.00 (83.4%) Coverage: 4.04/5.00 (80.8%)
- COP 4555 Student ratings. Value: 4.36/5.00 (87.2%) Coverage: 4.37/5.00 (87.4%)
- COP 4540 Student ratings. Value: 4.71/5.00 (94.2%) Coverage: 4.43/5.00 (88.6%)
- COP 4610 Student ratings. Value: 4.36/5.00 (87.2%) Coverage : 4.33/5.00 (86.6%)
- COP 3402 Student ratings. Value: 4.65/5.00 (93.0%) Coverage : 4.71/5.00 (94.2%)
- CDA 4101 Student ratings. Value: 4.12/5.00 (82.4%) Coverage: 3.88/5.00 (77.6%)

Conclusions

Both the value of this program outcome, and its attainment, are rated very highly by graduating students. The value of course outcomes that support attainment of this program outcome are perceived by students as ranging from high, 82.4%, to exceptional 94.2%. Outcomes coverage in these courses also range from high to exceptional, with only one course rated at an acceptable 77.6%. No course is rated less than acceptable in either value or coverage of course outcomes.

Overall rating

Value of outcome: **very high**. Attainment of outcome: **very high**.

Program Outcome c: *Demonstrate proficiency in problem solving and application of software engineering techniques.*

Indicators:

- Graduating Student rating. Value: 4.46/5.00 (89.2%) Attainment: 4.08/5.00 (81.6%)
- COP 3337 Student ratings. Value: 4.60/5.00 (92.0%) Coverage: 4.48/5.00 (89.6%)
- COP 3530 Student ratings. Value: 4.17/5.00 (83.4%) Coverage: 4.04/5.00 (80.8%)
- CEN 4010 Student ratings. Value: 4.37/5.00 (87.4%) Coverage: 4.25/5.00 (85.0%)
- CEN 4021 Student ratings. Value: 4.12/5.00 (82.4%) Coverage: 3.50/5.00 (70.8%)

Conclusions

Graduating students rate the value of this program outcome as very high, 89.2%. Their rating of their attainment of this outcome is high, 81.6%. The low rating of the coverage in CEN 4021 has been addressed in the previous assessment cycle. There had not been time for the effect to be reflected in the course offering for this present assessment.

Overall rating

Value of outcome: **very high**. Attainment of outcome: **high**.

AC Recommendation 8: *The Software Engineering Subject Area Coordinator should monitor the results from the Course Outcomes Survey by Students and the Course Outcomes Survey by Instructors at the end of the current offering in Spring 2010, and again when CEN 4021 is next offered. The data and conclusions for CEN 4021 should be specifically noted in the Subject Area Coordinator's report in the next assessment cycle.*

Program Outcome d: *Demonstrate mastery of at least one modern programming language and proficiency in at least one other.*

Indicators:

- Graduating Student rating. Value: 4.77/5.00 (95.4%) Attainment: 4.15/5.00 (83.0%)
- COT 2210 Student ratings. Value: 4.51/5.00 (90.2%) Coverage: 4.39/5.00 (87.8%)
- COP 3337 Student ratings. Value: 4.60/5.00 (92.0%) Coverage: 4.48/5.00 (89.6%)
- COP 4338 Student ratings. Value: 4.43/5.00 (88.6%) Coverage: : 4.33/5.00 (86.6%)

Conclusions

Graduating students rate the value of this program outcome at an exceptional 95.4%, and its attainment as high at 83%. The outcomes of courses that support this program outcome are also rated as exceptional or very high; outcome coverage in the courses is uniformly very high.

Overall rating

Value of outcome: **exceptional**. Attainment of outcome: **very high**.

Program Outcome e: *Demonstrate understanding of the social and ethical concerns of the practicing computer scientist.*

Indicators:

- Graduating Student rating. Value: 4.69/5.00 (93.8%) Attainment: 4.64/5.00 (92.8%)
- CGS 3092 Student ratings. Value: 4.51/5.00 (90.2%) Coverage: 4.39/5.00 (87.8%)

Overall rating

Value of outcome: **exceptional**. Attainment of outcome: **very high**.

Program Outcome f: *Demonstrate the ability to work cooperatively in teams.*

Indicators:

- Graduating Student rating. Value: 4.54/5.00 (90.8%) Attainment: 4.08/5.00 (81.6%)
- CGS 3092 course outcome: *Gain exposure to team problem solving*
- CEN 4010 course outcome: *Be familiar with working in a small software development team*
- CIS 4911 course outcome: *Demonstrate the ability to work effectively in a project team*

Course	Semester	# Resp.	Value	Coverage
CGS 3092	Spring 09	10	4.90	4.60
CGS 3092	Fall 09	53	4.66	4.71
CEN 4010	Spring 09	5	4.80	4.80
CEN 4010	Summer 09	9	4.78	4.78
CEN 4010	Fall 09	15	4.60	4.60
CIS 4911	Fall 09	2	5.00	4.50
		====	====	====
Combined	Year 2009	94	4.70	4.69
			94.04	*93.76*

Conclusions

Graduating students rate the value of this outcome as borderline exceptional, and their level of attainment as high. Students in CGS 3092, CEN 4010 and CIS 4911, all classes with a strongly related course outcome, rate both value and coverage of these outcomes as exceptionally high.

Overall rating
Value of outcome: **exceptional**. Attainment of outcome: **exceptional.**

Program Outcome g: *Demonstrate effective communication skills.*
Indicators:

- Graduating Student rating. Value: 4.69/5.00 (93.8%) Attainment: 4.38/5.00 (87.6%)
- CGS 3092 course outcome: Gain experience with making oral presentations, participating in informal debates, class discussions, and in critically observing others' presentations
- CGS 3092 course outcome: Be able to write papers involving legal, ethical, and professional issues in computing
- CIS 4911 course outcome: Demonstrate the ability to communicate the details of the technical solution through verbal and written modes.

Course	Semester	# Resp.	Value	Coverage	
CGS 3092	Spring 09	10	4.70	3.00	Verbal
CGS 3092	Spring 09	10	4.70	3.00	Written
CGS 3092	Fall 09	53	4.25	4.19	Verbal
CGS 3092	Fall 09	53	4.64	4.82	Written
CIS 4911	Fall 09	2	5.00	5.00	Verbal & Written
		====	====	====	
Combined	Year 2009	128	4.49	4.28	
			89.87	*85.55*	

Conclusions
Graduating students rate the value of this outcome as exceptionally high, and rate their attainment as very high. The classes in which communications skills are taught, ENC 3211 and COM 3100, are delivered by other instructional units. Responses from surveys of BS-CS courses which require project presentations, and that have a related communications outcome, indicate a borderline exceptionally high rating of the value of those outcomes, and rate the coverage of the outcomes as very high.
Overall rating
Value of outcome: **exceptional**. Attainment of outcome: **very high**.

AC Recommendation 9: *The Software Engineering course CEN 4010 includes a substantial project requirement. A course outcome, similar to the CIS 4911 outcome listed above, should be added to CEN 4010. This addition will improve the evaluation of this important program outcome.*

Program Outcome h: *Demonstrate understanding of the scientific method.*
Indicators:

- Graduating Student rating. Value: 4.00/5.00 (80.0%) Attainment: 4.00/5.00 (80.0%)

Conclusions
This BS-CS program outcome is fulfilled via the Science Requirement of the BS-CS program. Students complete a 2-semester Physics sequence, and 2 other science courses.
Overall rating
Value of outcome: **high**. Attainment of outcome: **high.**

Program Outcome i: *Demonstrate familiarity with fundamental ideas and issues in the arts, humanities and social sciences.*

Indicators:

- Graduating Student rating. Value: 3.69/5.00 (73.8%) Attainment: 3.38/5.00 (67.6%)

	2009	2008	2007	2006	2005
Attainment	67.60	90.00	78.40	75.60	70.00
Relevance	73.80	90.00	68.40	60.00	71.40

Conclusions

The ratings for 2008 are atypical and are based on only 4 student responses. Graduating students have consistently rated the relevance of this program outcome as low, below 75%. Their attainment ratings are not much higher. Evaluation of this program outcome is problematic since this outcome is fulfilled largely via the University Core Curriculum, normally in the student's sophomore year, and prior to admission into the CS major. There are no related program requirements in the students' upper division program.

