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APPENDIX A-1: BS in CS *Program Educational Objectives*

http://www.cis.fiu.edu/programs/undergrad/csassessment/bsoutcomes.php

BS Computer Science Program Educational 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.

APPENDIX A-2: BS in CS *Student Outcomes*

http://www.cis.fiu.edu/programs/undergrad/csassessment/bsoutcomes.php

BS-CS Student 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 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) Have experience with contemporary environments and tools necessary for the practice of computing

APPENDIX B-1: BS in CS *Assessment Plan*

SCHOOL OF COMPUTING AND INFORMATION SCIENCES
ASSESSMENT PLAN
of the
Bachelor of Science in Computer Science

I. INTRODUCTION

The document, Assessment Mechanisms and Procedures, of the School of Computing and Information Sciences (SCIS), describes the means by which the School conducts the annual assessment of its BS in Computer Science program. The instruments employed for assessment, and the SCIS administrative structure for performing the assessment are described in that document. These means include

- Survey Instruments
  1. Course Outcomes Survey by Students
  2. Course Outcomes Survey by Instructors
  3. Survey of Graduating Students
  4. Survey of Alumni
- Recommendations from constituents
  1. Industry Advisory Board (IAB)
  2. Women in Engineering and Computer Science (WIECS)
  3. ACM Student Chapter
- Direct Measures
  1. Senior Project Assessment
  2. Course-Embedded Assessment

The administrative structure for conducting the assessment comprises

- The Undergraduate Program Director (UPD)
- The Assessments Coordinator (AC)
- The Subject Area Coordinators (SACs)

The assessment procedures are performed by the SCIS Subject Area Coordinators and the SCIS Assessments Coordinator. Their findings are reported to the SCIS Undergraduate Committee for evaluation, resulting in a set of recommendations to the SCIS faculty.

This document, the SCIS Assessment Plan, defines the implementation of the entire assessment cycle. It specifies the roles of all participants in the process, and sets out a timetable for execution of those roles.

II. PARTICIPANTS

1) The Undergraduate Program Director (UPD)

The Undergraduate Program Director is appointed by the Dean of the School of Computing and Information Systems. The UPD bears overall responsibility for the administration of all SCIS undergraduate programs.

The role of the UPD relevant to the assessment process is

- To designate the chair of the SCIS Undergraduate Committee (below)
- To ensure that the assessment timetable is followed and that the procedures are otherwise executed as set forth in this document and in the Assessments Mechanisms and Procedures Document
- To document and implement program adjustments arising from the annual assessment process that are approved by the SCIS faculty and, if necessary College and University Curriculum Committees.

2) The Subject Area Coordinators (SACs)

The Subject Area Coordinators may be appointed by the UPD or elected by the SCIS faculty. Each SAC bears responsibility for a group of courses in the BS in Computer Science curriculum:

Foundations Subject Area courses:
MAD 2104, MAD 3512, COP 4534, COP 4555, COT 3420
List 2 electives: MAD 3305, MAD 3401, MAD 4203, MHF 4302
Programming Subject Area courses:
COP 2210, COP 3337, COP 3530, COP 4226, COP 4338, COP 4520
Software Engineering Subject Area courses:
CEN 4010, CEN 4021, CEN 4072, CIS 4911
Computer Organization Subject Area courses:
CDA 3103, CDA 4101, CNT 4713, COP 4610
Computer Systems Subject Area courses:
CAP 4770, COP 4604, COP 4710, COP 4722
Professional Development Subject Area courses:
CGS 1920, CGS 3095, ENC 3249
Calculus and Physics Area courses:
MAC 3311, MAC 3312, PHY 2048(L), PHY 2049(L), STA 3033

The role of a Subject Area Coordinator is:

- To maintain a common syllabus for each SCIS course in their area.
- To maintain the instruments and rubrics for course-embedded assessment in their area
- To liaise with the academic unit teaching a non-SCIS course that is a required or elective course in the BS in CS program.
- To interpret the data from the Student and Instructor Course Outcomes surveys for each course in their area.
- To prepare an annual report presenting the findings from the course surveys, and to make recommendations based on these findings.

3) The Assessments Coordinator (AC)

The Assessments Coordinator is appointed by the SCIS Dean. The role of the AC is:

- To interpret the data from the Survey of Graduating Students, Senior Project assessment, and Alumni survey.
- To prepare the SCIS annual assessment report. The report presents the data from these assessment mechanisms and resulting findings and recommendations, and summarizes the recommendations from the several SAC annual reports.
- To monitor the BS in CS program for compliance with the ABET accreditation criteria.
- To prepare the ABET accreditation self-study report, and program documentation as may be required by ABET.

The Assessments Coordinator should not simultaneously be a Subject Area Coordinator, except for the Calculus and Physics area (liaison).

4) The Undergraduate Committee (UGC)

The Undergraduate Committee may be appointed by the SCIS Dean or elected by the SCIS faculty. The UGC Chair convenes and conducts all UGC meetings as necessary. The Undergraduate Program Director and Assessments Coordinator are ex-officio members of the Undergraduate Committee.

The UGC has the responsibility of considering proposed changes to the existing SCIS undergraduate courses and programs, and of making recommendations, based on these considerations, to the full SCIS faculty.

The role of the UGC in the assessment process specifically, is to consider the AC's annual assessment report. Each AC or SAC recommendation contained in the annual report is evaluated by the UGC. Where helpful, the UGC

may require further input or clarification from the author (AC or SAC) of a recommendation. At the conclusion of their deliberations, the UGC chair prepares a summary of recommendations for presentation to the SCIS faculty. In the summary:

- The UGC may endorse an AC or SAC recommendation for adoption by the SCIS faculty.
- The UGC may endorse an AC or SAC recommendation and propose to the SCIS faculty a means of enacting the recommendation.
- The UGC may decline to act on a recommendation, setting forth reasons for its decision.
- The UGC may author its own recommendations to the SCIS faculty.

5) The SCIS Faculty

The SCIS faculty, collectively, has sole responsibility for promulgating and modifying its academic programs. The SCIS faculty approves or rejects any recommendations for adjustments to the BS in Computer Science program. Adoption of SCIS approved program adjustments may be subject to final approval of College and University Curriculum Committees.

III. SCHEDULE

1) Surveys

The schedule for administering Course Outcomes, Graduating Students and Alumni surveys is set out in the SCIS Assessment and Mechanisms document. All surveys are carried out on-line. The SCIS Director for IT and Business Relations has the responsibility of ensuring that the data from any survey is available within one month of conclusion of the survey.

2) Direct Measures Assessment

Senior Projects are presented at the end of every semester. The resulting assessment data are collected by the Senior Project coordinator and are available by the start of the following semester. Data from the course-embedded assessments are prepared by the SAC's and are made available by the start of the next semester.

3) Subject Area Coordinator Annual Reports

The SAC annual reports cover the Spring, Summer, and Fall semesters of one calendar year. The SAC annual reports are made available to the Assessments Coordinator by the end of January of the following year.

4) Recommendations from Constituents

Recommendations from IAB, WEICS, ACM Chapter, or other constituent group are provided to the assessments Coordinator no later than the end of January of each year.

5) Assessment Coordinator Annual Report

The AC annual report incorporates data and recommendations from all of the sources listed above. The report covers the period of one calendar year and is made available to the Undergraduate Committee by the end of February of the following year.

6) Undergraduate Committee Summary of Recommendations

UGC meetings to consider the annual assessment report are conducted during the months of February, March and April. UGC concludes all deliberations, and the UGC summary of recommendations is made available to the SCIS faculty, no later than two weeks prior to the end of the Spring semester.

The UGC chair should prioritize recommendations for adjustments to the BS in CS program that require further approval by the College Curriculum Committee. The SCIS Dean and/or UPD should expedite SCIS faculty consideration of such recommendations, bearing in mind the deadlines of the College Curriculum Committee, and with a view to implementation at the start of the next academic year.

7) SCIS Faculty Assessment Meeting

The SCIS Dean convenes a meeting of the SCIS faculty to consider the UGC recommendations prior to the end of the Spring semester, but no sooner than one week following receipt of the UGC summary of recommendations. Should matters be left over from this meeting, such matters should be addressed during the first meeting of the full SCIS faculty in the following Fall semester.

IV. ENACTMENT

- UGC recommendations not requiring faculty approval must be enacted by the responsible entity, SAC or UPD, immediately and reported to the next meeting of the full SCIS faculty.
- UGC recommendations approved by the SCIS faculty during the Spring meeting, and not requiring further approval by the College, must be enacted by the UPD as soon as practicable, and by the start of the following Summer semester if at all possible.
- Recommendations approved by the SCIS faculty during the Fall meeting, and not requiring further approval by the College, must be enacted by the UPD as soon as practicable during the Fall semester.
- Recommendations for BS in CS program adjustments approved by the SCIS faculty, and subsequently approved by the College and/or University Committees, must be enacted at the earliest possible date following approval by the highest Committee.

The Undergraduate Program Director has overall responsibility for enactment of all program adjustments resulting from the annual assessment process. The UPD is charged with documentation and publication of program adjustments.

Revised: November 16, 2010

APPENDIX B-2: BS in CS *Assessment Mechanisms & Procedures*

SCHOOL OF COMPUTING AND INFORMATION SCIENCES
ASSESSMENT MECHANISMS AND PROCEDURES
of the
Bachelor of Science in Computer Science

I. INTRODUCTION

The School of Computer and Information Sciences (SCIS) at Florida International University uses several mechanisms to assess the extent to which its undergraduate program outcomes and objectives are being met. Further, the School has defined procedures to evaluate the assessment results and to identify ways to improve its curriculum based on the assessment results, as deemed necessary and appropriate by its faculty.

SCIS currently uses four survey instruments:

1. Course Outcomes Survey by Students
2. Course Outcomes Survey by Instructors
3. Survey of Graduating Students
4. Survey of Alumni

Direct measure of attainment of the program outcomes is performed by assessment of student performance in the Senior Project course (Capstone course) taken in the students' final semester.

In addition to the data from the survey instruments and Senior Project assessment, SCIS seeks recommendations from other constituents of the BS in CS program, including the Industrial Advisory Board, Women in Engineering and Computer Science group, and the ACM student chapter.

II. ADMINISTRATIVE STRUCTURE

To administer and evaluate these assessments, SCIS has created an administrative structure that includes:

- the Undergraduate Program Director (UPD),
- the Assessments Coordinator (AC),
- the Subject Area Coordinators (SACs)

The Undergraduate Program Director is appointed by Dean of the School.

The Assessments Coordinator and the Subject Area Coordinators are appointed by the Undergraduate Program Director.

Each course in the BS in Computer Science program falls under one of five subject areas, each with its own SAC: Programming, Software Engineering, Computer Systems, Foundations, and Communication & Ethics. Each Subject Area Coordinator is responsible for writing an annual report detailing recommendations for modifications pertaining to all courses in their respective subject area.

The Assessments Coordinator is responsible for writing an annual report summarizing the recommendations of the SACs, and recommendations received from the other program constituents. The AC's report is submitted to the SCIS Undergraduate Committee for consideration.

On consideration of the AC and SAC reports, the SCIS Undergraduate Committee may subsequently make recommendations to the full SCIS faculty. Recommendations adopted by the SCIS faculty are implemented via the normal academic procedures of the university.

The Undergraduate Program Director 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, SCIS utilizes data from the survey instruments and Senior Project evaluation, and recommendations from its constituent groups, to assess whether the program outcomes and objectives of the BS in Computer Science program are being met. The details of these assessment mechanisms, and their application, are described below.

A. SURVEY INSTRUMENTS:

SCIS currently uses four survey instruments. All surveys are conducted online. The Associate Director for Computing Technologies is responsible for ensuring that meaningful statistics for each survey are available within a month after the semester concludes.

The student and instructor Course Outcomes Survey statistics are analyzed and reported in the annual reports of the Subject Area Coordinators.

The Graduating Students and Alumni survey statistics are analyzed and reported in the annual report of the Assessments Coordinator.

1. Course Outcomes Survey by Students

This survey is undertaken during the final two weeks of every semester.

Students of every class offered during the semester are asked to rate each course outcome from two perspectives by indicating the extent to which they agree or disagree with two assertions about that outcome:

- *I believe that this is a valuable outcome for this course*
- *The subject matter of this outcome was covered adequately in class*

Responses are given on a scale of 1 to 5 with 5 indicating strong agreement with the assertion, and 1 indicating strong disagreement. The students' responses from both perspectives, *value of outcome* and *adequacy of coverage*. are averaged across the class, individually for each outcome, and cumulatively for all outcomes

2. Course Outcomes Survey by Instructors

This survey is undertaken at the conclusion of every semester.

For each class offered during any semester, the instructor of the class completes a grid showing how course assignments and tests relate to the individual course outcomes. The instructor rates each course outcome from two perspectives:

- The *appropriateness* of the outcome is rated as one of *essential*. *appropriate*, or *inappropriate.*
- The in-class coverage of the outcome is rated as one of *extensively*, *adequately*, *not enough*, or *not at all*.

The instructor also provides ratings of the *relevance* and *student mastery* of the *course prerequisite outcomes*, and may choose to provide recommendations for additional prerequisite outcomes.

3. Survey of Graduating Students (Program Outcomes)

This survey is undertaken every semester, beginning during the final two weeks of the semester.

The graduating student is asked to rate each of the BS in Computer Science (curricular) Program Outcomes, *a* through *j*, from 2 perspectives.

- The graduating student indicates the extent to which they agree or disagree with the following assertion:
- *This program outcome has been met for me personally*
- The graduating student indicates how meaningful they consider the outcome to be:
- *How meaningful do you consider this outcome to be for you personally?*

Program outcomes *k* and *l* relate to the success of the graduating student in finding CS-related employment, and admission to graduate school respectively. For each of these 2 outcomes, *k* and *l*, the student indicates how successful they have been, and how their CS education has contributed to that success.

Responses to all questions are given on a scale of 0 through 5, with 0 being least favorable, and 5 being most favorable, and are averaged across all students completing the survey.

4. Survey of Alumni (Program Objectives)

This survey is undertaken by graduates of the BS in Computer Science program, and is conducted every three years.

Alumni completing this survey are asked to provide ratings of the several facets of the BS in Computer Science Program Objectives under four broad areas:

- quality of Educational Experience (6 facets)
- quality of Faculty and Instruction (4 facets)
- quality of preparation in the Curricular Areas (4 facets)
- promotion of Diversity and Healthy Environment (4 facets)

Each facet is rated on a scale of 0 (Unsatisfactory) through 4 (Excellent). The ratings are averaged for each individual facet (18), for each area (4), and cumulatively across all facets.

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) Industry Advisory Board (IAB):

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 Dean of the School, the UPD, and the AC will review these formal and informal recommendations of the Board.

2) Women in Engineering and Computer Science (WIECS) group:

The WIECS 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 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 into our program. The AC and the UPD 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 are reviewed by the AC and the UPD on an annual basis.

C. DIRECT MEASURES

1. Senior Project Assessment

For the purpose of assessing the BS in CS Program Outcomes via the Senior Project, the UPD, in consultation with the faculty, constitutes an evaluation team(s) of at least 3 persons to include

1. The Senior Project course coordinator/instructor (faculty),
2. A second faculty member not associated with the project,
3. A non-faculty representative from the SCIS Industry Advisory Board, or person with similar experience nominated by the Board.

Several such teams may be constituted, based on the number of student projects to be evaluated.

The evaluation team observes the students' oral presentations and/or demonstrations of their project. The evaluation team has access to all artifacts produced by the student team to satisfy the requirements of the Senior Project course.

The members of the evaluation team complete a suitable instrument to indicate their assessment of the extent to which the students' work demonstrates attainment of the BS in Computer Science Program Outcomes. The instrument includes rubrics to guide their evaluations. The instrument and included rubrics must be published.

The completed evaluation instruments, together with the project artifacts, become components of the annual assessment process, and must be maintained until at least the following ABET accreditation site visit.