Overall rating

Value of outcome: **low**. Attainment of outcome: **low.**

AC Recommendation 10: *SCIS should reconsider the viability of this program outcome. If the outcome is to be maintained, then its relevance to students must be enhanced, and some means of achieving the outcome should be provided as part of the BS-CS upper division requirements.*

Program Outcome j: *Have experience working in state-of-the-art computing environments.*

Indicators:

- Graduating Student rating. Value: 4.62/5.00 (92.4%) Attainment: 3.85/5.00 (77.0%)

	2009	2008	2007	2006	2005
Attainment	92.40	90.00	100.00	86.60	85.80
Relevance	77.00	70.00	76.60	71.20	68.60

Conclusions

Students have consistently rated the relevance of this program outcome as very high or exceptionally high. Student ratings of the attainment of the outcome have typically been below the acceptability level of 75%, or marginally acceptable. In the previous assessment cycle, this short-coming was addressed by adopting a recommendation to re-phrase the outcome. The outcome re-phrasing had not yet been incorporated into the survey instrument prior to administering the survey in Fall 2009.

Overall rating

Value of outcome: **high**. Attainment of outcome: **acceptable**.

AC Recommendation 11: *The re-phrased outcome j adopted by the SCIS faculty must be incorporated into the Graduating Student Survey instrument immediately, in time for the Spring 2010 survey. Particular attention must be paid to the student ratings of outcome j during the next assessment cycle.*

Program Outcome k: *Be successful in applying for computer science related entry-level positions in business, industry or government.*

Indicators:

Employment Status	**2009**	**2008**	**2007**	**2006**	**2005**
2 or more good offers	4	2	1	3	3
1 suitable offer	1	0	5	1	2
Offers unrelated to CS	0	0	0	2	1
No Offers Yet	5	1	2	2	0
Applications Rejected	0	0	0	0	0
Have not applied	3	1	4	1	1
Outcome *k* Relevance	80.00	100.00	98.40	88.80	90.00

Conclusions

Outcome k is highly relevant for graduating students, but the timing of the survey is not optimal for the purpose of assessing outcome k. Many students have applied for employment, but have not interviewed or received offers; some students have not yet applied. The absence of rejections, and the preponderance of students obtaining two or more good job offers, suggests strongly that our BS-CS graduates are very employable.

Overall rating

Value of outcome: **very high**. Attainment of outcome: **high**.

AC Recommendation 12: *Given the timing of the Graduating Student Survey, SCIS should consider a follow-up interview of graduates within a 5 to 10 week period after graduation. The interview could be done by phone, and for the specific purpose of discovering the recent graduate's employment status or acceptance into graduate school.*

Program Outcome l: [*Computer Science track graduates*] *Be successful in gaining admission to graduate programs in Computer Science.*

Indicators:

Application Status	**2009**	**2008**	**2007**	**2006**	**2005**
Accepted at 2 or more	0	0	0	0	1
Accepted at First Choice	1	1	0	1	0
Accepted at Secondary choice	0	0	0	0	0
All Applications Pending	1	0	2	1	0
All Applications Rejected	0	0	0	0	0
Have not applied	11	3	10	7	6
Outcome *l* Relevance	80.00	100.00	98.40	88.80	90.00

Conclusions

It is surprising that the relevance rating of this outcome is so high, given the small number of graduates who applied for admission to graduate programs. As with outcome k, the timing of the survey is not opportune. Fully half of the students responding have their applications pending. The others report successful applications, none report rejection. AC Recommendation 12 includes a recommendation for outcome l.

Overall rating

Value of outcome: **very high**. Attainment of outcome: **high**.

B. **Program Objectives**

The principal means of assessing attainment of the BS-CS Program Objectives is the Alumni Survey of Program Objectives. Table 4 summarized the responses on attainment of specific objectives. The alumni also provide "overall" ratings for the objectives. The results of this part of the survey are summarized in Table 5 (Section III D) and compared with the responses from the previous annual reports. Student attainment of program outcomes also contributes to student attainment of the program objectives. Additionally, the other interest groups within the SCIS umbrella, WICS, ACM, IAB, and UPE provide valuable indicators of the attainment of the program objectives.

Program Objective-1: *To provide our graduates with a broad-based education that will form the basis for personal growth and life-long learning.*

Indicators:

1) Alumni Survey of Program Objectives
   1.1. Please rate how your educational experience at FIU contributed to your capacity for personal growth
   Current Period: ***3.38/4 (84.50%),*** *Inception to date:* ***3.36/4 (84.00%)***
   1.2. Please rate how your educational experience at FIU contributed to your capacity for life-long learning
   Current Period: ***3.31/4 (82.75%),*** *Inception to date:* ***3.43/4 (85.75%)***
2) Attainment of related Program Outcomes
   2.1. *Outcome h* Understanding the scientific method: ***80.0%***
   2.2. *Outcome i* Familiarity with arts & Humanities: ***67.6%***
3) Activities of the ACM chapter

Conclusions

The atypical rating of Program Outcome i is addressed earlier in this report.

Attainment of Program Objective 1 is rated as **high**. There are no recommendations specific to Program Objective 1.

Program Objective-2: *To provide our graduates with a quality technical education that will equip them for productive careers in the field of Computer Science.*

Indicators:

1) Alumni Survey of Program Objectives
   1.1 Please rate the quality of your preparation upon graduation in Computer Programming
   Current Period: ***3.08/4 (77.00%),*** *Inception to date:* ***3.34/4 (83.50%)***
   1.2 Please rate the quality of your preparation upon graduation in Systems Development
   Current Period: ***2.77/4 (69.25%)*** *Inception to date:* ***2.81/4 (70.25%)***
   1.3 Please rate the quality of your preparation upon graduation in Data Structures and Algorithms
   Current Period: ***3.46/4 (86.50)*** *Inception to date:* ***3.30/4 (82.50%)***
   1.4 Please rate the quality of your preparation upon graduation in Computer Architecture & Organization
   Current Period: ***3.00/4 (75.00%)*** *Inception to date:* ***2.95/4 (73.75%)***

2) Attainment of related Program Outcomes
   2.1 *Outcome a* Proficiency in foundation areas **86.2%**
   2.2 *Outcome b* Proficiency in core areas **87.6%**
   2.3 *Outcome c* Proficiency in problem solving **81.6%**
   2.4 *Outcome d* Proficiency in a programming Language **83.0%**
3) Student Organizations

Conclusions

	CUMULATIVE			BY PERIOD		
	2/11/2004 To 3/18/2004	**2/11/2004 to 2/28/2007**	**2/11/2004 to 11/23/2009**	**2/11/2004 to 3/18/2004**	**3/19/2004 to 2/28/2007**	**5/26/2007 to 11/23/2009**
	65	**125**	**138**	**65**	**60**	**13**
Programming	83.00	84.25	83.50	83.00	85.50	77.00
Sys Develop.	66.50	70.50	70.25	66.50	74.50	69.25
Data Struct.	79.25	82.25	82.50	79.25	85.50	86.50
Architecture	73.50	73.50	73.75	73.50	73.75	75.00

The tables above summarize the responses from the Alumni Survey showing how the alumni rate their preparation in each of 4 subject areas. The data are shown cumulatively from inception of the survey, and by each survey cycle period.

1. Computer Programming: Alumni ratings have been consistently high, except that for the current evaluation period, this rating has fallen to **acceptable** only at **77.00%**. SCIS courses in this area are COP 2210, COP 3337 and COP 4338.
2. Systems Development: The rating for this subject area has remained consistently in the **low** range, well below the minimum acceptable level of 75%. SCIS courses in this area are COP 4540 and the Software Engineering courses as well as popular List-1 electives such as COP 4225 and COP 4226.
3. Data Structures and Algorithms: The cumulative ratings for this area have improved form acceptable to consistently high, and from acceptable to **very high** in the last two survey periods. This area is served by the SCIS course COP 3530
4. Architecture and Organization: Both cumulative and period ratings have remained consistently around 73 – 74%, just below an **acceptable** 75%. SCIS courses in this area are COP 3402, CDA 4101 and COP 4610.
5. See also Observations AS-11, AS-12 and AS-14 in Section III-D of this report.

There is a major concern about the ratings of the Systems Development area. A selection of related comments from the Alumni Survey is provided as Appendix N. A smaller sample is included here.

- *There was a serious lack of low-level programming languages such as assembly and C/C++. The course work focused almost entirely on Java development and did not prepare students for a large number of software engineering positions.*
- *The treatment of computer architecture was very poor. In fact, this is one of the most unfortunate aspects of such courses at FIU.*
- *did not get to learn a broad range of computer languages and operating systems. I was not able to take the Advanced Unix Programming class because of the times it was given. Taking that class would have helped me later on in my career*

- *Not enough C++ programming. I understand the arguments for using Java, but since C++ is more complex, students should have to adapt to Java (if needed in the work force) than adapt to C++ …*

It is important to understand that these comments do not characterize the BS-CS program as a whole. There are many positive comments, and some areas of the program are stronger than others. It is equally important to realize that the perspective of a student will evolve as he/she accumulates real-world work experience. This may explain the divergence between some program outcome ratings, and program objective ratings. The Systems Development area, in particular, is the one most obviously related to many employment spheres.

The enduring strength of the SCIS BS-CS program is that it has continued to provide the theoretical foundation that allows its graduates to adapt to changing work environments. The unavoidable interpretation of these ratings is that the BS-CS must do a better job of simultaneously equipping graduates with real-world tools. When combined with earlier observations about student preparedness for some advanced classes (paragraph A above), there seems to be a compelling argument for introducing a Systems Programming course at the intermediate level of the curriculum. Topics of such a course might include

- UNIX Systems Programming (traditional topics)
- UNIX & Windows Shell Programming
- UNIX & Java GUI
- Java Systems Programming (Database, XML, Networking, Threading)

AC Recommendation 13: *SCIS must investigate means of strengthening the system development areas of its curriculum. Towards this end, SCIS may consider bringing some of the content COP 4225 and COP 4226 into the required curriculum. The relationship of this curricular component to existing required courses, COP 4338, COP 3402, COP 4540 and COP 4610, and to the elective course COP 4520, will necessitate a more than cursory adjustment. It may also be necessary to create revised or additional elective courses for advanced study in systems programming/development.*

Program Objective-3: To provide our graduates with the communication skills and social and ethical awareness requisite for the effective and responsible practice of their professions.

Indicators

1) Alumni Survey of Program Objectives
   1.1 Please rate how your educational experience at FIU contributed to the development of your communication skills
   Current Period: ***3.00/4 (75.00%)****,* *Inception to date:* ***2.91/4 (72.75%)***
   1.2 Please rate how your educational experience at FIU contributed to your awareness of social and ethical responsibility
   Current Period: ***3.15/4 (78.75%)****,* *Inception to date:* ***2.96/4 (74.00%)***
2) Attainment of related Program Outcomes
   2.1 *Outcome e* Understanding of social and ethical issues **83.0%**
   2.2 *Outcome g* Effective communication skills **87.6%**
3) Student Organizations

Conclusions

See Observations AS-03 and AS-04 in Section III-D of this report. This objective is being met at a minimally **acceptable** level.

Recommendation AC14: *SCIS should create more opportunities for **application** of communication skills in the computer science curriculum, and should develop appropriately documented relevant evaluation metrics and feed-back mechanisms.*

Program Objective-4: To prepare students for BS level careers or continued graduate education.

Indicators

1) Alumni Survey of Program Objectives
   1.1. Please rate how your educational experience at FIU contributed to your preparation for a career in Computer Science
   *Current Period: **3.15/4 (78.75%)**, Inception to date: **3.18/4 (79.50%)***
   1.2. Please rate how your educational experience at FIU contributed to your preparation for graduate study
   *Current Period: **3.00/4 (75.00%)**, Inception to date: **3.07/4 (76.75%)***
2) Attainment of Program Outcomes
   2.1. *Outcome k* Success in applying for CS-related entry-level positions
   2.2. *Outcome l* Success in gaining admission to graduate programs
3) Student organizations

Conclusions

This objective is being met at an **acceptable** level. There are no recommendations specific to Program Objective 4.

Program Objective-5: To maintain a diverse student population and actively promote an environment in which students from all groups, including the traditionally under-represented, may successfully pursue the study of Computer Science.

Indicators

1) Alumni Survey of Program Objectives
   1.1. Please rate our effectiveness in maintaining a diverse student population
   *Current Period: **3.46/4 (86.50%)**, Inception to date: **3.43/4 (85.75%)***
   1.2. Please rate our diversity as an agent for your own personal growth
   *Current Period: **3.31/4 (82.75%)**, Inception to date: **3.07/4 (76.75%)***
   1.3. Please rate our diversity as an agent for your own awareness of social concerns
   *Current Period: **3.08/4 (77.00%)**, Inception to date: **2.95/4 (73.75%)***
   1.4. Please rate the extent to which SCS promoted a healthy learning environment
   *Current Period: **3.00/4 (75.00%)**, Inception to date: **3.24/4 (81.00%)***
   1.5. Overall rating of diversity promotion and environment
   *Current Period: **3.21/4 (80.25%)**, Inception to date: **3.17/4 (79.25%)***
2) Student Organizations

Conclusions

See Observation AS-18 in Section III-D of this report. This objective is being met at a **high** level. There are no recommendations specific to Program Objective 5.

Program Objective-6: To maintain a qualified and dedicated faculty who actively pursue excellence in teaching.

Indicators

1) Alumni Survey of Program Objectives
   1.1. Please rate the expertise of our faculty in their subject areas
   Current Period: ***3.23/4 (80.75%)****,* *Inception to date:* ***3.38/4 (84.50%)***
   1.2. Please rate the dedication of our faculty to undergraduate teaching
   Current Period: ***3.08/4 (77.00%)****,* *Inception to date:* ***3.17/4 (79.25%)***
   1.3. Please rate the mentorship (guidance, counseling) provided by our faculty
   Current Period: ***2.92/4 (73.00%)****,* *Inception to date:* ***2.79/4 (69.75%)***
   1.4. Please rate the overall instructional capability of our faculty
   Current Period: ***2.92/4 (73.00%)****,* *Inception to date:* ***3.22/4 (80.50%)***
   1.5. Overall quality of our faculty and instruction
   Current Period: ***3.04/4 (76.00%)****,* *Inception to date:* ***3.14/4 (78.50%)***
2) Student Organizations

Conclusions

This objective is being met at an **acceptable** level. However, with the exception of the mentorship role, all other aspects of this program objective show diminished ratings. In particular, the lower ratings of faculty expertise and instructional capability may be cause for concern. A comparison with the ratings from preceding Alumni Survey periods is informative. Also, see Observations AS-09 and AS-10 in Section III-D of this report.

Faculty Attribute	**Period 1 Inception**	**Period 2 02/04 to 02/07**	**Current 05/07 to 12/09**
	(65 Resp.)	**(60 Resp.)**	**(13 Resp.)**
Expertise	3.37 – 84.25%	3.43 – 85.75%	3.23 – 80.75%
Dedication	3.09 – 77.25%	3.27 – 81.75%	3.08 – 77.00%
Mentorship	2.78 – 69.50%	2.77 – 69.25%	2.92 – 73.00%
Instructional Capability	3.25 – 81.25%	3.25 – 81.25%	2.92 – 73.00%
Overall	3.12 – 78.00%	3.18 – 79.50%	3.04– 76.00%

It is tempting to speculate on the reasons for this apparent decline. However, the number of respondents in the current period is less than 10% of the total number completing the survey since inception. Special attention should be paid to the ratings of this program objective during the next assessment cycle. Meanwhile, it may be possible to get a better sense of whether there is a definite downward trend by looking at other available data, for example, student evaluations of course instructors.

AC Recommendation 15: *The Undergraduate Program Director (or his designees) may consider analyzing selected data available from the student evaluations of instructors performed at the end of each semester.* ***The data should be anonymous****, and should cover the period from Spring 2005 through Fall 2009. The data items selected for analysis should correlate to the faculty attributes listed in the above table.*

CONCLUSIONS

The available evidence suggests that during 2009, overall, the BS in Computer Science program outcomes and program objectives continue to be met at higher than the minimally acceptable levels.

This most significant concerns raised in this report are the lower than acceptable alumni rating of the systems development component of the curriculum, and an apparent, but unconfirmed, downward trend in the alumni rating of instructional capability. SCIS should move vigorously to reverse both trends.