2. Course-Embedded Assessment

In addition to assessment via the Senior Project, the Undergraduate Program Director and Assessments Coordinator, in consultation with the relevant Subject Area Coordinators, may designate courses for sampling of student work (exams and/or projects), for the purpose of assessing attainment of Student Outcomes. The particular courses to be sampled may be determined from semester to semester. The Subject Area Coordinators will maintain suitable sampling mechanisms and rubrics for assessment of Student Outcomes via the courses in their areas.

IV. IMPLEMENTING CURRICULUM CHANGES:

The Assessment Coordinator's annual written report is submitted to the SCIS Undergraduate Committee by the end of February of each year. The report includes recommended curriculum modifications based on all of the assessment mechanisms. The SCIS Undergraduate Committee completes 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 are implemented no later than in the subsequent Fall semester.

APPENDIX C: Subject Area Coordinator Reports

Computer Organization: Area Coordinator Report
Nagarajan Prabakar
October 15, 2013

1. **Introduction:**

The Computer Organization area consists of the following four courses: CDA-3103 (Fundamentals of Computer Systems), CDA-4101 (Structured Computer Organization), CNT-4713 (Net-Centric Computing), and COP-4610 (Operating Systems Principles). The assessment report given below for each of these courses is based on student responses about the course outcomes and the faculty course appraisals.

2. CDA-3103: Fundamentals of Computer Systems

The following table shows a summary of the course assessment evaluations:

	No. of Student Responses	Value of Outcome	Coverage Adequacy	Professor
Fall 2011	45	4.66	4.66	Pestaina
Spring 2012	38	4.51	4.57	Pestaina
Summer 2012	21	4.79	4.75	Pestaina
Fall 2012	36	4.77	4.78	Pestaina
Spring 2013	38	4.54	4.52	Pestaina
	=======	=======	=======	
Total	178	4.64	4.65	Weighted Avg

For all five outcomes of the course, most of the students (more than 80%) agree either strongly or moderately. There is no significant concern expressed in the Students Suggestions section.

Recommendation: No changes are recommended.

3. **CDA-4101: Structured Computer Organization**

The following table shows a summary of the course assessment evaluations:

	No. of Student Responses	Value of Outcome	Coverage Adequacy	Professor
Fall 2011	15	4.47	4.43	Barton
Fall 2012	16	4.04	3.78	Prabakar
Spring 2013	18	4.48	4.34	Prabakar
	=======	=======	=======	
Total	49	4.33	4.18	Weighted Avg

For all five outcomes of the course, most of the students (more than 75%) agree either strongly or moderately. There is no significant concern expressed by the students or faculty.

Recommendation: No change is needed on the course outcomes or syllabus.

4. **CNT-4713: Net-Centric Computing**

This new course was approved by the University effective from Spring 2012. The first course offering in Spring 2013 did not have the course outcome survey data as well as the faculty course appraisal data. In the next two years we will have sufficient data for the next report cycle.

Recommendation: No change is needed on the course outcomes or syllabus.

5. **COP-4610: Operating Systems Principles**

The following table shows a summary of the course assessment evaluations:

	No. of Student Responses	Value of Outcome	Coverage Adequacy	Professor
Summer 2011	7	4.24	3.71	Osorio
Fall 2011	16	4.66	4.34	Wei
Spring 2012	6	4.43	4.20	Wei & Zhao
Summer 2012	16	4.76	4.67	Jang Xu
Fall 2012	17	4.51	4.55	Wei
Spring 2013	20	4.50	4.37	Zhao
	=======	=======	=======	
Total	82	4.56	4.39	Weighted Avg

For all five outcomes of the course, most of the students (more than 75%) agree either strongly or moderately. Students from Summer-2011 and Spring-2013 suggested about their inadequate preparation in C for this course. Computer Engineering majors take only one introductory level C programming course and are unable to complete projects, whereas CS major students who complete COP-4338 Programming III before they enroll in COP-4610, have adequate C proficiency to complete projects. Also, the lack of adequate of prerequisite skills among a subset of students is cited in the faculty course appraisals (Summer2011, Fall2011, Spring2012, and Fall2012).

Recommendation: Enforce the prerequisite Programming III for all students enrolled in the course (including Computer Engineering majors). Repetition of this problem for several years, requires ECE Undergraduate Program Director to enforce this prerequisite. Also, the faculty needs to specify clearly about the expected C proficiency at the very first class. Furthermore, students may be given a quiz (about 10-20 short questions) in C during the first week of the term so that each students can gauge his/her ability to cope with the projects.

Computer Programming Subject Area Report

Prepared by Norman Pestaina, Subject Area Coordinator *September 27, 2013*

This report covers the period from Summer 2011 through Spring 2013. It summarizes and analyzes the data from the SCIS Course Evaluation System's Course Outcomes Surveys for the BS-CS courses in the Computer Programming subject area:

- COP 2210 Computer Programming I (*required*)
- COP 3337 Computer Programming II (*required*)
- COP 3530 Data Structures (*required*)
- COP 4338 Computer Programming III (*required*)
- COP 4226 Advanced Windows Programming (*elective*)
- COP 4520 Introduction to Parallel Programming (*elective*)

The Course Outcomes Survey is intended to be completed at the end of each semester by each student registered in any required or elective course of the BS-CS major. Students are surveyed on aspects of the course delivery, and on the value and coverage of each course outcome. The following table summarizes the availability of CES data for the period under review.

SEMESTER	COP 2210	COP 3337	COP 3530	COP 4338	COP 4225	COP 4520
Summer '11			X	X		
Fall '11	X	X	X	X	X	
Spring '12	X	X	X	X		X
Summer '12	X	X	X	X		
Fall '12	X	X	X	X	X	
Spring '13	X	X	X	X		

Table 1: Availability of CES Course Data, Summer 2011 – Spring 2013

In the survey of course delivery, students provide ratings on a scale of 1 through 5 of the following:

- My preparation for taking this course
- The level of difficulty of this course
- The suitability of the textbook for this course
- The amount of homework required for this course

In the survey of course outcomes, students provide ratings on a scale of 1 through 5 for two aspects:

- The value of the outcome
- The adequacy of class coverage of the outcome.

A separate overall rating of course outcomes is solicited, also on a scale of 1 through 5.

Students may also offer written suggestions on any aspect of the course.

All student responses to the surveys are anonymous.

COP 2210 Computer Programming I (required)

This is a required course in the BS-CS major and is offered in multiple sections in each semester.

A. Course Delivery

COP 2210		Survey of Course Delivery				
Term	#	*Preparation*	*Difficulty*	*Textbook*	*Homework*	*% CS Major*
SU 11						
FA 11	5	4.20	4.20	4.20	4.80	40.00
SP 12	2	5.00	5.00	5.00	5.00	0.00
SU 12	21	4.24	4.48	3.81	4.38	38.10
FA 12	5	5.00	5.00	4.80	5.00	20.00
SP 13	111	4.26	4.28	4.20	4.51	34.23
ALL	144	4.29	4.34	4.18	4.52	34.03

Table 2-1: Survey of COP 2210 Course Delivery

Analysis

All aspects of COP 2210 course delivery are rated above the acceptability threshold of 3.75.

B. Course Outcomes

O1. Be familiar with the concepts of Objects & Classes
O2. Master the fundamental Java data types
O3. Master the Java selection and iteration constructs
O4. Master using String, ArrayList and Wrapper classes
O5. Master analyzing problems and writing Java program solutions to those problems using the above features

There are no course outcomes survey data available for this reporting period. This failure has been noted and corrective action initiated.

C. Student Suggestions

- There are several strong endorsements of the course instructor. COP 2210 students seem to greatly appreciate the teaching style and facilitation of learning.
- A number of comments (Summer 2012 and Spring 2013) provide contrasting observations on the content and pace of the course.

D. **SAC Recommendations**

1) **The course outcomes survey must be re-implemented expeditiously.**
2) **It might be useful to attempt a correlation between the ratings of the value of COP 2210 course outcomes and the students' written suggestions on the content of the course.**

COP 3337 Computer Programming II (required)

This is a required course in the BS-CS major and is offered in multiple sections in each semester. There are no data available for Summer 2011.

A. Course Delivery

COP 3337		Survey of Course Delivery				
Term	*#*	*Preparation*	*Difficulty*	*Textbook*	*Homework*	*% CS Major*
SU 11						
FA 11	67	4.19	4.33	4.21	4.58	88.00
SP 12	55	4.05	3.96	3.82	4.31	64.00
SU 12	26	4.46	4.42	4.23	4.62	92.00
FA 12	49	4.67	4.37	4.20	4.62	69.39
SP 13	56	4.25	3.96	3.77	4.41	25.00
ALL	253	4.29	4.18	4.03	4.50	65.64

Table 3-1: Survey of COP 3337 Course Delivery

Analysis

All aspects of COP 3337 course delivery are rated above the acceptability threshold of 3.75.

B. Course Outcomes

O1. Master the design and implementation of classes using inheritance and polymorphism
O2. Master the use and implementation of interfaces
O3. Be exposed to writing recursive methods
O4. Be familiar with the implementation of linked list data structures
O5. Be familiar with the Stack & Queue data structures
O6. Be exposed to the Java Collection interface
O7. Master analyzing problems and writing Java program solutions to those problems

COP 3337		O1		O2		O3		O4		O5		O6		O7	
Term	#	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*
SU 11															
FA 11	67	4.59	4.58	4.55	4.48	4.42	4.36	4.62	4.50	4.23	4.22	3.82	3.73	4.11	3.97
SP 12	55	4.52	4.31	4.50	4.22	4.37	4.25	4.37	4.11	4.57	4.24	4.22	3.79	4.28	3.85
SU 12	26	4.50	4.65	4.50	4.62	4.71	4.58	4.54	4.54	4.73	4.81	4.38	4.40	4.15	3.92
FA 12	49	4.59	4.53	4.73	4.57	4.65	4.46	4.71	4.55	4.70	4.60	4.63	4.47	4.29	4.17
SP 13	56	4.62	4.33	4.64	4.40	4.40	4.18	4.64	4.29	4.56	4.28	4.44	4.11	4.40	4.28
ALL	253	4.57	4.46	4.59	4.44	4.48	4.34	4.58	4.38	4.52	4.37	4.26	4.04	4.25	4.05

Table 3-2: Value and Coverage of COP 3337 Individual Course Outcomes

Analysis

Value of Outcomes: With the exception of outcome O6 in Fall 2011, the individual COP 3337 course outcomes are all perceived to have high value, indicated by ratings that uniformly surpass 4.10, and that are significantly higher in most observations.

Adequacy of Coverage: The individual COP 3337 course outcomes are all perceived to be well covered in class presentations. The weighted averages for this reporting period are all above 4.00, well in excess of the acceptability threshold of 3.75.

The following table describes the overall ratings for course outcomes (collectively):

COP 3337	# Responding	Value of Outcomes	Adequacy of Coverage
Summer '11			
Fall '11	57	4.33	4.26
Spring '12	55	4.40	4.11
Summer '12	26	4.50	4.51
Fall '12	49	4.62	4.48
Spring '13	56	4.53	4.27
ALL	243	4.47	4.30

Table 3-3: Overall Value and Coverage of COP 3337 Course Outcomes

Analysis

Value of Outcomes: The grouped COP 3337 course outcomes are perceived to have high value as indicated by the ratings that uniformly surpassed 4.40 in each semester.

Adequacy of Coverage: The grouped COP 3337 course outcomes are perceived to be very well covered in class. The semester ratings uniformly surpassed 4.10 in each semester.

C. Student Suggestions

- There are several comments about the several class instructors. While not directly related to the course outcomes, there is a fair implication that course topics are not always similarly covered by the various instructors.
- Several comments suggest that a (closed) lab would be beneficial in COP 3337.
- There are a number of comments about the difficulty level of assignments.
- Some comments indicate difficulty transitioning from COP 2210 into COP 3337.

D. **SAC Recommendations**

1) **Classroom instruction in COP 3337 could be supplemented by providing resources such as closed labs or peer tutoring, or some other mechanism to provide students with additional opportunities for mastering the course outcomes.**
2) There may be a need to synchronize the outcomes of COP 2210 with the prerequisites of COP 3337 in order to afford students a smoother transition.

COP 3530 Data Structures (required)

This is a required course in the BS-CS major and is offered in each semester.

A. Course Delivery

COP 3530		Survey of Course Delivery				
Term	*#*	*Preparation*	*Difficulty*	*Textbook*	*Homework*	*% CS Major*
SU 11	2	4.50	4.50	5.00	4.50	0.00
FA 11	28	4.29	3.43	4.11	4.21	28.57
SP 12	20	4.70	4.45	4.50	4.60	25.00
SU 12	20	4.25	4.15	3.75	4.47	20.00
FA 12	37	4.35	4.03	4.11	3.94	51.35
SP 13	31	4.32	4.00	4.10	4.52	16.13
ALL	138	4.37	3.99	4.13	4.31	29.71

Table 4-1: Survey of COP 3530 Course Delivery

Analysis

With the exception of the 3.43 rating of the *Difficulty* in Fall 2011, all aspects of COP 3530 course delivery are rated above the acceptability threshold of 3.75. The ratings of this aspect in subsequent semesters all comfortably exceed the threshold.

B. Course Outcomes

O1. Be familiar with basic techniques of algorithm analysis
O2. Be familiar with writing recursive methods
O3. Master the implementation of linked data structures such as linked lists and binary trees
O4. Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure
O5. Be familiar with several sub-quadratic sorting algorithms including quicksort, mergesort and heapsort
O6. Be familiar with some graph algorithms such as shortest path and minimum spanning tree
O7. Master the standard data structure library of a major programming language (e.g. java.util in Java 5)

COP 3530		O1		O2		O3		O4		O5		O6		O7	
Term	#	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*
SU 11	2	4.50	3.50	4.50	4.50	4.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
FA 11	28	4.22	3.33	3.86	3.25	4.43	3.52	4.25	3.63	4.04	3.39	4.41	3.43	4.32	3.57
SP 12	20	4.95	4.90	4.85	4.65	4.95	4.85	4.95	4.90	4.95	4.60	4.75	4.35	4.85	4.70
SU 12	20	4.95	4.65	4.50	4.10	4.80	4.70	4.75	4.70	4.90	4.60	4.95	4.75	4.60	4.20
FA 12	37	4.49	4.30	4.14	3.76	4.62	4.35	4.53	4.33	4.11	3.67	4.42	4.29	4.27	4.14
SP 13	31	4.45	4.40	4.45	4.03	4.60	4.27	4.55	4.55	4.30	3.87	4.30	3.90	4.52	4.29
ALL	138	4.56	4.25	4.31	3.91	4.65	4.27	4.56	4.36	4.37	3.93	4.50	4.09	4.46	4.14

Table 4-2: Value and Coverage of COP 3530 individual Course Outcomes

Analysis

The Summer 2011 ratings are atypical, and in any case are based on only 2 responses. They are therefore disregarded in this analysis.

Value of Outcomes: The individual COP 3530 course outcomes are all perceived as having very high value; their ratings are consistently around 4.50, often higher.

Adequacy of Coverage: The Fall 2011 ratings of the coverage of the individual COP 3530 course outcomes are uniformly below the 3.75 acceptability threshold. In each of the 4 subsequent semesters, only Outcome 5 (sorting), on one occasion only, is rated marginally below 3.75. The averages for the entire 6-semester period are all above 3.90, well above acceptability.

The following table describes the overall ratings for course outcomes (collectively):

COP 3530	# Responding	Value of Outcomes	Adequacy of Coverage
Summer '11	2	3.93	3.64
Fall '11	28	4.22	3.45
Spring '12	20	4.89	4.71
Summer '12	20	4.78	4.53
Fall '12	37	4.37	4.12
Spring '13	31	4.45	4.19
ALL	138	4.49	4.14

Table 4-3: Overall Value and Coverage of COP 3530 Course Outcomes

Analysis

The Summer 2011 ratings, based on only 2 responses, are atypical, and are disregarded.

Value of Outcomes: The grouped COP 3530 course outcomes are perceived to have very high value as indicated by the ratings of 4.89 and 4.78 in Spring and Summer 2012, and a weighted average of 4.49.

Adequacy of Coverage: Except for Fall 2011, the grouped COP 3530 course outcomes are perceived to be very well covered in class with ratings above 4.10 in each semester, and a weighted average of 4.14.

C. Student Suggestions

There are several comments regarding the instructors of COP 3530, but few that directly address course outcomes. Nonetheless, these comments seem consistent with the significantly lower outcome ratings in the earlier 2011 semesters. Fortunately, the potential concerns appear to have been addressed as evidenced by consistently good ratings in later semesters.

D. **SAC Recommendations**

There are no recommendations re COP 3530.

COP 4338 Computer Programming III (required)

This is a required course in the BS-CS major and is offered in every semester.

A. Course Delivery

COP 4338		Survey of Course Delivery				
Term	#	*Preparation*	*Difficulty*	*Textbook*	*Homework*	*% CS Major*
SU 11	13	4.92	4.92	4.92	4.92	0.00
FA 11	23	4.52	4.22	3.74	4.74	13.04
SP 12	20	4.30	4.40	4.00	4.55	25.00
SU 12	8	4.50	4.00	4.38	4.38	0.00
FA 12	11	3.91	4.36	4.09	4.18	0.00
SP 13	29	4.66	4.55	4.14	4.59	10.34
ALL	104	4.50	4.43	4.14	4.60	10.57

Table 5-1: Survey of COP 4338 Course Delivery

Analysis

All aspects of course delivery of COP 4338 are rated as acceptable, at or above 3.75.

B. Course Outcomes (to Spring 2012)

O1. Master Java multithreading and serialization
O2. Master simple Java networking
O3. Be familiar with reflection in Java
O4. Be familiar with all elements of modern C++ programming including templates, inheritance, STL
O5. Be familiar with elements of C programming, including the use of pointers required for C and legacy C++
O6. Master writing program solutions to problems using the above features

COP 4338		O1		O2		O3		O4		O5		O6		O7	
Term	#	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*
SU 11	13	4.85	4.85	5.00	4.92	5.00	5.00	4.75	4.69	3.92	3.77	5.00	5.00		
FA 11	23	4.61	4.39	4.13	3.87	3.91	3.48	3.96	3.27	4.00	3.57	4.70	4.57		
SP 12	20	4.55	4.30	4.20	3.75	4.11	3.42	3.60	3.25	3.89	3.61	4.70	4.70		
SU 12															
FA 12															
SP 13															
ALL	56	4.64	4.46	4.36	4.07	4.23	3.81	4.01	3.59	3.94	3.63	4.77	4.72		

Table 5-2A: Value and Coverage of COP 4338 individual Course Outcomes to Spring 2012

Course Outcomes (after Spring 2012)

O1. Master C basic types, arrays, and pointers
O2. Be familiar with the UNIX utilities such as Makefile, and debugging using gdb
O3. Master standard Input/Output
O4. Be familiar with process address spaces: Data, Heap, Code, and Stack
O5. Master dynamic memory management
O6. Master multithreading and synchronization
O7.Master writing program solutions to problems using the above features

COP 4338		O1		O2		O3		O4		O5		O6		O7	
Term	#	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*
SU 11															
FA 11															
SP 12															
SU 12	8	4.75	4.12	4.75	4.38	4.88	4.25	4.75	3.75	4.75	3.88	4.75	4.00	4.75	4.25
FA 12	11	4.82	4.64	4.45	4.36	4.82	4.45	4.64	4.36	4.82	4.55	4.73	4.45	4.73	4.36
SP 13	29	4.90	4.75	4.79	4.41	4.86	4.78	4.90	4.50	4.72	4.48	4.72	4.31	4.86	4.66
ALL	48	4.86	4.62	4.71	4.39	4.85	4.62	4.82	4.34	4.75	4.40	4.73	4.29	4.81	4.52

Table 5-2B: Value and Coverage of COP 4338 individual Course Outcomes after Spring 2012

Analysis

The COP4338 course outcomes were revised as part of the redefinition of the course content, replacing Java language features (see above) and C++ with a complete focus on the C language. Thus, outcomes data prior to Summer 2012 are not relevant, and only the post- Summer 2012 data are considered.

Value of Outcomes: The ratings of the value of all COP 4338 outcomes are extremely high. Only the Fall 2012 rating of outcome O2 is below 4.50, and this along with the O4 are the only ones below 4.70. Students ascribe extremely high value to the revised COP 4338 outcomes.

Adequacy of Coverage: There is strong agreement that the course outcomes are covered adequately in class. The average ratings are all at or above 4.29, and no individual rating falls below 3.75.

The following table describes the overall ratings for course outcomes (collectively):

COP 4338	# Responding	Value of Outcomes	Adequacy of Coverage
Summer '11	13	4.75	4.69
Fall '11	23	4.22	3.86
Spring '12	20	4.18	3.85
Summer '12	8	4.77	4.09
Fall '12	11	4.71	4.45
Spring '13	29	4.82	4.55
ALL	104	4.54	4.23

Table 5-3: Overall Value and Coverage of COP 4338 Course Outcomes

Analysis

Value of Outcomes: The revised (Summer 2012) course outcomes are perceived to have very high value.

Adequacy of Coverage: COP 4338 students predominantly believe that the course outcomes receive adequate coverage in class.

C. Student Suggestion

There are too few post-Summer 2012 comments to allow for meaningful generalization, but these seem to support the high valuation of the revised COP 4338 outcomes.

D. SAC Recommendations

The original course outcomes are still listed in the common syllabus for COP 4338. The syllabus must be revised to reflect the revision of the course outcomes.

COP 4226 Advanced Windows Programming (elective)

This is a list-elective course for BS-CS majors. It is offered in the Fall semester only.

A. Course Delivery

COP 4226		Survey of Course Delivery				
Term	#	*Preparation*	*Difficulty*	*Textbook*	*Homework*	*% CS Major*
SU 11						
FA 11	18	4.44	3.83	4.28	3.28	11.11
SP 12						
SU 12						
FA 12	10	4.30	4.00	4.50	3.20	100.00
SP 13						
ALL	28	4.39	3.89	4.36	3.25	42.86

Table 6-1: Survey of COP 4226 Course Delivery

Analysis

Only the *Homework* component of the course delivery is rated below 3.75.

B. Course Outcomes

O1: Master the Application Framework, Message Passing and Event Handling
O2: Master the graphics interface using Colors, Pens, Brushes, Fonts for Text and Shapes
O3: Master Modal and Modeless Dialog Windows
O4: Master Menus, Keyboard Accelerators, Toolbars and Status Bars
O5: Master Document and Dialog based applications.
O6: Be familiar with the Common Controls and Dialogs
O7: Be familiar with Database Connectivity, Serialization, Drag and Drop, and Multithreaded Programming
O8: Master programming for a visual environment

COP 4226		O1		O2		O3		O4		O5		O6		O7		O8	
Term	#	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*
SU 11																	
FA 11	18	4.83	4.89	4.61	4.83	4.78	4.67	4.67	4.78	4.78	4.61	4.67	4.67	4.59	4.41	4.56	4.61
SP 12																	
SU 12																	
FA 12	10	4.89	4.80	4.50	4.50	4.80	4.80	4.56	4.70	4.60	4.60	4.80	4.60	4.70	4.60	4.80	4.70
SP 13																	
ALL	28	4.85	4.86	4.57	4.71	4.79	4.72	4.63	4.75	4.72	4.61	4.72	4.65	4.63	4.48	4.65	4.64

Table 6-2: Value and Coverage of COP 4226 individual Course Outcomes

Analysis

Value of Outcomes: Students ascribe extremely high value to the COP 4226 course outcomes.
Adequacy of Coverage: Students predominantly agree strongly that the course outcomes are covered adequately in class. Note that several *coverage* ratings exceed the *value* ratings.
The following table describes the overall ratings for course outcomes (collectively):

COP 4226	# Responding	Value of Outcomes	Adequacy of Coverage
Fall '11	23	4.22	3.86
Fall '12	11	4.71	4.45
ALL	34	4.38	4.05

Table 6-3: Overall Value and Coverage of COP 4226 Course Outcomes

Analysis

Value of Outcomes: Students ascribe high value to the overall COP 4226 course outcomes.

Adequacy of Coverage: The COP 4226 course outcomes are covered adequately in class.

C. Student Suggestions

The majority of the few student comments express concern about the time required for the homework assignments

D. SAC Recommendations

The COP 4226 course instructor(s) may want to evaluate the homework component of this course.

COP 4520 Introduction to Parallel Programming (elective)

This is a list-elective course for BS-CS majors. It was offered once only in this review period.

A. Course Delivery

COP 4520		Survey of Course Delivery				
Term	#	*Preparation*	*Difficulty*	*Textbook*	*Homework*	*% CS Major*
SU 11						
FA 11						
SP 12	9	3.89	3.22	3.89	3.56	11.11
SU 12						
FA 12						
SP 13						
ALL	9	3.89	3.22	3.89	3.56	11.11

Table 7-1: Survey of COP 4520 Course Delivery

Analysis

The student ratings of the *level of difficulty* of COP 4520, and of the *amount of homework required* are both below the expected threshold of 3.75. Although the rating of preparation for taking this class, 3.89, is above the minimum threshold of 3.75, it is uncharacteristically low for this aspect of course delivery (see the ratings for the other classes).

B. Course Outcomes

1. Be familiar with parallel algorithm design.
2. Be familiar with parallel performance analysis.
3. Master the MPI programming paradigm.
4. Be familiar with POSIX multi-threaded programming.
5. Be familiar with OpenMP programming.
6. Be exposed to parallel applications.

COP 4520		O1		O2		O3		O4		O5		O6	
Term	#	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*	*Value*	*Cover*
SU 11													
FA 11													
SP 12	9	4.67	4.11	4.67	4.33	4.78	3.67	4.22	3.67	4.44	3.33	4.56	3.67
SU 12													
FA 12													
SP 13													
ALL	9	4.67	4.11	4.67	4.33	4.78	3.67	4.22	3.67	4.44	3.33	4.56	3.67

Table 7-2: Value and Coverage of COP 4520 individual Course Outcomes

Analysis

Value of Outcomes: Students ascribe very high value to all COP 4520 course outcomes.

Adequacy of Coverage: Coverage of outcomes O1 and O2 are rated much above 3.75. The ratings of remaining 4 course outcomes fall below the 3.75 acceptability threshold.

COP 4520	# Responding	Value of Outcomes	Adequacy of Coverage
Fall '11	9	4.56	3.80
	========	========	========
ALL	9	4.56	3.80

Table 7-3: Overall Value and Coverage of COP 4520 Course Outcomes

Analysis

The overall valuation of outcomes, and the overall adequacy of coverage of outcomes ratings are both above the 3.75 acceptability threshold, the valuation rating considerably so at 4.56.

C. Student Suggestions

The 4 comments are all consistent with the low course delivery ratings of *level of difficulty* and *amount of homework required*.

D. SAC Recommendations

The scarcity of data, and the fact of having only a single offering of COP 4520, do not lend to a high degree of confidence in this analysis. Nonetheless, it may be worth considering whether the course prerequisites, COP 3530 and CDA 4101, provide adequate preparation; perhaps students taking this course lack sufficient (academic) maturity.

Addendum to Computer Programming Subject Area Report of September 25, 2013

Prepared by Norman Pestaina, Subject Area Coordinator

October 25, 2013

This addendum covers the period from Summer 2011 through Spring 2013. It summarizes and analyzes the data from the Faculty Course Appraisal System for the BS-CS courses in the Computer Programming subject area:

- COP 2210 Computer Programming I (*required*)
- COP 3337 Computer Programming II (*required*)
- COP 3530 Data Structures (*required*)
- COP 4338 Computer Programming III (*required*)
- COP 4226 Advanced Windows Programming (*elective*)
- COP 4520 Introduction to Parallel Programming (*elective*)

The Faculty Course Appraisal is intended to be completed at the end of each semester by the instructor of each required or elective course of the BS-CS major. Instructors provide their appraisals on each of several facets of their courses:

- Coverage of course objectives in assignments and tests
- Appropriateness and Coverage of course objectives
- Student mastery of individual course prerequisites
- Overall student preparation for taking the course

Additionally, an instructor may

- offer suggestions about *"other prerequisite outcomes that might help students to be better prepared"* for the class
- provide comments about *"other insights or observations about this course that might contribute to improvements"*

COP 2210 Computer Programming I (required)

This is a required course in the BS-CS major and is offered in multiple sections in each semester.

A. Coverage of course objectives in assignments and tests

All course objectives were covered in every semester, often in multiple assignments, and in tests.

B. Appropriateness and Coverage of course objectives

The appropriateness of all course outcomes is routinely rated as *Essential*. With the exception of Problem Solving outcome, the coverage of all outcomes is consistently rated as *Extensive*. The coverage of the Problem Solving outcome is more usually rated as *Adequate*.

C. Student mastery of individual course prerequisites

There are no prerequisites for this course.

D. Overall student preparation for taking the course

Adequate.

E. Prerequisite Outcome Suggestions

N/A.

F. General Comments

None.

COP 3337 Computer Programming II (required)

This is a required course in the BS-CS major and is offered in multiple sections in each semester.

A. Coverage of course objectives in assignments and tests

All objectives are always covered in assignments and tests.

B. Appropriateness and Coverage of course objectives

All course objectives are consistently rated as *Essential*. The coverage of the course outcomes is predominantly rated as *Adequate* or *Extensive*.

C. Student mastery of individual course prerequisites

			Objects & Classes	Methods, Param's	Fund. Data Types	Control Structures	String, ArrayList
SU 11	Pestaina		Good	Adequate	Good	Adequate	Deficient
FL 11	Wells		Good	Good	Good	Good	Good
FA 11	Pelin		Good	Deficient	Adequate	Good	Adequate
FA 11	Shaw		Good	Good	Good	Good	Adequate
FA 11	Pestaina		Adequate	Adequate	Adequate	Adequate	Deficient
SP 12	Pestaina		Adequate	Adequate	Adequate	Deficient	Adequate
SP 12	Kraynek		Adequate	Deficient	Good	Good	Deficient
SP 12	Kraynek		Adequate	Deficient	Good	Good	Deficient
SP 12	Shaw		Good	Good	Good	Good	Adequate
SU 12	Pestaina		Adequate	Adequate	Adequate	Adequate	Deficient
SU 12	Milani		Good	Good	Good	Good	Good
FA 12	Pestaina		Deficient	Adequate	Adequate	Deficient	Adequate
FA 12	Pelin		Good	Deficient	Adequate	Adequate	Adequate
FA 12	Shaw		Adequate	Adequate	Adequate	Adequate	Adequate
FA 12	Wells		Good	Good	Good	Adequate	Deficient
FA 12	Smith		Good	Good	Good	Good	Good
SP 13	Shaw		Adequate	Adequate	Adequate	Adequate	Adequate
SP 13	Pestaina		Deficient	Adequate	Adequate	Deficient	Deficient
SP 13	Smith		Good	Adequate	Adequate	Good	Good

D. Overall student preparation for taking the course

Student preparation received 13 ratings of *Adequate*, and 6 of *Deficient*.

E. Prerequisite Outcome Suggestions

See SP 12 Pestaina, SP 12 Shaw, SU 12 Pestaina, SP 13 Smith.

F. General Comments

See FA 11 Shaw, FL 12 Pelin, SP 13 Shaw.

COP 3530 Data Structures (required)

This is a required course in the BS-CS major and is offered in each semester.

A. Coverage of course objectives in assignments and tests

All course objectives are covered in assignments or tests except for the Sub-Quadratic Sorting and Graph Algorithm outcomes in FL 12. This appears to be inconsistent with the reporting of the coverage of those outcomes for the same semester as *Extensive* and *Adequate* respectively.