In both the 2008 and 2009 annual reports, some Subject Area Coordinators, and the Assessments Coordinator, expressed concern in relation to the extremely low response rates to the survey instruments employed in our assessment process. It appears that a sustainable solution has been found in the case of the Course Outcomes Survey by Students. The number of responses to the Survey of Program Outcomes by Graduating Students (Exit Survey) has risen appreciably in 2009, but still needs to be improved and sustained at a minimum of half the number of students graduating. The Survey of Program Objectives by Alumni needs to be revitalized.

A significant revision to the rating scales of the various surveys has been recommended. It is hoped that this revision can be accomplished in a timely fashion so that all surveys during 2010 will employ similar metrics. Other changes approved during the previous assessment cycle must be implemented promptly so that there can be uniform processes and data available for the next cycle. These include incorporation of direct assessment strategies to lessen the exclusive reliance on survey data.

It is apparent that a review of the structure as well as the content of the BS-CS curriculum should be undertaken sooner rather than later. As a point of departure for this discussion, and not as a concrete recommendation, we offer a possible structure:

Level1 (foundation):	Discrete	COP 3337	COP 3402
Level2 (principles):	Automata	COP 3530	CDA 4101
Level3 (integration):	COP 4555	COP 4540	Sys Prog
Level4 (advanced):	HCI_GUI+	CEN 4010	COP 4610
Level5 (practicum):	Capstone	Elective	Elective

Other elements such as ethical practice, social awareness, communication skills, team-work, professional development and appreciation of the need for life-long learning should be integrated into this structure, rather than be included as separate elements only.

There are also indications that the BS-CS Program Outcomes and Program Objectives may be in need of re-appraisal and possibly revision. The timing for a review is not inopportune given the ABET criteria harmonization:
http://www.abet.org/Linked%20Documents-UPDATE/Criteria%20and%20PP/CAC%20Readers%20Guide.pdf
In addition, a finer resolution of the individual course outcomes statements is desirable and may be undertaken as part of this review.

The student organizations, ACM and UPE, continue to contribute meaningfully to the extra-curricular development of our students. It is lamentable that the WICS organization has become dormant. WICS has contributed immensely in the lives and development of our students, particularly female, and to realization of the diversity-related objectives of our programs. It must be a priority to revitalize WICS. The Industry Advisory Board has continued its role of bridging the academic and professional lives of our students.

VII. APPENDICES

Appendix A:

SCS Assessment Plan

1) **Curriculum Committee**
   a) The Assessments Coordinator
      Convenes and chairs meetings of the curriculum committee.
      Directs and oversees the overall assessment activities of the school.
      Reports curriculum committee findings to the director and faculty of the school.
      Directs implementation of curriculum modifications.
      Represents the school on the College curriculum committee. (May delegate.)
      Monitors the BS program for compliance with accreditation criteria.
      Prepares program assessment documentation required by the accreditation bodies.
   b) The Subject Area Leaders
      Maintain common syllabus and requirements for each course in a subject area.
      Interpret semester course evaluations to assess specific course outcomes.
      Report findings and recommendations to the curriculum committee.

   The Assessments Coordinator is appointed by the SCS Director.
   The Subject Area Leaders may be appointed or elected by the faculty.
      Programming: COP 2210, COP 3337, COP 3530, COP 4338, COP 4555.
      Software Engineering: CEN 4010, CEN 4015, CEN 4021.
      Computer Systems: COP 3402, CDA 4101, COP 4610, Non-math Electives.
      Foundations: MAD 2104, COT 3420, MAD 3512, Math Electives.
      Communication & Ethics: ENC 3211, CGS 3092.
      Science: PHY 2048/9, Science Electives
   The Assessments Coordinator and Subject Area Leaders for programming, software engineering, computer systems and foundations constitute the Curriculum Committee. The Coordinator should not simultaneously be a Leader of any of the first four subject areas, but may lead the Communications and Science areas.

2) **Assessment Activities**
   a) Course Outcomes: 1) A *student survey* and 2) an *instructor appraisal* are conducted towards the end of each semester in which a course is offered. The survey results and instructor appraisal are considered by the Subject Area Leader and Assessments Coordinator and reported to the Curriculum Committee for consideration. Adjustments not requiring syllabus change may be effected as soon as the following semester. The Curriculum Committee meets at the start of each semester to consider syllabus modifications recommended by the Subject Area Leader and/or Assessments Coordinator. On the recommendation of the Curriculum Committee, the faculty may consider modifications to the syllabus. 3) *Other assessment strategies* that may be considered include student portfolios, prerequisite tests and common finals.
   b) Program Outcomes: 1) A *graduating student survey* is conducted towards the end of each semester. The results of this survey and of the relevant course outcomes surveys are considered by the Curriculum Committee, meeting at the start of each

semester. 2) O*ther assessment strategies* that may be considered are an exit exam, student portfolios, capstone course.

c) Program Objectives: 1) An *alumni survey* is conducted annually on a 3-year cycle. 2) The *industrial advisory board* meets annually. 3) A *student interest group* meets in the Fall and Spring semesters. 4) *Other assessment strategies* that may be considered are student focus groups, employers survey.

3) Defining and Implementing Improvements

The Curriculum Committee meets routinely at the start of each semester. Additional meetings may be called as may be deemed necessary by the Assessments Coordinator.

1) Curriculum adjustments indicated by the course outcomes assessment of the previous semester are considered at the first semester meeting.
2) Results of the program outcomes and program objectives assessments should be considered at the soonest possible opportunity taking into account College curriculum committee deadlines.
3) Recommendations for program adjustments must be approved by the faculty.

Appendix B:

BS Program Objectives

1. To provide our graduates with a broad-based education that will form the basis for personal growth and life-long learning.
2. To provide our graduates with a quality technical education that will equip them for productive careers in the field of Computer Science.
3. To provide our graduates with the communication skills and social and ethical awareness requisite for the effective and responsible practice of their professions.
4. To prepare students for BS level careers or continued graduate education.
5. To maintain a diverse student population and actively promote an environment in which students from all groups, including the traditionally under-represented, may successfully pursue the study of Computer Science.
6. To maintain a qualified and dedicated faculty who actively pursue excellence in teaching.

BS Program Educational Outcomes

To complete the program of study for the BS in Computer Science, every student will

a) Demonstrate proficiency in the foundation areas of Computer Science including mathematics, discrete structures, logic and the theory of algorithms.
b) Demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems.
c) Demonstrate proficiency in problem solving and application of software engineering techniques.
d) Demonstrate mastery of at least one modern programming language and proficiency in at least one other.
e) Demonstrate understanding of the social and ethical concerns of the practicing computer scientist.
f) Demonstrate the ability to work cooperatively in teams.
g) Demonstrate effective communication skills.
h) Demonstrate understanding of the scientific method.
i) Demonstrate familiarity with fundamental ideas and issues in the arts, humanities and social sciences.
j) Have experience working in state-of-the-art computing environments.
k) Be successful in applying for computer science related entry-level positions in business, industry or government.
l) [*Computer Science track graduates*] Be successful in gaining admission to graduate programs in Computer Science.

Appendix C:

SCHOOL OF COMPUTER SCIENCE
ASSESSMENT MECHANISMS AND PROCEDURES

I. INTRODUCTION

The School of Computer Science at Florida International University uses many different assessment mechanisms to assess the extent to which its undergraduate program objectives are being met. Further, the School has defined procedures to evaluate the assessment results and identify ways to improve its curriculum deemed necessary and appropriate by its faculty.

SCS currently uses four survey instruments:

- Course Outcomes Survey by Students for each course
- Course Outcomes Survey by Instructors for each course
- Survey of graduating students
- Survey of alumni

In addition to these survey instruments, we seek recommendations from other important sources including the Industrial Advisory Board of the School, undergraduate women's group, ACM student chapter, and the like. We will reevaluate these recommendation mechanisms in the future and design survey mechanisms for individual constituencies if so warranted.

II. ADMINISTRATIVE STRUCTURE

To administer and evaluate these assessments, the School has created the administrative structure that includes the undergraduate program director (UPD), the assessments coordinator (AC), and five subject area coordinators (SAC), each in-charge of courses in a specific subject area. The Director of the School appoints the UPD, and the UPD is responsible for appointing the AC and the SACs.