B. Appropriateness and Coverage of course objectives

All course objectives are consistently rated *Essential* or *Appropriate*, and their coverage as *Extensive* or *Adequate*.

C. Student mastery of individual course prerequisites

			Inheritance	Interfaces	Recursion	Linked Lists	Stack, Queue	Collection
SU 11	Milani		Adequate	Adequate	Adequate	Adequate	Adequate	Adequate
FL 11	Pelin		Deficient	Non-existent	Deficient	Adequate	Non-existent	Deficient
SP 12	Weiss		Adequate	Adequate	Adequate	Good	Good	Adequate
SP 12	Navlakha		Adequate	Adequate	Adequate	Adequate	Adequate	Adequate
SP 12	Navlakha		Adequate	Adequate	Adequate	Adequate	Adequate	Adequate
SU 12	Navlakha		Good	Adequate	Good	Adequate	Good	Adequate
FL 12	Navlakha		Good	Adequate	Good	Adequate	Good	Adequate
FL 12	Liu		Adequate	Adequate	Deficient	Deficient	Good	Deficient
FL 12	Pelin		Deficient	Deficient	Deficient	Deficient	Deficient	Deficient
SP 13	Weiss		Deficient	Deficient	Adequate	Good	Good	Adequate
SP 13	Pelin		Adequate	Adequate	Deficient	Adequate	Non-existent	Deficient

D. Overall student preparation for taking the course

Student preparation received 1 *Good* rating, 6 ratings of *Adequate*, and 4 of *Deficient*.

E. Prerequisite Outcome Suggestions

See Sp 13 Pelin.

F. General Comments

See FL 12 Liu, FL 12 Pelin, SP 13 Pelin.

SAC Recommendation

There appears to be a decline in the level of preparation and/or ability of COP 3530 students in recent semesters. This is reflected both in the mastery of prerequisites appraisals and instructor comments above. A review of the outcomes of COP 3530 concurrently with a review of the outcomes of the prerequisite course COP 3337 would seem to be indicated.

COP 4338 Computer Programming III (required)

This is a required course in the BS-CS major and is offered in each semester.
The course outcomes were adjusted, beginning in Spring 2012, to reflect a change in the course syllabus to C instead of Java. The appraisals prior to Spring 2012 are not considered here.

A. Coverage of course objectives in assignments and tests

All course objectives were covered in every semester, often in multiple assignments.

B. Appropriateness and Coverage of course objectives

All objectives were rated as *Appropriate, Very Appropriate* or *Essential* and their coverage rated as *Adequately* or *Extensively*.

C. Student mastery of individual course prerequisites

			Significant Java Programming Experience		Mastery of the Collections API		Ability to make choices to achieve efficient programs	
			Relevance	Mastery	Relevance	Mastery	Relevance	Mastery
SP 12	Raju		Incidental	Good	Irrelevant	Adequate	Highly Useful	Adequate
SU 12	gliza002		Useful	Good	Incidental	Good	Highly Useful	Deficient
FA 12	Liu		Useful	Good	Useful	Good	Useful	Good
SP 13	Zhao		Highly Useful	Good	Irrelevant	Good	Highly Useful	Adequate

D. Overall student preparation for taking the course

Adequate or *Good*.

E. Prerequisite Outcome Suggestions

The Spring 12 appraisal suggests that some students lack experience in developing non-trivial or large "*multi-function, multi-file"* programs.

F. General Comments

The Spring 12 appraisal makes the observation that some advanced topics removed in the transition from Java to C would still have value for students.

SAC Recommendation

A revision of the prerequisite outcomes is indicated.

COP 4226 Advanced Windows Programming (elective)

A. Coverage of course objectives in assignments and tests
All objectives were covered in multiple assignments and in at least one test or quiz.

B. Appropriateness and Coverage of course objectives
All objectives were rated as *Essential* or *Appropriate*, and all were covered *Extensively* or *Adequately*.

C. Student mastery of individual course prerequisites
All prerequisites were rated at least *Useful*, and student preparation was rated as *Good*.

D. Overall student preparation for taking the course
Student preparation was rated as *Good*.

E. Prerequisite Outcome Suggestions
None.

F. General Comments

The Fall 2011 appraisal indicates that "*The preparation of the CS majors is consistently deficient*". This comment is not repeated in the Fall 2012 appraisal.

COP 4520 Introduction to Parallel Programming (elective)

This is a list-elective course for BS-CS majors. It was offered once only in this review period.

G. Coverage of course objectives in assignments and tests
All objectives were covered in at least one assignment and in at least one test or quiz.

H. Appropriateness and Coverage of course objectives
All objectives were rated as *Essential* or *Appropriate*, and all were covered *Extensively* or *Adequately*.

I. Student mastery of individual course prerequisites
All prerequisites were rated at least *Useful*, and student preparation was rated as *Good*.

J. Overall student preparation for taking the course
Student preparation was rated as *Adequate*.

K. Prerequisite Outcome Suggestions
None.

L. General Comments
The instructor reported that the course outcomes were not set correctly in the ICA system.

Assessment of 2011 - 2013 Foundations Courses

Xudong He

October 4, 2013

1 Introduction

The Foundations courses are COT 3420 (Logic for Computer Science), COP 4555 (Principles of Programming Languages), COT-4534 (Algorithm Techniques), MAD 2104 (Discrete Mathematics), MAD 3512 (Theory of Algorithms), and the math electives. There are no students' evaluations and no instructor appraisals from these two Math Department courses. There are also no instructor appraisals received for the above CS courses either.

2 COT 3420 Logic for Computer Science

Alex Pelin taught a section of COT 3420 in Summer 2011, Spring 2012, Summer 2012, and Spring 2013. Christine Lisetti taught a section COT 3420 in Fall 2011, Fall 2012, and Spring 2013.

The following table shows a summary of the student evaluations:

	# Responding	Outcome Value	Coverage Adequacy
Summer 11	18	3.68	3.42
Fall 11	19	4.59	4.18
Spring 12	8	4.50	3.69
Summer 12	8	3.77	3.65
Fall 2012	19	4.24	4.32
Spring 13	27	4.46	3.99
	=======	=======	=======
Year 2011-13	99	4.25	3.93

Overall the evaluations are satisfactory. The summers had lower evaluations. Some students suggested having a better textbook in Summer 11, Fall 11, and Spring 2012. This concern disappeared in later offerings. Some comments with Alex Pelin's teaching were reviewing some of materials covered in discrete math, which some students did not have a good understanding and thus had problems in understanding materials covered in this course. On the other hand, some comments with Christine Lisetti's teaching were just opposite, i.e. they felt too much reviewing of discrete math and thus they did not learn enough new materials. It seems that the appropriate amount of discrete math reviewing needs to be carefully considered. One common suggestion was to have more homework assignments (or even more exams) and have them counted towards the final grades.

Both Alex Pelin and Christine Lisetti noted that the students did not have adequate preparation from deficient to non-existent for the class. Alex Pelin commented on the continual deterioration of student quality and lack of motivation. Christine commented on that student's lack of understanding of induction and essential concepts of propositional logic forced her to sacrifice the coverage of first order logic.

3 COP 4555 Principles of Programming Languages

Xudong He taught one section of COP 4555 in Fall 2011 and another in Spring 2012. Geoff Smith taught one section of COP 4555 in Fall 2012 and again in Spring 2013.

The following table shows a summary of the student evaluations:

	#	Outcome	Coverage

	Responding	Value	Adequacy
Fall 11	16	3.77	4.14
Spring 12	16	4.33	4.17
Fall 12	21	4.53	4.61
Spring 13	26	4.27	4.30
	=======	=======	=======
Year 2011-13	79	4.25	4.32

The overall student evaluations were satisfactory. Xudong He first taught this course in Fall 11 and again in Spring 12 while Geoff Smith was on sabbatical. Since this course was developed by Geoff Smith and Xudong He used Geoff Smith's class notes in those two offerings. It is clear that Xudong He's first time teaching of this course had lowest evaluations. The most common comment was about the usefulness of covering F# language in this class. Some students commented on the difficulty of some later assignments.

Both Xudong He and Geoff Smith noted that students had adequate preparation. One problem is without regard to class attendance. Another more serious problem is wide spread plagiarism in homework assignments.

4 COT- 4534 Algorithm Techniques

This is a new course. It was offered first time in Spring 2013. There are no overall valuation of the outcomes and no adequacy of coverage of the outcomes. As a result no quantitative data can be shown.

Some student comments include to have more theoretical home works and to make the course harder.

5 Recommendations

There are some persistent problems in the above two foundation courses. In COT 3420, students lack of background. In COP 4555, there is a wide spread of plagiarism in homework assignment. For COT 3420, one possible solution is to offer our own Discrete Math course, which covers some materials such as propositional logic and induction, thus complements COT 3420. For COP 4555, one simple solution as suggested by Geoff Smith is to not count homework in grading and thus discourage the practice of homework copying.

Recommendations About the Professional Development Area of the CIS Curriculum
by Alex Pelin

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The Professional Development area consists of the courses CGS 1920, CGS 3095 and ENC 3249.

I. The course CGS 1920, Introduction to Computing, is a 1 credit course. It is a required course for the BS degree in both the CS and the IT programs. Here is its catalog description.

Overview of the computing field to students, research programs and career options.

I looked through the course semesterly reports from the summer of 2011 to the spring of 2013. The course delevery was excellent and, accoding to the students, the course objectives were considered worthwhile and were covered adequately. The comments of the students were laudatory.

I see no reason to change the course.

II. CGS 3095, Technology in the Global Arena, is 3 credit course. I did not find its description the school web page, but there it is in the IT and CS brochures. Its catalog description reads

Legal, ethical, social impacts of computer technology on society, governance, quality of life: intellectual property, privacy, anonimity, professionalism, social identity in the U.S. and globally. Its prerequisites are (COP 2210 or COP2250) and (ENC 3249 or ENC 3213).

It is a required course. Some of the topics are also covered in CGS 3092, and the prerequisites are almost the same (the students must take ENC 3213). CGS 3092, a 1 credit course, is also required.

From the course descriptions I gather that the main difference is that CGS 3092 deals mostly with the individual responsability of the computer professional as an individual while CGS 3095 is concerned more with the impact of the technology and implicitely the computer professionals as a group. Besides this, it seems that CGS 3095 is a CGS 3092 that covers the same topics at greater length. My recommendation is to check that the two courses don't overlap excessively.

Otherwise, the course semesterly reports are excellent. The students feel that the instruction was delivered adequately, and the course objectives were reached.

III. ENC 3249, Professional and Technical Writting. This is a 3 credit required course. I did not have the course semesterly reports, But I talked to the professor and he was pleased with the work of the CIS students. Written communication is essential and this course fulfills
this need.

Subject Area: Computer Systems (Reported by Shu-Ching Chen)
Duration: Summer 2011 to Spring 2013

COP 4710 Database Management
COP 4722 Survey of Database Systems
CAP 4770 Introduction to Data Mining
COP 4604 Advanced UNIX Programming

COP 4710 Database Management

- *Appraisal and Course Evaluation Reports Status: This course was taught five times by three instructors during this period. The instructors have submitted all of the course appraisals for all the sessions. The student evaluation for all of the five sessions is available in the system.*
- *Summary of Assessment: This course has seven outcomes, all of which has been indicated by the instructors as either essential or appropriate.*
- *Embedded assessment questions to cover seven are done in Fall 2011 and Spring 2013. The assessment results show that the students have good course outcome.*
- *Recommendation: I recommend no changes to the outcome of this course.*

COP 4722 Survey of Database Systems

- *Appraisal and Course Evaluation Reports Status: This course was taught four times by one instructor during this period. The instructor has submitted all of the course appraisals for all the sessions. The student evaluation for all of the four sessions is available in the system.*
- *Summary of Assessment: This course has five outcomes, all of which has been indicated by the instructors as either essential or appropriate.*
- *Recommendation: I recommend no changes to the outcome of this course.*

CAP 4770 Introduction to Data Mining

- *Appraisal and Course Evaluation Reports Status: This course was taught one time by one instructor during this period. The instructor didn't submit the course appraisal for this session. The student evaluation for this session is available in the system.*
- *Summary of Assessment: It is not available.*
- *Recommendation: I recommend no changes to the outcome of this course.*

COP 4604 Advanced UNIX Programming

- *Appraisal and Course Evaluation Reports Status: This course was taught two times by two instructors during this period. The course appraisal for Summer 2011 is missing. The student evaluation for Summer 2012 is missing.*
- *Summary of Assessment: This course has six outcomes, all indicated by the instructors as essential.*
- *Recommendation: I recommend no changes to the outcome of this course.*

Subject Area: **Software Engineering** (Coordinated by Masoud Sadjadi)

CEN 4010 – Software Engineering I

- **Summary of Assessment:**

  This course was taught six times during the past two years. According to all the instructors of this course, the relevancy of the prerequisites was rated from useful to highly useful and mastery of the students was rated from adequate to good. Students' preparedness was indicated as adequate.

SE I CEN 4010	Prerequisite				Student Preparedness
	COP 3530 Data Structures				
	Programming		Data Structures		
	Relevance	Mastery	Relevance	Mastery	
Summer 2011	Useful	Adequate	Useful	Adequate	Adequate
Fall 2011	Highly Useful	Good	Highly Useful	Good	Adequate
Spring 2012	Highly Useful	Adequate	Useful	Adequate	Adequate
Summer 2012	Useful	Adequate	Useful	Adequate	Adequate
Fall 2012	Highly Useful	Adequate	Useful	Adequate	Adequate
Spring 2013	Highly Useful	Adequate	Useful	Adequate	Adequate

According to the survey by 93 students, the average overall outcome is 4.56 out of 5 and the average coverage adequacy is 4.39 out of 5.