The five subject areas are Programming, Software Engineering, Computer Systems, Foundations, and Communication & Ethics. The SACs are responsible for writing periodic recommendations for modifications pertaining to all courses in their respective subject areas. The AC is responsible for writing a periodic report summarizing these recommendations of the SACs and the recommendations received from other sources. This report is submitted to the curriculum committee of the School which then follows the normal academic procedures of the university to implement the modifications suggested. The UPD bears the

overall responsibility for assessing the undergraduate programs of the School as well as ascertaining that defined procedures are followed in a timely fashion.

III. ASSESSMENT INSTRUMENTS AND PROCEDURES

As indicated earlier, the School uses both, the survey instruments and recommendation from identified groups to assess whether its program objectives are being met. The details of these assessment mechanisms and how we plan to use them are described below.

A. SURVEY INSTRUMENTS:

1) COURSE OUTCOMES SURVEYS:

There are two bodies that conduct the course outcomes surveys, students taking the courses and faculty members teaching them.

a) By Students:

This survey is undertaken by current students for each of their classes every term. Each student is asked to rate the appropriateness of each of the outcomes for the course from two points of views: the level to which the outcome was met for the student personally and how meaningful the student considers the outcome. The survey is conducted on-line during the last two weeks of each term.

b) By Instructors:

Instructors of each of the courses complete this survey that includes which assignments, quizzes, tests, etc. covered which of the course objectives, how do they rate the appropriateness of each of these objectives, how effectively were they able to address that objective, how relevant they think each of the outcomes of the prerequisite course(s) is, what was the level of mastery of students in their prerequisite topics, and their suggestions about improving the overall preparation of the students for taking that course. The instructors complete this survey on-line within a week of the completion of the term.

The Associate Director for Computing Technologies is responsible for ascertaining that meaningful statistics for each survey are available within a month after the term concludes.

Each SAC is responsible for reviewing these survey results for all courses in the subject area, and write an annual report recommending possible

modifications, if any. The AC must receive these reports by the end of January, that is, by the end of the first month of the Spring term. The AC then summarizes and consolidates these recommendations in one report that must be submitted to the School's curriculum committee by the end of February of each year.

2) SURVEY OF GRADUATING STUDENTS:

This survey, undertaken by students who are ready to graduate with the undergraduate degree in Computer Science, is conducted in an on-line fashion every term. All graduating students are asked to rate every outcome of our degree program as to the extent it has been met for them personally as well as how meaningful they consider it to be for them personally. The students are also asked to give their suggestions to improve our undergraduate curriculum. The survey will be conducted on-line.

We will use the results of this survey to modify our curriculum appropriately to ascertain that students have a smooth learning experience as they progress through their curriculum. Curriculum modifications based on students' comments will be proposed by the AC in the annual report submitted to the curriculum committee by the end of February.

3) SURVEY OF ALUMNI:

This survey undertaken by our graduates is conducted every three years. Its primary purpose is to allow us to get the feedback from our graduates as to how adequately our curriculum has prepared them to achieve success in their current practices, either advanced graduate studies or employment in any computing industry or government. The survey will be conducted in an on-line fashion.

We will use the results of this survey to modify our curriculum contents to prepare our students better to maximize their potential to achieve success. The AC is responsible to include curriculum modifications based on the alumni survey in the annual report submitted to the curriculum committee.

B. RECOMMENDATIONS:

Periodically, we seek out recommendations for curricular changes from diverse bodies and interest groups. In all cases, curriculum modifications based on these recommendations will be included in the annual report submitted by the AC to the School's curriculum committee.

1) Industrial Advisory Board:

The IAB of the School is expected to meet once a year to discuss among other things, how we can prepare our students better to face the current challenges in the field. The Director of the School, the UPD, and the AC will review these formal and informal recommendations of the Board.

2) Undergraduate women's forum:

Our undergraduate women's forum meets occasionally throughout the year under the leadership of a faculty member of the School. The problems faced by women in science areas of endeavor are unique, and we will take the recommendations of this group to address their concerns about our curriculum and how can we assist them to perform better and attract more women in our program. The AC and the UPD will review the recommendations of the group on an annual basis.

3) ACM Student Chapter:

The members of our ACM Student Chapter meet periodically throughout the year. Recommendations made by this group through their faculty advisor will be reviewed by the AC and the UPD on an annual basis.

IV. IMPLEMENTING CURRICULUM CHANGES:

The annual written report submitted by the Assessments Coordinator to the curriculum committee of the School by the end of February includes recommended curriculum modifications based on all assessment mechanisms. The curriculum committee will complete all internal deliberations in the School by the end of the Spring semester so that the faculty approved changes in our curriculum can be submitted to the College Curriculum Committee's first meeting in the Fall semester. The University approved curriculum modifications will be implemented no later than in the subsequent Fall term.

Appendix D:

Alumni Survey:
http://www.cs.fiu.edu/~pestaina/BS_CS_09_AlumniSurvey.pdf

Exit Survey
http://www.cs.fiu.edu/~pestaina/BS_CS_09_ExitSurvey.pdf

Appendix E:

Subject Area Report for 2009

Subject Area: Communications & Ethics (Reported by Pat McDermott-Wells)
CGS 3092 Professional Ethics and Social Issues in Computer Science
COM 3011 Business and Professional Communication
ENC 3211 Report and Technical Writing

COM 3011 and ENC 3211 are taught by other instructional units and consequently are not subject to the School's assessment mechanisms. The Subject Area Coordinator's report thus addresses CGS 3092 only.

CGS 3092
All objectives were covered on an assignment or in an in class discussion
All objective were considered essential
Most objectives were covered extensively except for team problem solving
Most prerequisite objectives currently listed include specific programming skills that were considered incidental, but necessary to ensure the maturity of the student when taking this course.
Prerequisites for this course will change to COP 2210 or 2250, plus ENC 3213 as of next semester.

Recommendations*: Consider replacing this course with the proposed Technology in the Global Arena course. The proposed course addresses the requirement to add globalization to the major. However, the proposed course must be 3 credits to meet the globalization requirement.*

Appendix F: Subject Area: **Computer Systems** (Coordinated by Masoud Sadjadi)

CDA 4101 Structured Computer Organization

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	4	4.11	3.95
Fall 09	14	4.13	3.86
Year 2009	18	4.12	3.88

- ***Summary of Assessment:*** *This course was taught twice and by two different instructors. Four out of the five outcomes were indicated as essential and they were all covered adequately or extensively by both instructors. One student is concerned about the amount of material covered in this course, but it does not seem to be the case for the rest of the students who took the survey.*
- ***Recommendation:*** *The recommended changes from last year, namely, the change to the fifth outcome seems to be an appropriate one. Therefore, I recommend no changes to the outcome of this course.*

CNT 4513 Data Communications (previously CEN 4500)

	# Responding	Outcome Value	Coverage Adequacy
Fall 09	14	4.08	3.87
Year 2009	14	4.08	3.87

- ***Summary of Assessment:*** *The course has eight outcomes that have all been indicated as either essential or appropriate by the only instructor who taught this course. All the outcomes have been covered either extensively or adequately by the instructor through the assignments, tests, and term project. From the feedback in the students' evaluation, it seems that some students are not happy with the contents, some are not happy with the book, and some are not happy with the method of teaching. The instructor complains about the students' mixed preparation and background as both IT and CS students are allowed to take this course.*
- ***Recommendation:*** *I recommend no changes to the syllabus and outcome of this course. I recommend the textbook to remain the same as before. However, this is the third year that we have seen the problem with mixed students' preparation and unless the two group of students, namely, IT and CS students, are not separated, the problem with remain in the future. One solution is to develop another course for the IT students that builds on their background, does not include extensive analytic questions, and does not require extensive programming experience.*

COP 3402 Fundamentals of Computer Systems

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	22	4.42	4.59
Summer 09	4	4.85	4.95
Fall 09	21	4.85	4.79
	=======	=======	=======
Year 2009	47	4.65	4.71

- ***Summary of Assessment:*** *This course has five outcomes that have been indicated as either appropriate or essential by the only instructor who taught this course and according to him the outcomes have been adequately covered in the class. In general, most of the students who took the survey were extremely happy with the content and the instructor, but some expected more preparation for the quizzes.*
- ***Recommendation:*** *I recommend no changes to the syllabus and outcome of this course. Also, the assignments by the instructor seem adequate.*