SE I CEN 4010	# Responding	Overall Outcome	Coverage Adequacy
Summer 2011	17	4.51	4.37
Fall 2011	14	4.54	4.46
Spring 2012	24	4.53	4.14
Summer 2012	13	4.51	4.42
Fall 2012	17	4.81	4.71
Spring 2013	8	4.36	4.32
Year 2011-13	**93**	**4.56**	**4.39**

Instructors' comments:

- *Students need to learn how to work in teams. Not sure if this is an outcome that can be incorporated in a previous course.*
- *I believe that the syllabus for this class is way too ambitious for a semester. It is my understanding that CEN 4010 is the first class where students are asked to develop a nontrivial system (and I quantify non trivial as a system with at least 10 core classes which needs some sort of design; ie. it will be difficult to just hack it*

*together). So we briefly cover all the Soft. Eng. phases, yet on Soft. Eng. II, they do not get to see any advanced design techniques, as Soft. Eng. II is focused on project management. I am not aware of any other course were students need to design and develop another non-trivial system before they go to the Senior Project. Then on the senior project final presentations, which I have attended, the students seem to apply Software Engineering concepts haphazardly, with no real mastery on the concepts (e.g. a student could not answer when you need (or do not need) a statechart diagram, but he was using one). I believe this is not the fault of the faculty; we have good teachers. I believe this is because a semester is just not enough time to implement a meaningful system if you don't want to cut corners on the application of Software Engineering concepts. That is, I believe Software Engineering 1 should be more of a 2 semester *required* course, and what is now known as Soft. Eng. II should be an *optional* course, renamed to "Software Project Management". I think this could have a measurable improvement on the quality of the Senior Projects. Of course, this is just my opinion after teaching this course for the first time, so take it with a grain of salt. I can expand on this matter if needed, just let me know. Thanks.*

- *We currently have two categories of students in the course; these include (1) computer science students, and (2) computer engineering students. It appears that the preparation for the two categories of students is different for the CEN 4010 class; this results in the computer-engineering students being at a disadvantage. The project in the CEN 4010 class requires significant knowledge of database systems and it appears that the computer-engineering students are not required to take the database class as a prerequisite or a co requisite. Either the computer-engineering students will have to meet the database knowledge requirement or the project in the class will have to be reworked to remove the database component.*

Students' comments *:

- *The project should weight the most, not the exams since it is the main purpose of the class.*
- *Too much workload. Trying to find time to write the reports, prepare presentations, study for tests and then work on a gigantic project all at the same time while taking other classes feels impossible.*
- *This is a good course.*
- *I like this class. There is no other comment I have at this moment.*
- *The specification of documents should be more accurate.*
- *I think students should be required to take certain courses to prepare them for the main project. For example some students in the class had not taken a database course and they had to learn all of this by themselves.*
- *Have better review sessions for exams.*
- *Instead of exams, it would be better to have more in class discussions and homework.*
- *This course was great. However I believe that the instructor should have example of the different documents that they need us to submit.*
- *Class could have a different setup in terms of assignments and deliverables.*
- *This class should use practical examples -e.g. one of the oriented projects- to explain the different steps of the software engineering process. Also, it is important to note that what this class teaches is not always used in professional development environments.*
- *Way too much work for one class, instructions for assignments was not clear.*
- *I think the amount of work is too much. You not only have to study for the midterm and final, but you also have to implement an application when the focus of the class is the steps to building the application (for that we have Senior Project).Another thing is they tell you not to start coding because you don't just hack the code. And then in one week at the end the professor expect you to code a whole working web site.*
- *As a CS student I felt unprepared to prepare and implement a real world system. This course opened my eyes to not only how unprepared I was, but also how unprepared my course work thus far has made me. Dealing with the stress of how difficult it was to implement our system AND document within the given time frame, I highly suggest more time is taken into account to prepare students for this course. I would also highly suggest getting a professor rather than a grad student. While our instructor did try his best (allowed us to attend office hours) some of his teachings were very confusing thus adding to the stress this course brought me this semester.*

- *The professor who teaches the course should create their own powerpoints and instruction material, I believe the powerpoints we had for this class were not very helpful. Also, the use of the book should be more integrated into the class. The professor should explain the material more in detail in class.*
- *Too much to do and only receive 3 credits and small portion of grade*
- *Computer Engineering majors are not required to take database management before taking this course while it is required to complete the project for this course.*
- *Allow the teams to be able to trade members*
- *The nomenclature for these concepts in this class is overwhelming and the engineering processes can be is a lot to take in in a short period of time. perhaps if the assignments would be broken into slightly smaller segments*
- *This course should require that students take a database class beforehand. In addition, as we were required to develop a WEB application, the university really should offer a course in WEB application development (since this is a completely new topic for many).*
- *The course is very informative. Although I have heard about different students experiences in this course. It seems there is a lack of consistency in the material and especially in the project for the course.*
- *The instructor tends to drag on talking about points he has already made. It makes us lose focus and start drifting away. He also stumbles a lot on the material and it just doesn't flow well. We also did not talk about any software architecture models like Agile development or anything like that.*
- *You might need to add a course on servers considering the course required the knowledge of how to implement servers with our program.*
- *It is a good course, but as for the final project the classes i have taken haven't adequately prepared me for them.*
- *Less documentation*
- *There should be less documentation in this class and more software development workshops*
- *Having the students start the programming of the project sooner is much better*

- **Observations and Recommendations:**
  - I have conducted a pre-test on the first day of my Fall 2013 Senior Project class and included a modified version of my questions for my last Software Engineering I final exam. I was disappointed to learn that the average grade of 31 students who took this pre-test was only 62.5 out of 100, which is basically a C- in my class. The outcome of this pre-test indicates how under prepared our students are with respect to their theoretical and practical knowledge of software engineering.
  - During the past four semesters that I have been coordinating the Senior Project classes, I have learned that many of our students do not know how to properly use basic terms commonly used among software engineers and their knowledge of UML diagram is greatly deficient.
  - I do believe that our software engineer professors are very knowledgeable and have no doubt about their excellent methods of teaching. However, I came to this conclusion that a majority of our students have learned how to hide behind their teammates in group projects and pass SE I on the shoulders of their friends. Therefore, I strongly suggest that each individual student becomes responsible to perform his/her share of the project and practice all the different software engineering activities by himself/herself.
  - Based on the above observations, I have the following suggestions for the SE I instructors:
    - As the process of choosing projects by students becomes time consuming and it may not be easy for the instructor to understand all the details of all the projects, I suggest that one or more projects to be chosen and predefined by the instructor before the semester starts. Note that the total number of the functional requirements for all the chosen projects should be equal or greater than the number of students enrolled in the class.
    - Each student should be randomly assigned to one (or more) specific functional requirement(s) of one of the chosen projects.
    - Each student must be responsible to practice all the different software engineering activities using his/her assigned functional requirement(s).
    - As the load for the software engineering activities are more than enough for a 3-credit course, and as project management is taught in SE II, the students should not be expected to manage their own projects too. The instructor of the course, or his/her TA(s), should assume that role and should

make sure that all the students are on time with their tasks. Also, they should have alternative plans, in case some of the students fall behind or ahead of the schedule of the projects.

- To make sure that each individual student gains the required knowledge and knows how to use it in the assigned project, they all should be given an opportunity to present their assigned work as part of group presentations, after each milestone of the project has reached.
- To make sure that each individual student knows how to properly use UML diagrams, they should all be asked to use a UML tool that is approved by the industry and can verify their diagrams. The instructor should ask students to verify their diagrams before submitting their deliverables.
- To make sure that all students understand software engineering terms and can use them properly, the definition of such terms should be asked in the mid and/or final tests.

CEN 4021 – Software Engineering II

- **Summary of Assessment:**

This course was taught twice during the past two years. According to the instructors of this course, the relevancy of the prerequisites was rated from useful to highly useful and mastery of the students was rated from deficient to adequate and good. Students' preparedness was indicated as adequate.

SE II CEN 4021	**Prerequisite**						**Student Preparedness**
	CEN 4010 SE I						
	SW Life Cycle		**Requirement Specification**		**Software Design & Implementation**		
	Relevance	**Mastery**	**Relevance**	**Mastery**	**Relevance**	**Mastery**	
Spring 2012	Highly Useful	Good	Highly Useful	Good	Highly Useful	Good	Adequate
Spring 2013	Highly Useful	Good	Highly Useful	Adequate	Useful	Deficient	Adequate

According to the survey by 23 students, the average overall outcome is 4.64 out of 5 and the average coverage adequacy is 4.08 out of 5.

SE II CEN 4021	**# Responding**	**Overall Outcome**	**Coverage Adequacy**
Spring 2012	9	4.58	3.61
Spring 2013	14	4.68	4.38
Year 2011-13	**23**	**4.64**	**4.08**

Instructors' comments:

- *The prerequisites are currently adequate.*
- *For a future review of the official course syllabus, I'd suggest an exclusive focus on project management, leaving the topic of software architectures to the SE I course or to another elective (preferred case).*
- *More discussions of requirements modeling using use cases and some discussions of design patterns in Software Engineering I. This is my first time of teaching this course, which is primarily on software project management. I will explore how to make this course more realistic and technical challenge.*

Students' comments *:

- *If this was the only class or if I was taking one other class, the course load would have been manageable, but taking 12 credits means that the juggling was insane. Having 20 hours of homework a week for a 4-credit class is unconscionable.*
- *I would suggest that there be less written homework, we got homework every week along with projects and exams, not to mention the load of other classes.*
- *I think it would be of great value for the class to cover real world cases. Since this class has to do with software project management, there are many examples of companies in the real world that we could read about and discuss.*
- *Overall workload was too high; the combination of three project deliverables, three exams, and homeworks for every single class was just too much for one course, preferably there should be fewer homeworks. The project seemed a little too open- ended, would have preferred more specific goals (budget, timetable, personnel available, etc.) - as is we had to determine these things ourselves which was difficult to do given our inexperience as project managers. Overall the expectations for the project should have been more specific, perhaps sample deliverables (the same work done for a different project) could have been provided to use as guides, or at least the format documents should have been more detailed and specific.*
- *This course should be taken before software engineering 1 or along with due to the implications that planning plays in software engineering*

- **Observations and Recommendations:**
  - As suggested by one of the instructors also, this course should be only focused on software project planning and management. Therefore, I suggest that we remove the software architecture topic from the syllabus of this course and cover it in details in SE I.
  - This course needs to be more applied and become more practical. For this, I suggest that we offer this course during the same semester as SE I is offered so that the students from this class can become project managers of the SE I projects. To address the potential issues that may arise, I suggest that we do the following:
    - It would be best if the instructor for both SE I and SE II to be the same person. If this is not possible in a semester, then the two instructors from SE I and SE II should meet before the semester starts and plan on how to synchronize their assignments.
    - Students in SE II should only gather data from students in SE I and must NOT give direct feedback to the SE I students. Basically, SE II students do NOT actually manage the SE I projects. Instead, SE II student sprovide the data and outcome of their work to the instructors of SE II for their assignments to be evaluated and receive their grades. Also, they should provide their work to the instructor of SE I for his/her use to actually manage the projects. This should greatly help the SE I instructor with the project management task, giving incentive to allow SE II students to contact SE I students.
    - The number of students in SE II may be more than the number of projects in SE I; therefore, more than one student from SE II may be assigned to gather data from the same SE I project. To limit the number of times that SE I students may be interrupted by SE II students to gather project status data, the SE II students assigned to the same SE I project may work together to collect the data, but they must process the data independently to make sure that they learn all the project management activities through practice.

CEN 4072 – Software Testing & Verification

- **Summary of Assessment:**

This course was taught twice during the past two years. According to the instructor of this course, the relevancy of the prerequisites was rated as useful and mastery of the students was rated as good. Students' preparedness was indicated as adequate.

Testing CEN 4072	Prerequisite		Student Preparedness
	COP 3530 Data Structures		
	Data Structures		
	Relevance	Mastery	
Fall 2011	Useful	Good	Adequate
Fall 2012	Useful	Good	Adequate

According to the survey by 38 students, the average overall outcome is 4.75 out of 5 and the average coverage adequacy is 4.21 out of 5.

	# Responding	Overall Outcome	Coverage Adequacy
Fall 2012	17	4.72	4.03
Fall 2013	21	4.78	4.35
Year 2011-13	**38**	**4.75**	**4.21**

Instructors' comments:

- *After teaching the course for two semesters, Fall 2010 and Fall 2011, it is time for a review of the syllabus to more clearly specify the outcomes of the course. Two topics have not been covered in either edition of the course, GUI testing and debugging, due to time constraints. In my opinion these topics should be removed from the syllabus. Program inspections and program tracing take up more time than expected thereby reducing the time for other topics.*
- *Most of the students taking the course are seniors and are well prepared to take the course. This semester the third edition of the course was offered. In this edition of the course two topics were not covered GUI testing and debugging, due to time constraints. The syllabus is currently being refined to remove debugging from the syllabus. We cover some GUI testing using capture/playback mechanism in Rational Functional Tester.*

Students' comments *:

- *The project is all practical application of software testing tools and methods but the class is almost 100% theory. I'd like to see more practical content in the lectures.*
- *I think that this course should be more focused of practical uses of tools that we can use for software testing. Also the applications that are going to be tested have to be fully functional and have a minimum of quality to be tested.*
- *The professor for this class was very uninformed about the subjects and tools we were to use. He had no idea how to use the tools he asked us to use for the class project and pretty much we were on our own to do it. He gave us previous projects from his class to base our project on and he didn't even know about the problems in the projects he gave us to work on. In conclusion, this course would be great with someone that actually knew concepts as well as practice, not just concepts.*
- *Provide more emphasis on PROJECTS then on Tests. The whole purpose of fully understanding testing is achieved through practice.*

- *I think the subjects covered were great, but the assigned project needs to be explained better. Some of us weren't clear as to what was required for the project until it was time to present it.*
- *We invested a lot of time into the project and learned much from it, however it isn't worth much of the grade in the end - it really should count for more and be a greater emphasis of the course. The material studied for the tests, while somewhat relevant, is nevertheless a poor substitute for the practical experience gained while working on the project - and yet the tests comprise 75% of the grade, placing a disproportionate emphasis upon that material.*
- *Project, why you so long and worth so little?!*
- *Have a program that is actually testable.*
- *Have simpler team projects and more adequate review sessions for exams.*
- *Less theoretical stuff. More practical.*
- *The instructor would reference a lot of things from Software Engineering, which was not a pre requisite for this class. Therefore sometimes he would ask questions that I did not know. It ended up being fine because he presented you with what you needed to know.*
- *Provide more examples and help for the documentations and presentations.*

- **Observations and Recommendations:**
  - This course needs better software examples for students to practice different testing tools.
  - Students in this course need the knowledge of software engineering activities.
  - Based on the above two observations, I make the following suggestions:
    - SE I should become a pre-requisite for this course.
    - Students can use their own SE I projects as the example to practice different software testing tools.
    - When the software from SE I is not sufficient for practicing a software tool, the instructor should provide other software project examples from the past SE I projects done by other students.

COP 4911 – Senior Project

- **Summary of Assessment:**

This course was taught six times during the past two years. According to all the instructors of this course, the relevancy of the prerequisites was rated from useful to highly useful and mastery of the students was rated from deficient to adequate and good. Students' preparedness was indicated as adequate and good.

Senior Project CIS 4911	Prerequisite				Student Preparedness
	CEN 4010 SE I				
	SW Dev. Process		Basic PM Concepts		
	Relevance	Mastery	Relevance	Mastery	
Summer 2011	Highly Useful	Adequate	Highly Useful	Deficient	Adequate
Fall 2011	Highly Useful	Good	Highly Useful	Good	Adequate
Spring 2012	Highly Useful	Adequate	Highly Useful	Adequate	Adequate
Summer 2012	Highly Useful	Adequate	Highly Useful	Deficient	Adequate

Fall 2012	Highly Useful	Good	Highly Useful	Good	Good
Spring 2013	Highly Useful	Good	Useful	Adequate	Good

According to the survey by 64 students, the average overall outcome is 4.58 out of 5 and the average coverage adequacy is 4.18 out of 5.