COP 4225 Advanced UNIX Programming

	# Responding	Outcome Value	Coverage Adequacy
Summer 09	6	4.44	4.33
	=======	=======	=======
Year 2009	6	4.51	4.39

- ***Summary of Assessment:*** *This course has six outcomes; all indicated by the instructor as essential. The instructor was able to adequately cover the first four, but not enough time for the last two outcomes.*
- ***Recommendation:*** *I recommend no changes to this course. Based on the complaints by the students that we received in the previous two years, the contents of this course was revised last year and the changes seem to be appropriate based on the feedback by the six students who took the survey.*

COP 4540 Database Management

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	5	4.69	4.03
Fall 09	20	4.71	4.53
	=======	=======	=======
Year 2009	25	4.71	4.43

- ***Summary of Assessment:*** *This course has seven outcomes, all of which has been indicated by the only instructor as either essential or appropriate.*
- ***Recommendation:*** *I recommend no changes to the syllabus and outcome of this course.*

COP 4610 Operating Systems Principles

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	1	4.80	4.00
Summer 09	3	4.73	4.80
Fall 09	16	4.26	4.26
	=======	=======	=======
Year 2009	20	4.36	4.33

- ***Summary of Assessment:*** *This course has five outcomes; all of them were indicated as appropriate or essential by the two instructors and except for one the rest were either covered extensively or adequately. Some students complained about the lack of sufficient training on NACHOS. The computer engineering students do not seem to have the required background to catch up with the assignments and term project.*
- ***Recommendation:*** *I recommend replacing the forth outcome of this course, namely, "Be Familiar with Disc Allocation and Arm Scheduling Algorithms" with a more general scheduling algorithm. The changes to the other outcomes that were made last year seem to be appropriate. Also, it is helpful for the computer engineering students to have taken more programming courses before taking this class.*

COP 4226 Advanced Windows Programming

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	9	4.32	4.29
Fall 09	30	4.53	4.38
	=======	=======	=======
Year 2009	39	4.48	4.36

- ***Summary of Assessment:*** *This course has seven outcomes that has been modified last year based on the feedback that we received by the instructor and the students. As indicated by the instructor of this course, the outcomes for this course were not updated accordingly in the appraisal forms. Also, there is a concern that the computer engineering students do not have the required background to catch up with the assignments and term project.*
- ***Recommendation:*** *I recommend no changes to this course. Last year, this course went through some major changes and all the changes seem to be appropriate based on the feedback by the professor and the students who took the survey. However, the changes were not reflected on the course appraisal form, which should be fixed for next year. Also, it is helpful for the computer engineering students to have taken more programming courses before taking this class.*

CEN 4023 Windows Component Technology
This course was not offered during 2009.

Appendix G:

Assessment of 2009 Foundations Courses

Geoffrey Smith

February 1, 2010

1 Introduction

The Foundations courses are COT 3420 (Logic for Computer Science), COP 4555 (Principles of Programming Languages), MAD 2104 (Discrete Mathematics), MAD 3512 (Theory of Algorithms), and the math electives. Because the Mathematics Department has not done assessments for their courses, we discuss only COT 3420 and COP 4555.

2 COT 3420 Logic for Computer Science

Ana Pasztor taught a section of COT 3420 in Spring 2009 and another in Summer 2009, Alex Pelin taught a section in Spring 2009, and Christine Lisetti taught a section in Fall 2009. Assessing COT 3420 in Spring and Summer 2009 is difficult in that students submitted a total of just 6 evaluations over the three sections, which is probably less than a 10% response rate. In Fall 2009, however, 23 student evaluations were submitted; it seems that the new "netbook" procedure was a great success.

The following table shows a summary of the student evaluations:

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	3	4.08	4.42
Summer 09	3	3.83	4.08
Fall 09	23	4.22	3.99
	=======	=======	=======
Year 2009	29	4.17	4.04

Overall the evaluations seem generally positive, but it was only in the Fall 2009 section that the response rate was sufficient to warrant any firm conclusions. In that section, there was some dissatisfaction with the course textbook: just 12 out of 23 students agreed strongly or moderately that the required text was suitable.

In their appraisals, Alex, Ana, and Christine all found the students' preparation deficient, particularly with respect to propositional logic and mathematical induction. Ana repeated her suggestion from previous years that a new class specifically on induction and recursion would be valuable. Christine commented that she consistently finds that students have trouble in getting motivated with mathematical logic and seeing how it relates to computer science as a whole. She reported trying a new approach that begins by introducing *logical intelligent agents*, and then using them to motivate the logical concepts throughout the semester. She mentioned some preliminary student feedback that suggests that her approach improves student motivation and understanding.

3 COP 4555 Principles of Programming Languages

In 2009, Geoff Smith taught one section of COP 4555 in Spring 2009 and another in Fall 2009. Students submitted 9 evaluations in Spring and 18 in Fall, again reflecting a much improved response rate with the new "netbook" procedure.

The following table shows a summary of the student evaluations:

	# Responding	Outcome Value	Coverage Adequacy
Spring 09	9	4.61	4.69
Fall 09	18	4.23	4.21
	=======	=======	=======
Year 2009	27	4.36	4.37

The student evaluations are positive, although there was a noticeable drop in satisfaction from Spring to Fall. (Possibly this was an artifact of the higher response rate, however.) In Fall, there were quite a few students who were unsure whether the textbook (which is just a set of on-line notes) is suitable.

In his appraisals, Geoff again stated that the change from Standard ML to F# seems to have increased student interest. He did mention that the students in the Fall section seemed somewhat less capable and less motivated than in previous semesters.

Appendix H: Subject Area: Programming (Reported by Tim Downey)

COP 2210 Computer Programming I
COP 3337 Computer Programming II
COP 3530 Data Structures
COP 4338 Computer Programming III

COP 2210 Computer Programming I

All objectives are covered on an assignment and/or an exam.
All objectives are considered essential or appropriate.
All objectives were covered extensively except for Problem Solving and Fundamental Data Types. Two instructors reported covering Problem Solving adequately. One instructor reported covering Fundamental Data Types adequately. Student evaluations confirm the instructor's appraisals, except one class did not have an evaluation submitted by the instructor.
Most of the instructors thought that the students' preparation for taking the course was adequate. One instructor felt that it was deficient.
An instructor thinks that college algebra should be a prerequisite.
An instructor recommends dividing Objective #1 into two objectives: be familiar with using an existing class; be familiar with creating a class.
Please see the COP-3337 Programming II comments. Despite the relatively positive instructor's appraisals and student evaluations, some instructors are not covering all the objectives.

Recommendation:

Since this course is primarily for computer science majors we should require a passing grade in college algebra. Please note that this recommendation was made last year also.
Programming I instructors should be strongly encouraged to cover all of the objectives for Programming I, especially Strings and ArrayLists.

COP 3337 Computer Programming II

All objectives are covered on an assignment and/or an exam; except one instructor did not cover Objective 6 in any test or exam.
All objectives are considered essential or appropriate; most were essential. Two instructors felt that Objective 6 was appropriate, but not essential. One instructor felt that Objectives 4 and 5 (as well as 6, above) were appropriate, but not essential (these all cover the Java Collection Interface).
All objectives were covered extensively or adequately, except one class did not have an evaluation submitted by the instructor. Student evaluations confirm the instructor's appraisals, except for one class. In that class, the student evaluation of the coverage of outcomes was low. The areas that were not covered were recursion, interfaces, stacks & queues and problem solving.
All prerequisite objectives were considered highly useful.

Student prerequisite preparation was generally good and adequate; several instructors reported multiple deficiencies for their students. Three sections reported a deficiency in Strings/ArrayLists. One section reported a deficiency in Objects/Classes.
Please also see the COP-3530 Data Structures comments.

Recommendation:
Programming II instructors should be strongly encouraged to cover all of the objectives for Programming II, especially Stacks & Queues and the Java Collections.

COP 3530 Data Structures
All objectives are covered on an assignment and/or an exam.
All objectives are considered essential or appropriate.
All objectives were covered extensively or adequately. Student responses supported this; except for one course that had very low student evaluation of outcomes.
There was a wide range of opinions on the value of the specific prerequisites, encompassing the entire range from irrelevant to highly useful, and the mastery of the prerequisites, with several "deficient" ratings. It is unclear why this would be, given that both student evaluations and instructor appraisals for COP-3337 do not give an indication that there is a problem with the outcomes of COP3337.