Senior Project CIS 4911	# Responding	Overall Outcome	Coverage Adequacy
Summer 2011	3	4.70	4.55
Fall 2011	21	4.59	3.98
Spring 2012	7	4.05	3.84
Summer 2012	8	4.59	4.56
Fall 2012	6	4.38	3.69
Spring 2013	19	4.79	4.45
Year 2011-13	**64**	**4.58**	**4.18**

Instructors' comments:

- *The students need to be exposed to more project management concepts and practice more of the concepts learned, particularly working in teams.*
- *There needs to be a discussion with all the faculty interested in participating in the senior project course so that there is a common understanding of how the course should be delivered. This discussion is very important since we are using the senior project course as a major component of the assessment process for the BS in Computer Science. There needs to be some type of incentive for faculty to participate in the senior project.*
- *Students need to do more in the area of ethical issues e.g., copyright, trademarks, privacy concerns, impact to society, and so on. Students also need to be able to write a copyright notice for their project and understand the meaning of the notice.*
- *The senior project continues to be lacking in good mentorship, particularly in the area of grading students' work and returning the feedback to the students in a timely fashion. There also needs to be a clear separation and understanding of the various roles used during the senior project by all the stakeholders. These roles include: mentors, clients and senior project coordinator(s). The faculty is currently working to address this and other issues so there should be some changes in Fall 2012.*
- *The course needs to include guest lectures on some of the topics already covered in previous courses. Two of the topics that come to mind are (1) Basics of project management, and (2) Ethical issues e.g., impact on society, privacy, and use of copyrights. It would improve the delivery of the course if there were lectures to review this content in a more practical setting while the students are taking the course.*
- *There are several issues with respect to the course management, including the roles of the client, mentor and course coordinator. These issues have recently been raised at a faculty meeting and may have been resolved.*

Students' comments *:

- *I am satisfied with the way this course is currently taught.*

- *More programming courses would have been nice. Some math courses seem fairly pointless in regards to anything we've done in CS.*
- *This was the most disorganized class I have ever taken at FIU. Due dates changed at random, and the professor constantly mentioned that the professor would update the class website to reflect this, though it had not been updated until this week, with only 3 weeks of class left. It took almost 2 months to receive a grade for my first assignment, and I still have not received a grade for my second assignment or third assignment (keep in mind there are only 4 assignments and 4 presentations in this course). Feedback is either non-existent or too basic to be of any use. I also do not understand why this is a 3-credit course when we attend for 1 hour a week (if even that often, since most of our classes are cancelled) and we are never taught any new material.*
- *There should actually be some instruction done. At least a cursory overview of the topics we will be applying throughout the semester.*
- *Less documentation!*
- *Too much paperwork is required.*
- *Make it a two-course project like the computer-engineering students. It would allow more time to devote to coding instead of rushing through producing documentation and leaving little time to finish the final product.*
- *I think the cis4911 committee/coordinators could give the choice of picking a project from a list of given projects for the class or proposing their own project. Also, mentors with the most knowledge in each project's technologies should be assigned for those teams. Overall, I think more feedback and advice from the mentors would be useful to make sure development follows the most reasonable (and less difficult) path.*
- *The professor had very poor preparation for this course. I still don't understand the need to charge for 3 credits when we only meet to give presentations. The teacher doesn't actually do any teaching!*
- *In this class we are requested to do several deliverable that will overall represent the documentation for our final project, but it turns out to be too much content. So in order for the students not to sacrifice in software quality this class should be taken in two semesters, one for the documentation and the other for software development. Or better yet associate the class of Software Engineer with the upcoming senior project.*
- *2) There is a disconnection between the requirements of the course and mentor expectations. The course requires extensive documentation and frequent presentations, which comprise our entire grade and consume much of the time we have free to devote to this course (considering all members of my team work and are taking other challenging courses). However our mentor cares little for documentation and prefers progress with the actual project, which proved difficult and time-consuming to implement. Our team was forced to strike a balance between documentation/presentations and implementing the project itself in order to satisfy both our mentor and the requirements of the course, and I do not feel we excelled at either as well as we could have. This class needs to decide if it is meant to teach us new skills in software engineering/testing and project management (something many students came into this course with an inadequate knowledge of), or whether it is meant to demonstrate our existing skills by implementing a real world software project, something we did not have the time to accomplish satisfactorily alongside the documentation.*
- *It is not enough time to assemble the teams and work in the project.*
- *I believe this class should not be called senior project but rather software engineering 1. I thought this class was going to be an advanced class that requires reading research papers and interacting with professors and PhD students. I believe this class should be either removed or redesigned to be what is called senior project class*
- *Need more guidance*
- *More internship/research programs for undergrad students*
- *The syllabus was constantly changed. We never knew exactly what to do. At the beginning we were supposed to develop and not to do much documentation since we had to map the rubrics for accreditation, but almost at the all changed. Too much work for just a 3-credit class. I think the professor needs to plan from the beginning of the semester what is due and never change it. I really ended up hating the class even though I developed good software with good features.*

- *The instructor was arrogant and full of himself. 90% of the class was spent having the instructor talk about the instructor's own achievements, which had nothing to do with what was being talked about. The rest of the time was listening to the other instructor talk about the experience when it's clear that the instructor has never touched a keyboard in his life. The class taught nothing and the instructor spent a majority of the time trying to force projects to use things that the mentors did not want and it took half the semester to have another instructor come in to say he could not do that. This may seem harsh but it's the truth. The instructor does not belong in a classroom. His lack of organization is very apparent as classes were just spur of the moment things for him as he was never prepared. He NEVER responded to any of the multiple emails sent by people unless he was asked in class. He would flip flop on everything, one minute your document was fine, the next it was total garbage in his eyes. This class is a major disappointment. More time is spent trying to deal with the class being Software Engineering 3 (if it existed) than actually completing the project. It is very apparent that the instructor hasn't written a line of code in years and the other instructor only knows enough to throw out terms that half the times aren't relevant. For those with work in projects that weren't very visual, they had to go an extra mile to prove that their demos did things (one team did a lot of work in the kernel). This course is less about making projects to showcase what you learned in school and more of a continuation of Software Engineering. The documentation is ridiculous, as most mentors don't care for it. I am almost appalled that these projects are considered passing. Some are trivial at best and showcase nothing in terms of Computer Science. For instance, App Development for iOS and Android, these showcase nothing other than being pretty and able to communicate with databases. There is nothing to them other than tedious coding. Take this in contrast to teams that are working with complex algorithms, modifying operating system functionality, and otherwise interesting projects. I would take it as a slap in the face that people could get away with doing something so pedantic and graduating. This is not just a review for this class but the FIU curriculum in general. Programming is taught in the most backward way and students are passing that should not. It should be very apparent if someone took 5 minutes to sit in a class and actually look at what was being taught. Suggestions to make classes easier are making the situation even worse, I tutored the midterm and finals tutoring sessions as well as doing many hours of tutoring, students have spent MONTHS learning programming and still haven't been taught the existence of if statements. They sit around dealing with meaningless java specifics that are not relevant while throwing the important concepts out the window. Out of my experience I felt that the only classes I had even a remote interest were either made too easy by students claiming the class was too hard or were graduate courses. My suggestions for improvements are to have mentors run the class instead of someone whose interest is Software Engineering, brings more diverse criticism. Get rid of the software engineering stuff, this is senior project not software engineering 2 or 3. Projects should actually be interesting, many of the topics done are not related to computer science and are more appropriate for IT majors, there needs to be a divide between CS and IT and it seems that CS is just becoming a slightly harder version of IT which it should not be. Have multiple people review projects (some people that can actually code and not just say they can) and have mentors set what they want. It seems that mentors and the instructor wanted completely different things and time was wasted simply trying to do these things than accomplish what our mentors wanted.*
- *The professor does not provide guidance requiring the deliverables that we must submit. For example, the professor asks to submit or proposed project posters, but never specified what was required in the poster's content.*
- *I disliked this class very much. I felt this course was a lot more difficult than it had to be. The teacher was my mentor and he was very unhelpful. I needed more direction and he was not available. Very bad instructor, I heard that one of the mentors was a lot more helpful with his group.*

- **Observations and Recommendations:**
  - As this course has gone through major changes over the past two years, some students have rightfully been confused and at times frustrated with the lack of clear direction and clear expectation from this course.
  - The pre-test taken in Fall 2013 has indicated that in general our senior project students are under prepared for what is expected of them in this course.
  - A single semester is too short to finish a major project by groups of 2 to 5 students, especially, if the projects are not assigned at the very beginning of the semester.
  - Students may hide behind their teammates and may pass the course without earning it.

- Many of the students taking this course do not have sufficient teamwork experience.
- Many of the students taking this course have not taken SE II and have no software project management experience.
- Projects do not seem to be diverse enough to cover all aspects of our curriculum and most projects are very software engineering centric.
- Based on the above observations, I make the following suggestions:
    - SE I should better prepare the students as suggested before.
    - The coordinator (another name for senior project's instructor) must reach out to the SCIS faculty members and SCIS industrial partners before the semester starts and ask for project suggestions. To make sure that the suggested projects are appropriate for the senior project course, the only metric should be whether the project is software intensive or not. In other words, whether the students assigned to this project would need to develop a significant software solution to solve a significant problem or not, as opposed to whether the project is a software engineering project or not.
    - We do have deliverable templates for Software Engineering and System Centric projects. For all the other possible project types, the coordinator should work with the mentor to come up with some appropriate project deliverable templates to be used by the assigned students.
    - Students should be assigned to the selected projects on the first week of the semester to get them started as early as possible.
    - The tentative schedule for the whole semester should be given on the first day of class and the expectation should be clearly explained.
    - The coordinator or his TA(s) should play the role of the project manager for the assigned projects, freeing the students to only worry about their project activities.
    - According to the timeline and milestones of the projects, every week (or every other week, depending on the size of the class), each individual student should get a chance to present a progress report as part of a group presentation.
    - The coordinator should give comments/feedback either verbally or in written form to each individual student with respect to his/her performance and the status of the project after students present their work or deliver their deliverables.
    - Teamwork should be emphasized as this may be the first time students work in a group setting.

* The comments by students were modified only for spelling and grammatical errors. In addition, the actual names of the instructors were removed from the comments for anonymity.

APPENDIX D-1: Exit (Graduating Student) Survey raw data

The raw data based on individual semesters is available at https://www3.cis.fiu.edu/alumni/admin/. The aggregate data for all six semesters from Summer 2011 to Spring 2013 are included below.

Outcome a: Students will demonstrate proficiency in the foundation areas of Computer Science including mathematics, discrete structures, logic and the theory of algorithms

This program outcome has been met for me personally

I agree strongly	*I agree moderately*	*I agree somewhat*	*I disagree somewhat*	*I disagree moderately*	*I disagree strongly*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.46*	*0.80*
51-58.62%	*28-32.18%*	*7-8.05%*	*0-0.00%*	*0-0.00%*	*1-1.15%*		

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

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.52*	*0.74*
55-63.22%	*25-28.74%*	*4-4.60%*	*3-3.45%*	*0-0.00%*	*0-0.00%*		

Outcome b: Students will demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems

This program outcome has been met for me personally

I agree strongly	*I agree moderately*	*I agree somewhat*	*I disagree somewhat*	*I disagree moderately*	*I disagree strongly*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.51*	*0.69*
53-60.92%	*26-29.89%*	*7-8.05%*	*1-1.15%*	*0-0.00%*	*0-0.00%*		

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

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.77*	*0.50*
70-80.46%	*14-16.09%*	*3-3.45%*	*0-0.00%*	*0-0.00%*	*0-0.00%*		

Outcome c: Students will demonstrate proficiency in problem solving and application of software engineering techniques

This program outcome has been met for me personally

I agree strongly	*I agree moderately*	*I agree somewhat*	*I disagree somewhat*	*I disagree moderately*	*I disagree strongly*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.54*	*0.66*
55-63.22%	*24-27.59%*	*8-9.20%*	*0-0.00%*	*0-0.00%*	*0-0.00%*		

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

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.69*	*0.53*
63-72.41%	*21-24.14%*	*3-3.45%*	*0-0.00%*	*0-0.00%*	*0-0.00%*		

Outcome d: Students will demonstrate mastery of at least one modern programming language and proficiency in at least one other

This program outcome has been met for me personally

I agree strongly	I agree moderately	I agree somewhat	I disagree somewhat	I disagree moderately	I disagree strongly	Mean	Std Dev
A(5)	B(4)	C(3)	D(2)	E(1)	F(0)	4.67	0.74
66-75.86%	16-18.39%	4-4.60%	0-0.00%	0-0.00%	1-1.15%		

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

Extremely meaningful	Moderately meaningful	Somewhat meaningful	Somewhat meaningless	Moderately meaningless	Extremely meaningless	Mean	Std Dev
A(5)	B(4)	C(3)	D(2)	E(1)	F(0)	4.71	0.59
67-77.01%	16-18.39%	3-3.45%	1-1.15%	0-0.00%	0-0.00%		

Outcome e: Students will demonstrate understanding of the social and ethical concerns of the practicing computer scientist

This program outcome has been met for me personally

I agree strongly	I agree moderately	I agree somewhat	I disagree somewhat	I disagree moderately	I disagree strongly	Mean	Std Dev
A(5)	B(4)	C(3)	D(2)	E(1)	F(0)	4.33	0.85
47-54.02%	25-28.74%	13-14.94%	1-1.15%	1-1.15%	0-0.00%		

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

Extremely meaningful	Moderately meaningful	Somewhat meaningful	Somewhat meaningless	Moderately meaningless	Extremely meaningless	Mean	Std Dev
A(5)	B(4)	C(3)	D(2)	E(1)	F(0)	4.33	0.87
46-52.87%	29-33.33%	8-9.20%	3-3.45%	1-1.15%	0-0.00%		

Outcome f: Students will demonstrate the ability to work cooperatively in teams

This program outcome has been met for me personally

I agree strongly	I agree moderately	I agree somewhat	I disagree somewhat	I disagree moderately	I disagree strongly	Mean	Std Dev
A(5)	B(4)	C(3)	D(2)	E(1)	F(0)	4.41	0.92
54-62.07%	20-22.99%	10-11.49%	2-2.30%	0-0.00%	1-1.15%		

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

Extremely meaningful	Moderately meaningful	Somewhat meaningful	Somewhat meaningless	Moderately meaningless	Extremely meaningless	Mean	Std Dev
A(5)	B(4)	C(3)	D(2)	E(1)	F(0)	4.67	0.60
63-72.41%	20-22.99%	3-3.45%	1-1.15%	0-0.00%	0-0.00%		

Outcome g: Students will demonstrate effective communication skills

This program outcome has been met for me personally

I agree strongly	I agree moderately	I agree somewhat	I disagree somewhat	I disagree moderately	I disagree strongly	Mean	Std Dev
A(5)	B(4)	C(3)	D(2)	E(1)	F(0)	4.34	0.93
50-57.47%	23-26.44%	10-11.49%	2-2.30%	2-2.30%	0-0.00%		

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

Extremely meaningful	Moderately meaningful	Somewhat meaningful	Somewhat meaningless	Moderately meaningless	Extremely meaningless	Mean	Std Dev
A(5)	B(4)	C(3)	D(2)	E(1)	F(0)	4.67	0.58

62-71.26%	*22-25.29%*	*2-2.30%*	*1-1.15%*	*0-0.00%*	*0-0.00%*

Outcome h: Students will demonstrate understanding of the scientific method

This program outcome has been met for me personally

I agree strongly	*I agree moderately*	*I agree somewhat*	*I disagree somewhat*	*I disagree moderately*	*I disagree strongly*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.07*	*1.13*
41-47.13%	*24-27.59%*	*13-14.94%*	*6-6.90%*	*2-2.30%*	*1-1.15%*		

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

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.18*	*1.09*
43-49.43%	*27-31.03%*	*13-14.94%*	*0-0.00%*	*2-2.30%*	*2-2.30%*		

Outcome i: Students will demonstrate familiarity with fundamental ideas and issues in the arts, humanities and social sciences

This program outcome has been met for me personally

I agree strongly	*I agree moderately*	*I agree somewhat*	*I disagree somewhat*	*I disagree moderately*	*I disagree strongly*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*3.90*	*1.21*
36-41.38%	*22-25.29%*	*19-21.84%*	*6-6.90%*	*2-2.30%*	*2-2.30%*		

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

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*3.53*	*1.38*
25-28.74%	*24-27.59%*	*25-28.74%*	*2-2.30%*	*7-8.05%*	*4-4.60%*		

Outcome j: Students will have experience with contemporary environments and tools necessary for the practice of computing

This program outcome has been met for me personally

I agree strongly	*I agree moderately*	*I agree somewhat*	*I disagree somewhat*	*I disagree moderately*	*I disagree strongly*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.20*	*0.86*
37-42.53%	*34-39.08%*	*13-14.94%*	*2-2.30%*	*1-1.15%*	*0-0.00%*		

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

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.48*	*1.10*
62-71.26%	*17-19.54%*	*3-3.45%*	*1-1.15%*	*1-1.15%*	*3-3.45%*		

Outcome k: Students will be successful in applying for computer science related entry-level positions in business, industry or government

Indicate your degree of success in finding CS related employment

Two or more good offers	*One suitable offer*	*Offer(s) not related to my major*	*I have applied, but no offers yet*	*All job applications have been rejected*	*I have not applied for employment*	*Mean*	*Std Dev*

A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*3.33*	*1.75*
27-31.03%	*31-35.63%*	*1-1.15%*	*13-14.94%*	*2-2.30%*	*13-14.94%*		

My CS education is a meaningful contributor to my ability to find a suitable job

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.59*	*0.90*
65-74.71%	*15-17.24%*	*3-3.45%*	*2-2.30%*	*1-1.15%*	*1-1.15%*		

Outcome I: Computer Science track graduates will be successful in gaining admission to graduate programs in Computer Science

Indicate your degree of success in gaining admission to Graduate School

Accepted at several schools	*Accepted at a primary choice school*	*Accepted at a secondary choice school*	*My applications are still pending*	*All my applications were rejected*	*I have not applied to grad school*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*1.24*	*1.97*
11-12.64%	*11-12.64%*	*1-1.15%*	*3-3.45%*	*0-0.00%*	*61-70.11%*		

My CS education is a meaningful contributor to my ability to gain admission to graduate school

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.38*	*1.02*
54-62.07%	*20-22.99%*	*9-10.34%*	*2-2.30%*	*0-0.00%*	*2-2.30%*		

****Overall Student Satisfaction for Computer Science Areas (Outcomes A-E)***

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.60*	*0.68*
301-69.20%	*105-24.14%*	*21-4.83%*	*7-1.61%*	*1-0.23%*	*0-0.00%*		

*****Overall Student Satisfaction for Non-Computer Science Areas (Outcomes G-I)***

Extremely meaningful	*Moderately meaningful*	*Somewhat meaningful*	*Somewhat meaningless*	*Moderately meaningless*	*Extremely meaningless*	*Mean*	*Std Dev*
A(5)	*B(4)*	*C(3)*	*D(2)*	*E(1)*	*F(0)*	*4.13*	*1.17*
130-49.81%	*73-27.97%*	*40-15.33%*	*3-1.15%*	*9-3.45%*	*6-2.30%*		

APPENDIX D-2: Alumni Survey raw data

The raw data of alumni survey is available at https://www3.cis.fiu.edu/alumni/admin/. The data collected from May 2007 to August 2013 is summarized below.