Recommendation:
Despite the evident lack of prerequisite preparation for some of the students in the course, COP-3530 is still meeting the objectives, according to appraisals from the follow-up course COP-4338 Programming III. The outcomes for the course should be reevaluated; instructors should be strongly encouraged to cover all of the objectives.

COP 4338 Computer Programming III
All objectives were covered on an assignment and/or an exam, except reflection.
All objectives were considered essential, except recursion.
All objectives were covered extensively, except recursion.
The relevant prerequisite objectives was rated highly useful
The mastery of prerequisite objectives was rated good, except reflection.
The preparation of the students was rated good
Two students requested more networking; one wanted more threading; one student wanted more extensive programs and more C++.

Recommendation:
This course seems to be fulfilling its task of preparing students for the Operating Systems course and teaching some C and C++ along the way. The Reflection outcome is not being covered anymore, but the outcomes for the course do not reflect this. The outcomes should be brought in alignment with the course.

Appendix I:

Software Engineering Area Report – Calendar Year 2009

This report contains the assessment of the courses in the Software Engineering area taught in the School of Computing and Information Sciences (SCIS) for the calendar year 2009. This area contains the courses: CEN 4010 Software Engineering I, CEN 4012 Software Design and Development Project (previously CEN 4015), CEN 4021 Software Engineering II, CEN 4023 Component-Based Software Development and CIS Senior Project.

During the calendar year 2009 the following courses and sections were offered: CEN 4010 - one section in the Spring, one section in the Summer, and one section in the Fall; CEN 4012 one section in the Spring; CEN 4021 – the students took the graduate CEN 5064 Software Design in the Spring and did not follow the CEN 4021 departmental syllabus; and CIS 4911 – one section in the Spring and one section in the Fall. The CEN 4023 course was not offered in 2009.

This report was prepared using the results from the online student course assessments and the instructor appraisals for the Spring, Summer and Fall semesters of 2009. These assessment materials are available on the SCIS website.

Course outcomes:

CEN 4010:
(1) Be familiar with the Software Development Life Cycle
(2) Master the techniques to gather and specify the requirements of a medium-size software system using UML,
(3) Master the techniques to design and implement a medium-size software system
(4) Be familiar with software testing techniques
(5) Be familiar with software documentation
(6) Be familiar with working in a small software development team
(7) Be familiar with system walkthroughs

CEN 4012:
(1) Demonstrate mastery of techniques of analyzing and designing software systems.
(2) Demonstrate mastery of software planning.
(3) Demonstrate mastery of software systems implementation.
(4) Demonstrate mastery of software testing techniques.
(5) Demonstrate ability to work effectively in a software development team.

CEN 4021:
(1) Master techniques of planning and monitoring the progress of a software project
(2) Master software project cost estimation techniques
(3) Be familiar with software architectures
(4) Be familiar with software development team structures

CIS 4911:
(1) Master formulating a problem.
(2) Master specifying the requirements to solve a problem.
(3) Master of designing the solution to a problem.
(4) Master of realizing the solution to a problem.
(5) Master the ability to validate the solution to a problem

(6) Master the ability to manage a semester long project.
(7) Master the ability to work effectively in a project team.

Student Course Assessments:

The summary for the software engineering courses for calendar year 2009 includes the results of the survey on course delivery, course outcomes and student suggestions. The course delivery criteria included (1) the student's preparation for taking the course, (2) the level of difficulty of the course, (3) an evaluation of the required text, and (4) the amount of home work required for the course. The course outcomes are listed in the previous section.

CEN 4010:

A total of 29 students completed the online course evaluations for the 3 sections of CEN 4010 taught in 2009 (Spring, Summer and Fall). The majority of the students surveyed (72%) either strongly agreed (32%) or moderately agreed (40%) that the course delivery was good. As compared to 2008 the percentage of students who either strongly agreed or moderately agreed that the course delivery was good dropped by 16%. A majority of the students strongly or moderately agreed that the level of difficulty was adequate (76%). There was a drop in this category by 20% as compared to 2008. The suitability of the text scored lower in 2009 (mean of 3.55/5.00) than 2008 (mean of 4.28/5.00) or 2007 (3.95/5.00). The lowest scoring attribute in the course delivery criteria was the suitability of the text book (mean of 3.55/5.00) with the preparation for taking the course slightly greater (mean 3.69/5.00).

The results obtained for the course outcomes showed a similar trend. Over 84% of the students strongly agreed (56%) or moderately agreed (27%) that overall the course outcomes were valuable. Over 80% of the students strongly agreed (52%) or moderately agreed (28%) that the course outcomes were adequately covered in class. Both these values showed a reduction from 2008, scoring 94% and 92% respectively.

CEN 4012:

One (1) student completed the online survey for the course out of three students.

CEN 4021:

Five (5) students completed the online survey for the course. The majority of the students surveyed (70%) either strongly agreed (10%) or moderately agreed (60%) that the course delivery was good. The lowest attribute was suitability of the course text which recorded a mean value of 2.80/5.00. This was an improvement for both the course delivery and the course text over 2008.

The results obtained for the course outcomes were positive. An estimated 81% of the students strongly agreed (44%) or moderately agreed (37%) that the course outcomes were valuable. Over 68% of the students strongly agreed or moderately agreed that the course outcomes were adequately covered in class. An estimated 18% of the students surveyed either moderately disagreed or strongly agreed that the outcomes of the course were adequately covered. These survey results were similar to 2008.

CIS 4911:

Only two (2) students completed the student evaluation in 2009.

Suggestions (Students):

CEN 4010:

- The student suggestions were generally positive with respect to the course instructors.
- Several students stated that the workload for the course was too much, particularly the documentation for the project.
- Several students stated that taking a Database course and a Windows Programming course would better prepare them for this class. This has been a recurring concern for several years.
- Students from Computer Engineering stated that they were ill-prepared for the course. That is they lack experience in Programming and Databases.
- One student stated that they learnt a lot in other courses but was not prepared to implement the type of system required for this class.
- One student stated that the class should cover testing frameworks before the implementation phase of the project.

CEN 4012:

- The only student that took the survey said that providing the notes from the software engineering class was very helpful.

CEN 4021 (students followed the CEN 5064 Software Design syllabus)

- A student stated that this course should not be taken with graduate students, since they have a better understanding of the material.
- A student stated that the class should be taught twice a week (75minutes) and not once (150 minutes).
- A student complained that too much time was spent on documentation and not enough on coding. The student also stated that there should be a prerequisite class that teaches UML.
- One student stated that the model-driven software development (MDSD) approach was very different and that the professor should stress the importance of reading the book. In addition, the class notes were too abstract and more time should be spent on examples.

Instructor Course Assessments:

CEN 4010:
The instructors for the sections taught in the Spring, Summer, and Fall semesters reported that the course objectives were covered using a variety of evaluation methods including tests, assignments, review papers, and project presentations and deliverables. All the course objectives were either extensively or adequately covered for all the semesters. The mastery of prerequisite topics in all the semesters was either good or adequate.

CEN 4012:
The online instructor's appraisal of the course was completed by the coordinator of the course. The feedback from the instructors indicated that the course objectives were covered using project deliverables and project presentations. All the course objectives were either extensively or adequately covered. The prerequisite topics were all relevant and the students displayed either good or adequate mastery of these topics. The student preparation was adequate for the course.

CEN 4021:
This course was taught with the graduate CEN 5064 Software Design. This was done due to the low enrollment in CEN 4021. This issue has been resolved in Fall 2009.

CIS 4911
The enrollment of the class was very low, but it is expected to increase in the coming semesters. Low enrollment has an impact on the experience the students gain in working in teams.

Prerequisite Outcome Suggestions (Instructors):

CEN 4010:
- Knowledge on using server-side technologies such as Tomcat, Apache Server, PHP/JSP/ASP. Student exposure to graphical user interface design technologies would also be beneficial to students taking this course.
- This class has significant interactions with programming and databases. Perhaps a database class would enhance the students' abilities in the class. Too many students have little to no programming experience in the technologies used to implement the class project according to their feedback.

CEN 4012:
- Students should take a course in software planning and estimating the cost to develop software.

Recommendations:

3. Since the issue regarding the students in CEN 4021 being taught in the graduate class has been resolved in Fall 2009 there is no need to address that issue here.
4. Currently the students in the software design and development track take the CEN 4012 Software and CIS 4911 Senior Project classes. This issue has been resolved in Fall 2009.
5. There is a need to have students take a programming course that contains web-based programming and working with databases before taking CEN 4010. This issue is still of some concern since students continue to raise it during the class surveys. The recommendation is to either change the class projects to use the knowledge gained in the prerequisite courses or keep the current class projects and provide the students with the opportunity to gain the prerequisite knowledge in other courses. The current projects used in the CEN 4010 classes are the type of projects being developed in industry e.g., web-based applications that use server technology.
6. The results from the student surveys for CEN 4010 showed that the adequacy of the text book is once again an area of concern. There has also been a drop in the quality of the course delivery by the instructors. It is recommended that the course coordinator meet with the instructors in software engineering to look into these issues.
7. There is a need for more students to take part in the online surveys.

Peter J. Clarke
Software Engineering Area Coordinator

Appendix J

Summary of Activities (2009)
Association for Computing Machinery
FIU Student Chapter

Report Date: February 3, 2010 Report by: Kip Irvine, faculty advisor

Membership

The ACM student chapter currently has about 30-40 active members. This would include students who: (1) train with the programming team, (2) serve as officers, (3) attend general meetings, and (4) participate in the weekly special-interest groups. Overall, there has been a steady increase in both membership and student activity over the past two years. This is primarily due to the leadership by a few graduate students and advanced undergraduates who lead the special interest groups, as well as the constant involvement in coaching by two faculty members (Narasimhan and Irvine). In addition, Professor Prabakar has been assisting the Panther Linux User Group (PLUG).

Programming Competitions

The FIU ACM chapter sent two teams to the ACM Southeast programming competition, held in Melbourne, Florida, in November 2000. The teams were coached by Professor Giri Narasimhan and Kip Irvine. Professor Giri Narasimhan conducted weekly workshops in advanced algorithms for team members throughout the Fall semester. The ACM club held an undergraduate programming competition for FIU students in September 2009.

Corporate Sponsorship

In December 2009, Ultimate Software (Weston, FL) announced a gift of $11,000 to the ACM Programming team. The purpose of these funds are to sponsor team travel to ACM competitions, community outreach, and scholarships for team members. It is likely that this will be a recurring gift, once per year.

High-School Programming Competition

The ACM club hosted its 6th Annual FIU High School Programming Competition (April 2009). Participation was approximately 70 students from high schools from Dade, Broward, and even Central Florida. The event was sponsored by Ultimate Software.

Volunteer Tutoring Program

The ACM club continued its volunteer tutoring program throughout 2009. Thanks to support from Dean Deng and Director Navakha, the tutoring program now has a paid student coordinator. In September, we implemented a software tracking system to help students connect with tutors. A total of 64 tutoring sessions were logged in Spring 2009, involving 14 tutors. In Fall 2009, approximately 120 hours of tutoring were conducted by 12 tutors. Awards were given to the top tutors at the annual SCIS awards banquet.

Company Visits

SCIS was visited by Ultimate Software, Goldman-Sachs, IBM, Microsoft, TekSystems, Ansca Mobile, and Deutsche Bank. These companies have shown a heightened interest in recruiting out top students. The presentations were well attended, often with standing room only.

Student Picnic

ACM held a very successful joint picnic for FIU students in Crandon Park (Nov 2009). Approximately 20 students attended.

Campus Student Organizations

ACM is an active member of the FIU Campus Student Organizations council, which oversees all sponsored clubs on campus. Because of its activity, it has been able to earn approximately $700 per semester in funds from student activities fees. This money is usually spent on social events, T-shirts, and travel for students to conferences.

ACM Special Interest Groups

There are four very active special interest groups in the FIU-ACM club:

- GSIG – General Special Interest group
- Games
- Robotics
- Crypto & Security
- Panther/Linux User Group (PLUG)

A description of each group (except PLUG) may be found at http://cis.fiu.edu/acm

Appendix K

WICS@FIU REPORT for 2009

WICS has been inactive during much of 2009.

Appendix L

2009 Upsilon Pi Epsilon Report

Upsilon Pi Epsilon (UPE) is the international honor society for students in Computer Science, Information Technology, Computer Engineering, and Management Information Systems programs. During the months of January to December 2009, the members of the FIU chapter of UPE focused on organizing events to promote and encourage excellence among our peers and establish a sense of community with students, staff, and faculty.

Below is a list of the accomplishments and activities of UPE during 2009:

Induction Ceremony: In April 2009, 7 new FIU SCIS students were inducted into a life-long membership with UPE. Their induction into UPE also entitled them to a year-long membership with ACM.

Sumo-Wrestling Robot Programming: In August 2009, UPE partnered with the Engineering Student Council and received 6 sumo-wrestling robot kits. The kits contain unassembled parts to build robots that must be programmed to "sumowrestle" each other outside of a ring. The ferocious man-eating robots, as described by the UPE member that is organizing the event, have been used to teach UPE members new programming and engineering skills.

Microsoft Partnership: In September 2009, UPE began a partnership with Microsoft through the Microsoft Student Partner program. As part of the partnership, UPE will promote Microsoft products, scholarships, and internships to fellow SCIS peers.

Windows 7 Launch Party: In October 2009, UPE organized a Windows 7 Launch Party. UPE reserved room ECS 243 and entertained 147 FIU students with Windows 7 demos, videos, trivia, prizes, and food. The event was so successful that Microsoft used pictures of the event in its Monthly Newsletter as an example of how the Windows 7 Launch parties should be.

Petition to stay in the MMC campus: Throughout the 2009 Fall semester, UPE members distributed petitions to students in the SCIS department to keep our professors on the MMC campus at FIU. With help from the FIU ACM student club, approximately 540 petitions were signed and submitted to the FIU President's office.

Special thanks should go to the UPE executive committee, under the leadership of Jairo Pava UPE President, for their hard work during 2009. This year UPE became more visible and active in SCIS and FIU.

Peter J. Clarke
UPE Advisor.

Appendix M

SCIS Industry Advisory Board

Information about the SCIS IAB is available from the School's web page: http://www.cis.fiu.edu/iab/

Summary of IAB Activities in 2009, and minutes of the meetings of the IAB are not available at this time. Should these become available in the public domain, relevant references or hyperlinks will be added as an addendum to this report.

For specific information, please contact Steve Luis, SCIS Director for Information Technology and Business Relations.

Appendix N: Alumni Survey Comments

There was a serious lack of low-level programming languages such as assembly and C/C++. The course work focused almost entirely on Java development and did not prepare students for a large number of software engineering positions.

The treatment of computer architecture was very poor. In fact, this is one of the most unfortunate aspects of such courses at FIU.

did not get to learn a broad range of computer languages and operating systems. I was not able to take the Advanced Unix Programming class because of the times it was given. Taking that class would have helped me later on in my career

The programming work was excellent, but it did not cover any project management skills and did not sufficiently cover the skills needed of an enterprise architect or system designer which is common today.

Not enough C++ programming. I understand the arguments for using Java, but since C++ is more complex, students should have to adapt to Java (if needed in the work force) than adapt to C++, because the latter is that much more difficult when faced with real applications (ie those a programmer would need to develop in the workplace) I would rather struggle a little more in school learning C++ along with the curriculum than to struggle in the office where I can loose my job.

Too many of the classes have little, if any, relevance in the work force. I agree that classes like theory of algorithms and logic for CS are important, but they have too little practical applications, except maybe for researchers. The curriculum should be more focused on technical aspects (eg programming, database management, data structures, etc) and a little less on the theory (theory of algorithms, logic, programming languages

They did not prepare me for a job upon completion. When i left in 1997, the work force wanted web programmers, and perl programmers, and Windows programming and Database admins, none of which was taught to me at FIU

Failure to incorporate on industry programming standards, such as Microsoft Visual C++. Towards the end of my graduate career, this was beginning to change. While the university should not be tied to any particular company, a large percentage of companies use a handful of tools. I would have been better prepared for the "real world" with more exposure to these development tools.

cs program/faculty (at least at the time i was there) felt that unix was dying and that windows is the future... I think we need to instill sound unix principles in students vs. windows... especially with the growing prominence of linux in IT shops. The other advantage of unix is students learn automation b/c unix tends to be more command line based... many IT shops want folks that can automate repetitive or complex tasks versus folks that know their way around guis.

Need more involvement with external company to bring practical training to the student