General Information:

Did you graduate with a BS degree from FIU?

Yes	No	Mean	Std Dev
A(1)	B(0)	0.95	0.22
18-94.74%	1-5.26%		

The following questions relate to our BS-CS program educational objectives.

For each of the following, please rate how your educational experience at FIU contributed to:

***Your capacity for personal growth**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.32	0.80
10-52.63%	5-26.32%	4-21.05%	0-0.00%	0-0.00%		

***Your capacity for life-long learning**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.16	0.93
9-47.37%	5-26.32%	4-21.05%	1-5.26%	0-0.00%		

***The development of your communication skills**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.00	0.86
6-31.58%	8-42.11%	4-21.05%	1-5.26%	0-0.00%		

***Your awareness of social and ethical responsibility**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.26	0.78
9-47.37%	6-31.58%	4-21.05%	0-0.00%	0-0.00%		

***Your preparation for a career in computer science**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.16	1.14
10-52.63%	5-26.32%	2-10.53%	1-5.26%	1-5.26%		

***Your preparation for graduate study**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.00	0.97
7-36.84%	7-36.84%	3-15.79%	2-10.53%	0-0.00%		

The following questions relate to the quality of our faculty and instruction

***Please rate the expertise of our faculty in their subject areas**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.05	0.94
8-42.11%	5-26.32%	5-26.32%	1-5.26%	0-0.00%		

***Please rate the dedication of our faculty to undergraduate teaching**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.00	0.73
5-26.32%	9-47.37%	5-26.32%	0-0.00%	0-0.00%		

***Please rate the mentorship (guidance, counseling) provided by our faculty**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	2.95	0.89
6-31.58%	7-36.84%	5-26.32%	1-5.26%	0-0.00%		

***Please rate the overall instructional capability of our faculty**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.00	1.03
6-31.58%	10-52.63%	1-5.26%	1-5.26%	1-5.26%		

The following questions are intended to help us determine how well the CS Curriculum prepares our students in specific areas of computer science

For each of the following, please rate the quality of your preparation upon graduation::

****Computer Programming**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.11	1.17
9-47.37%	7-36.84%	0-0.00%	2-10.53%	1-5.26%		

****Systems Development**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	2.74	1.16
6-31.58%	6-31.58%	4-21.05%	2-10.53%	1-5.26%		

****Data Structures & Algorithms**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	3.32	0.86
10-52.63%	6-31.58%	2-10.53%	1-5.26%	0-0.00%		

****Computer Architecture and Organization**

Excellent	Good	Satisfactory	Poor	Unsatisfactory	Mean	Std Dev
A(4)	B(3)	C(2)	D(1)	E(0)	2.84	1.23
6-31.58%	9-47.37%	1-5.26%	1-5.26%	2-10.53%		

The following questions are intended to help us evaluate the extent to which SCS promotes diversity and an environment in which minority students can succeed.

*******Please rate our effectiveness in maintaining a diverse student population***

Excellent A(4)	Good B(3)	Satisfactory C(2)	Poor D(1)	Unsatisfactory E(0)	Mean	Std Dev
10-52.63%	8-42.11%	1-5.26%	0-0.00%	0-0.00%	3.47	0.60

*******Please rate our diversity as an agent for your own personal growth***

Excellent A(4)	Good B(3)	Satisfactory C(2)	Poor D(1)	Unsatisfactory E(0)	Mean	Std Dev
9-47.37%	7-36.84%	2-10.53%	0-0.00%	1-5.26%	3.21	1.00

*******Please rate our diversity as an agent for your own awareness of social concerns***

Excellent A(4)	Good B(3)	Satisfactory C(2)	Poor D(1)	Unsatisfactory E(0)	Mean	Std Dev
6-31.58%	9-47.37%	3-15.79%	0-0.00%	1-5.26%	3.00	0.97

*******Please rate the extent to which SCS promoted a healthy learning environment***

Excellent A(4)	Good B(3)	Satisfactory C(2)	Poor D(1)	Unsatisfactory E(0)	Mean	Std Dev
6-31.58%	11-57.89%	0-0.00%	1-5.26%	1-5.26%	3.05	1.00

****Overall rating of eduactional experience at FIU***

Excellent A(4)	Good B(3)	Satisfactory C(2)	Poor D(1)	Unsatisfactory E(0)	Mean	Std Dev
51-44.74%	36-31.58%	21-18.42%	5-4.39%	1-0.88%	3.15	0.93

*****Overall quality of our faculty and instruction***

Excellent A(4)	Good B(3)	Satisfactory C(2)	Poor D(1)	Unsatisfactory E(0)	Mean	Std Dev
25-32.89%	31-40.79%	16-21.05%	3-3.95%	1-1.32%	3.00	0.90

******Overall rating of preparation upon graduation***

Excellent A(4)	Good B(3)	Satisfactory C(2)	Poor D(1)	Unsatisfactory E(0)	Mean	Std Dev
31-40.79%	28-36.84%	7-9.21%	6-7.89%	4-5.26%	3.00	1.14

*******Overall rating of diversity promotion and environment***

Excellent A(4)	Good B(3)	Satisfactory C(2)	Poor D(1)	Unsatisfactory E(0)	Mean	Std Dev
31-40.79%	35-46.05%	6-7.89%	1-1.32%	3-3.95%	3.18	0.93

Overall satisfaction with BS-CS program objectives

Excellent A(4)	Good B(3)	Satisfactory C(2)	Poor D(1)	Unsatisfactory E(0)	Mean	Std Dev
138-40.35%	130-38.01%	50-14.62%	15-4.39%	9-2.63%	3.09	0.98

APPENDIX E: Course-Embedded Assessment Summaries

BS in CS Student 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) Have experience with contemporary environments and tools necessary for the practice of computing.

Summary of Direct Measure Assessment Data for the BS in Computer Science

In accordance with the SCIS Assessment Plan for the BS in Computer Science, direct measures of attainment of Student Outcomes were performed as follows:

1. Outcome (a) – Subject Area: Foundations
   - MAD 2104
   - MAD 3512
2. Outcome (b) – Subject Areas: Computer Organization, Computer Systems, Programming
   - COP 3530
   - COP 4338
   - COP 4555
   - COP 4610
   - COP 4710
3. Outcome (c) – Subject Area: Software Engineering
   - CEN 4010
4. Outcome (d) – Subject Area: Programming Languages
   - COP 3337
   - COP 3530
   - COP 4338
5. Outcome (e) - Subject Area: Professional Development
   - CGS 3095
6. Assessment of all BS in CS Student Outcomes, (a) through (h), via observation of Senior Projects presented during the period from Summer 2011 to Spring 2013

Visit http://users.cis.fiu.edu/~pestaina/cis4911.html to look at the raw data for individual semesters. Direct Measure Assessment Summaries are included below for various periods.

APPENDIX E-1: Course-Embedded Assessment Summaries – Fall 2011

Fall 2011 **Summary of Direct Measure Assessment Data for the BS in Computer Science**

Prepared by Norman Pestaina, SCIS Undergraduate Programs Assessments Coordinator.
April 11, 2012

BS in CS Student Outcomes (Revised Fall 2010)
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 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) Have experience with contemporary environments and tools necessary for the practice of computing.

In accordance with the SCIS Assessment Plan for the BS in Computer Science, direct measures of attainment of Student Outcomes were performed as follows:

1. Course-embedded Assessment of BS in CS Student Outcome (a) (Foundations area) in MAD 2104 Discrete Mathematics.
2. Course-embedded Assessment of BS in CS Student Outcome (b) (Computer Science core) in COP 4555 Principles of Programming Languages.
3. Course-embedded Assessment of BS in CS Student Outcome (b) (Computer Science core) in COP 4710 Database Management.
4. Assessment of all BS in CS Student Outcomes, (a) through (h), via observation of six Senior Projects presented in Fall 2011.

The data obtained via these direct measures are summarized here. The following documents are referenced in this summary, and may be viewed at:
http://users.cs.fiu.edu/~pestaina/cis4911.html#fall2011

1. MAD 2104 Results of application of the Discrete Structures assessment rubric to the final exam of 1 section of MAD 2104, applied by Dr. Sue Gorman.
2. COP 4555 Results of Assessment Quiz prepared by Dr. Xudong He.
3. COP 4710 Embedded Assessment Report prepared by Dr. Shu-Ching Chen
4. Fall 2011 Rubric for assessing BS-CS Student Outcomes in Senior Projects

For reasons of confidentiality, the MAD 2104 final exams, and COP 4555 quiz are not included here.

Embedded Assessment of Outcome (a) in MAD 2104 Discrete Mathematics

The final examination responses in one section of MAD 2104 were analyzed by applying the *Discrete Structures Assessment* rubric. Ratings of the exams of the 7 Computer Science majors in this section who passed the course (C or higher grade) are summarized:

Rubric Score		# of Students	Cumulative %
16 = 100%	1	14	(1 / 7)
15 = 93.75%	2	43	(3 / 7)
14 = 87.5%	1	57	(4 / 7)
13 = 81.25%	1	71	(5 / 7)
12 = 75%	1	86	(6 / 7)
8 = 50%	1	100	

TABLE MAD 2104-1: Rubric Score by Number of Students

	Scored Rating of 1	
Discrete Structures Rubric Item	**#**	**%**
Understand Terminology of SETS	6	85.71
Write SET Theory Proof	5	71.43
Understand Terminology of RELATIONS	7	100.0
Perform Operations on RELATIONS	7	100.0
Understand Terminology of FUNCTIONS	5	71.43
Perform Operations on FUNCTIONS	5	71.43
Understand Notation of LOGIC	7	100.0
Apply Methods of LOGIC	6	85.71
Know Structure of PROOFS	6	85.71
Apply MATHEMATICAL INDUCTION	4	57.14
Compute PERMUTATIONS	7	100.0
Compute COMBINATIONS	7	100.0
Know Terminology of GRAPHS	6	85.71
Apply Methods of GRAPHS	4	57.41
Use Disjunctive Normal Form in BOOLEAN ALGEBRA	6	58.71
Apply Minimization Techniques in BOOLEAN ALGEBRA	5	71.43

TABLE MAD 2104-2: Rubric Scores by Rubric Item

Expectation:

a. 75% of students completing the exam should achieve a rating of at least 75% (12/16) on the rubric.
b. Each of the 16 rubric items should be scored 1 on at least 70% (5/7) of sampled exams.

Observation:

86% of sampled exams achieved a rating of 75% or higher. 14 of the 16 rubric items were scored at 1 for at least 70% of the sample. The remaining 2 items were scored at 1 on 57% of the sample.

Discussion:

The rubric items with the fewest 1-ratings, proof by induction and graph manipulation, correspond to areas that students have traditionally found more difficult. The results are encouraging.

Embedded Assessment of BS-CS Student Outcome (b) in COP 4555 Principles of Programming Languages

Course Outcomes

1. Master programming a functional language, such as Standard ML
2. Master programming with recursion
3. Be familiar with the use of context-free grammars to specify programming language syntax and with recursive descent parsing
4. Be familiar with natural semantics for imperative and functional programming languages and their use in building interpreters
5. Be familiar with polymorphic type systems and type inference
6. Be familiar with issues in the design and implementation of programming languages, such as lexical versus dynamic scoping and static versus dynamic type checking

15 students enrolled in COP 4555 completed a 10-question multiple choice assessment quiz:

Correct Answers	# of Students	Cumulative %
7= 70%	1	7 (1 / 15)
6 = 60%	9	67 (10 /15)
5 = 50%	2	80 (12/15)
4 or 2	3	100

TABLE COP 4555-1: Number of Correct Answers by Number of Students

Question#	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Outcomes	**5**	**5**	**5**	**6**	**(1, 2) 6**	**(1), 6**	**(1), 4**	**3**	**5**	**(2), 6**
# Correct	6/15	4/15	8/15	10/15	6/15	3/15	11/15	9/15	10/15	14/15
%Correct	40.0	26.7	53.3	66.7	40.0	20.0	73.3	60.0	66.7	93.3

TABLE COP 4555-2: Number of Correct Answers by Quiz-Question & Course Outcomes

Expectation:

a. 75% of students completing the assessment quiz should score 70% (7/10) or higher.
b. Each quiz question should be answered correctly by 75% of students completing the quiz.

Observation:

Only 1 of 15 students scored at an acceptable level of 70%. Further, only 2 of 10 questions (#7 and #10) were answered correctly by the expected number of students.

Discussion:

1) These results are in marked contrast to the results of a similar assessment in Fall 2010 when 63% of students attained a score of at least 7/10 (70%). **The subject area coordinator should determine to what extent the quizzes are comparable, and whether corrective action is indicated.**
2) There is a strong indication here for *standardization* of the COP 4555 assessment instrument to permit consistent interpretation of results across multiple applications.
3) A more focused assessment will be possible when the assessment quiz is designed around the fine-grained learning outcomes of COP 4555.

Embedded Assessment of BS-CS Student Outcome (b) in COP 4710 Database Management

Course Outcomes

1. Be exposed to information systems
2. Be familiar with database system and database architecture
3. Master the design conceptual schemas
4. Master normalization theory and the mapping of a conceptual schema to a relational schema
5. Master the expression of queries in SQL, relational algebra, and relational calculus
6. Be familiar with physical database design
7. Be familiar with writing application programs that use SQL

15 students enrolled in COP 4710 completed a 5-question multiple choice assessment quiz. The quiz and scores are attached. The results may be summarized as follows:

Correct Answers	# of Students	Cumulative %
5 = 100%	2	13 (2 / 15)
4 = 80%	8	67 (10 / 15)
3 = 60%	5	100

TABLE COP 4710 -1: Number of Correct Answers by Number of Students

Question#	**1**	**2**	**3**	**4**	**5**
Outcomes	**1, 2**	**3, 6**	**5**	**7**	**4**
# Correct	11/15	14/15	14/15	7/15	11/15
%Correct	73.3	93.3	93.3	46.7	73.3

TABLE COP 4710-2: Number of Correct Answers by Quiz-Question & Course Outcomes

Expectation:

a. 75% of students completing the assessment quiz should score 70% (7/10) or higher.
b. Each quiz question should be answered correctly by 75% of students completing the quiz.

Observation:

67% of students answered either 4 or 5 quiz questions correctly. All questions except question #4 were answered correctly by more than 73% of students taking the quiz. Question #4 was answered correctly at a contrastingly low rate.

Discussion:

1) The subject area coordinator should be made aware of the low attainment of outcome 7 indicated by question 4, and may consider whether corrective action is indicated.
2) A more focused assessment will be possible when the assessment quiz is designed around the fine-grained learning outcomes of COP 4710.

Assessment via CIS 4911 Senior Project

Each of the 6 projects was observed for the purpose of obtaining ratings of attainment of BS-CS outcomes by at least 2 faculty members. The ratings are on a scale of 1 .. 5, or 0 if the project provided insufficient evidence about a particular outcome. A mediation rating was obtained when the initial ratings differed by more than 1 point. The scoring rubric followed by the raters is attached.

	Outcome (a)	Outcome (b)	Outcome (c)	Outcome (d)	Outcome (e)	Outcome (f)	Outcome (g)	Outcome (h)
Project 1	1	5	5	5	1	4	5	5
Chamber Link	1	5	5	5	3	4	5	5
(M)					**3**			
Project 2	1	5	5	5	2	5	5	5
Mobile PP	1	5	5	4	2	5	5	5
Project 3	4	5	5	5	4	5	5	5
vMoodle	1	4	5	4	2	5	5	5
(M)	**1**	**4**	**5**	**5**	**2**	**5**	**5**	**5**
Project 4	1	4	5	5	2	5	5	5
NLP Visual.	0	5	5	4	2	5	5	5
Project 5	0	5	5	4	4	5	5	5
PseudoNexus	1	5	5	5	4	5	5	5
Project 6	2	4	5	5	2	5	5	5
Vis. Design	3	3	5	4	2	5	5	5
	Outcome (a)	**Outcome (b)**	**Outcome (c)**	**Outcome (d)**	**Outcome (e)**	**Outcome (f)**	**Outcome (g)**	**Outcome (h)**
Mean	***1.08***	***4.50***	***5.00***	***4.67***	***2.50***	***4.83***	***5.00***	***5.00***

*The means expressed in the final row of the table are averaged over the six **project outcome ratings**, using either the moderated rating or the average of the 2 un-moderated ratings.*

TABLE CIS 4911-1: Summary of Student Outcome ratings in Senior Project

Reliability: Prior to mediation, all 6 projects were each rated across all 8 student outcomes by 2 raters. The consistency of the un-mediated outcome attainment ratings is summarized in the following table.

Identical Ratings	Ratings differing by 1	Ratings differing by 2+
34/48	11/48	3/48
70.08%	25%	6.25%

TABLE CIS 4911-2: Consistency of Student Outcome ratings in Senior Project

93.75% of the paired ratings are either identical or differ by 1. This compares with 85% in both Fall 2010 and Spring 2011. The scoring rubric was refined prior to the Spring 2011 application, with improvement to 72.5% identical ratings, compared to 45% in Fall 2010. Again refined prior to this application, the number of identical ratings, 68.75%, is comparable, while the number of ratings that differ by no more than 1, 93.75%, represents a significant improvement over the 85% of previous applications. This represents good consistency,

and should be sustainable when the rubric is applied conscientiously.

The following standard is applied to all BS-BC Student Outcome ratings via the Senior Project.
Expectation: Attainment of all outcomes should be **75% or 3.75** on a 1 — 5 scale, or better.

- Outcome (a): *Demonstrate proficiency in the foundation areas of Computer Science…* ***1.08***

Observation: This exceedingly low rating excludes 0 (n/a) scores. The preponderance of 0 and 1 ratings suggests that this aspect of the CS curriculum is not being adequately reflected in senior projects. The 1 scores are almost uniformly for modeling using state transition diagrams.

- Outcome (b): *Demonstrate proficiency in various areas of Computer Science…* ***4.50***

Observation: 15 of 16 raters scored attainment of outcome (b) as *excellent (5)* or *very good (4)*; only 1 rater scored it as *good (3)*, and none as fair or poor.

- Outcome (e): *Demonstrate understanding of the social and ethical concerns …* ***2.50***

Observation: Only 3 of 16 raters scored attainment of outcome (e) as *very good (4)*, and 1 as good (3). 7 raters scored attainment of this outcome as fair (2), and 1 rater scored it as *poor (1)*;

- Outcome (c): *Demonstrate proficiency in problem solving and application of software engineering techniques…* ***5.00***
- Outcome (d): *Demonstrate mastery of at least one modern programming language…* ***4.67***
- Outcome (f): *Demonstrate the ability to work cooperatively in teams…* ***4.83***
- Outcome (g): *Demonstrate effective communication skills…* ***5.00***
- Outcome (h): *Have experience with contemporary environments and tools…* ***5.00***

Observation: Attainment of outcomes (c), (d), (f), (g) and (h) as demonstrated in the Senior Projects is uniformly rated as either *excellent (5)* or *very good (4)* across all six projects.

APPENDIX E-2: Course-Embedded Assessment Summaries (Spring 2012)

Spring 2012 Summary of Direct Measure Assessment Data for the BS in Computer Science

Prepared by Norman Pestaina, SCIS Undergraduate Programs Assessments Coordinator. 5/14/12

BS in CS Student Outcomes (Revised Fall 2010)

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 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) Have experience with contemporary environments and tools necessary for the practice of computing.

In accordance with the SCIS Assessment Plan for the BS in Computer Science, direct measures of attainment of Student Outcomes were performed as follows:

1. ***Course-embedded Assessment of BS in CS Student Outcome (a) (Foundations area) in MAD 2104 Discrete Mathematics.***
2. ***Course-embedded Assessment of BS in CS Student Outcome (a) (Foundations area) in MAD 3512 Theory of Algorithms.***
3. ***Course-embedded Assessment of BS in CS Student Outcome (b) (Computer Science core) in COP 3530 Data Structures.***
4. ***Course-embedded Assessment of BS in CS Student Outcome (b) (Computer Science core) in COP 4338 Computer Programming III and COP 4610 Operating Systems.***
5. ***Course-embedded Assessment of BS in CS Student Outcome (d) (Computer Programming) in COP 3337 Programming II, COP 3530 Data Structures, and COP 4338 Computer Programming III.***
6. ***Course-embedded Assessment of BS in CS Student Outcome (e) (Social and Ethical) in CGS 3092 Social and Ethical concerns in Computing***
7. ***Assessment of all BS in CS Student Outcomes, (a) through (h), via observation of the three Senior Projects presented in Spring 2012.***

The following data-source documents are referenced in this summary and may be viewed at http://users.cs.fiu.edu/~pestaina/cis4911.html#spring2012

1. ***Results of application of the Discrete Structures Assessment Rubric to the final exam of 1 section of MAD 2104, applied by Dr. Sue Gorman.***
2. ***Results of Embedded Assessment Quiz in MAD 3512 prepared by Dr. Dev Roy.***

3. ***Results of Embedded Assessment Quiz in COP 3530 prepared by Dr. Mark Weiss.***
4. ***Results of application of Computer systems rubrics in COP 4338 by Dr. Mark Weiss, and in COP 4610 by Dr. Jinpeng Wei.***
5. ***Results of application of the various Programming Assessment Rubrics to completed projects in COP 3337, COP 3530 and COP 4338, applied by Dr. Mark Weiss and Prof. Norman Pestaina (COP 3337).***
6. ***Results of application of the Ethics & Social Issues Assessment Rubric to completed projects in CGS 3092 by Dr. Scott Graham.***

Embedded Assessment of BS-CS Student Outcome (a) in MAD 2104 Discrete Mathematics

The final examination responses in one section of MAD 2104 were analyzed by applying the Discrete Structures Assessment rubric. Ratings of the exams of the 8 Computer Science majors in this section who passed the course (C or higher grade) are summarized:

Rubric Score	*# of Students*	*Cumulative %*
16 = 100%	1	13% (1/ 8)
15 = 94%	1	25% (2 / 8)
14 = 88%	1	38% (3 / 8)
12 = 75%	3	75% (6 / 8)
10 = 63%	1	74% (7 / 8)
9 = 56%	1	100% (8 / 8)

TABLE 1-1: MAD 2104, Rubric Score by Number of Students

Student Learning Outcome		Scored Rating of 1	
	Discrete Structures Rubric Item	#	%
1.1	Understand Terminology of SETS	8	100
1.2	Write SET Theory Proof	4	50
1.1	Understand Terminology of RELATIONS	7	88
1.2	Perform Operations on RELATIONS	2	25
1.1	Understand Terminology of FUNCTIONS	7	88
1.2	Perform Operations on FUNCTIONS	6	75
2.1	Understand Notation of LOGIC	8	100
2.1	Apply Methods of LOGIC	7	88
3.1	Know Structure of PROOFS	8	100
3.2	Apply MATHEMATICAL INDUCTION	4	50
4.1	Compute PERMUTATIONS	6	75
4.1	Compute COMBINATIONS	5	63
5.1	Know Terminology of GRAPHS	8	100
5.2	Apply Methods of GRAPHS	7	88
6.1	Use Disjunctive Normal Form in BOOLEAN ALGEBRA	7	88
6.2	Apply Minimization Techniques in BOOLEAN ALGEBRA	6	75

TABLE 1-2: MAD 2104, Rubric Scores by Rubric Item

Expectation:

a. 75% of students completing the exam should achieve a rating of at least 75% on the rubric.

b. Each of the 16 rubric items should be scored 1 on at least 70% of sampled exams.

Observation:

a. ***Exactly 75% of students achieved a rating of 75% or better***
b. ***12 of the 16 rubric items were scored 1 by at least 75% of the sample. Of the remaining 4 rubric items 3 were scored 1 by at least 50% of the sample and 1 was scored 1 by only 25%.***

<u>Discussion</u>:

The learning outcomes involving proof techniques (1.2, 3.2) and relations are rated lowest.

Embedded Assessment of BS-CS Student Outcome (a) in MAD 3512 Theory of Algorithms

Course Outcomes:

1. ***Be familiar with formal languages***
2. ***Master finite state machines***
3. ***Master Turing machines***
4. ***Be familiar with primitive recursive and recursive functions***
5. ***Be exposed to recursive unsolvability***

23 students enrolled in MAD3512 completed a 7-question multiple choice assessment quiz. The results are summarized as follows:

# of Correct Answers	**7**	**6**	**5**	**4**	**3**	**2**
%-score	**100%**	**86%**	**71%**	**57%**	**43%**	**29%**
# of Students	1	7	8	6	0	1
Cumulative **#** of Students	1	8	16	22	22	23
Cumulative **%** of Students	4	35	70	96	96	100

TABLE 2-1: MAD 3512, Number of Correct Answers by Number of Students

Question #	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Student Learning Outcome	**1.1**	**1.3**	**1.4**	**2.1**	**2.2**	**3.1**	**3.2**
# Correct Answers	18	19	20	23	12	13	10
% Correct Answers	78.3	82.6	87.0	100.0	52.2	56.5	43.5

TABLE 2-2: MAD 3512, Number and Percentage of Correct Answers to each Question

Expectation:

a. ***75% of students completing the assessment quiz should score 5 (70%) or higher.***
b. ***Each quiz question should be answered correctly by at least 75% of students.***

Observation:

a. ***71% of students achieved the threshold score of 5, or better.***
b. ***Only 4 of the 7 questions were answered correctly by at least 75% of students. The remaining 3 questions were answered correctly by approximately 50% of students.***

Discussion:

The available data includes the results of quizzes completed by some students who did not complete the course successfully. The course instructor was unable to identify and exclude these quizzes from the sample.

Embedded Assessment of BS-CS Student Outcome (b) in COP 3530 Data Structures

Course Outcomes

1. ***Be familiar with basic techniques of algorithm analysis***
2. ***Be familiar with writing recursive methods***
3. ***Master the implementation of linked data structures such as linked lists and binary trees***
4. ***Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure***
5. ***Be familiar with several sub-quadratic sorting algorithms including quicksort, mergesort and heapsort***
6. ***Be familiar with some graph algorithms such as shortest path and minimum spanning tree***
7. ***Master the standard data structure library of a major programming language (e.g. java.util in Java 1.2)***

14 students completing one section of COP 3530 answered a 6-question multiple choice assessment quiz in their mid-term exam, and an 8-question multiple choice quiz in their final exam. The results of these quizzes are combined to form a single course-embedded assessment event. The quizzes and scores are attached. The results may be summarized as follows:

# of Correct Answers	**14**	**13**	**12**	**11**	**10**	**9**	**8**
%-score	**100%**	**93%**	**86%**	**79%**	**71%**	**64%**	**57%**
# of Students	1	2	2	1	4	2	2
Cumulative **#** of Students	1	3	5	6	10	12	14
Cumulative **%** of Students	7%	21%	36%	43%	71%	86%	100%

TABLE 3-1: COP 3530, Number of Correct Answers by Number of Students

The following table summarizes the COP 3530 quiz results by individual question. Questions from the midterm exam are labeled M1 … M6, while questions from the final exam are labeled F1 … F8. Each is mapped to a Student Learning Outcome (SLO) associated with a Course Outcome.

	M1	**M2**	**M3**	**M4**	**M5**	**M6**	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**
SLO	**1.1**	**1.1**	**1.1**	**1.1**	**1.2**	**2.2**	**2.2**	**1.1**	**3.2**	**4.2**	**4.2**	**5.1**	**6.1**	**7.1**
N	13	14	10	13	12	11	6	11	10	8	12	7	14	8
%	93%	100%	71%	93%	86%	79%	43%	79%	71%	57%	86%	50%	100%	57%

TABLE 3-2: COP 3530, Number and Percentage of Correct Answers to each Question

Expectation:

a. 75% of students completing the assessment quiz should answer 10 or more questions correctly.

b. Each quiz question should be answered correctly by at least 75% of students.

Observation:

a. 10 of 14 students (71%) answered 10 or more of 14 questions correctly;.

b. 8 of 14 questions were answered correctly by 75% or more students. 2 of 14 questions were answered correctly by 71% of students. 3 of 14 questions were answered correctly by at least 50% of students. Only 1 question was answered correctly by fewer than 50% of students.

Discussion:

The Student Learning Outcomes are included with the raw data and may be useful to the COP 3530 course instructors and subject area coordinator in determining instructional areas for increased focus.

Embedded Assessment of BS in CS Student Outcome (b) (Computer Science core) in COP 4338 Computer Programming III, and COP 4610 Operating Systems.

Completed projects in COP 4338 and COP 4610 were evaluated by application of the Computer Systems Multithreading rubric (COP 4338), and the Computer Systems Storage Management rubric (COP 4610). On each rubric, the projects are scored against several rubric-points to obtain a rating expressed as a % of the maximum possible rating. These data are summarized in the following table. The COP 4338 projects are individual assignments while the COP 4610 projects are team projects.

Computer Systems	Multithreading (COP 4338)	Storage Management (COP 4610)
Sample Size	21	7
N >= 75%	20	5
% >= 75%	95%	71%

Table 4-1: Results of application of the Computer Systems rubrics

Expectation:

For each Computer Systems rubric, 75% of projects should be rated at 75% or better.

Observation:

a) On the Multithreading rubric, all but one evaluated project achieve the expected rating.

b) On the Storage Management rubric, the number of evaluated projects achieving the threshold 75% rating is marginally lower than the 75% standard.

Discussion:

There seems to be a need for fine-tuning of the COP 4610 rubrics.

Embedded Assessment of BS-CS Student Outcome (d) in COP 3337 Computer Programming II, COP 3530 Data Structures, and COP 4338 Computer Programming III

In précis, Outcome d) requires mastery of one programming language and proficiency in another; at the present time, Java and C respectively.

Students' mastery of each of 6 facets of Java programming is evaluated by application of facet-focused rubrics to completed programming projects in COP 3337 and COP 3530. On application of each rubric, all projects are scored against several rubric points resulting in a rating expressed as a % of the maximum. The acceptable rating is set at 75%. The rating data are summarized in the following table:

Computer Programming	API Usage (COP 3530)	Recursion (COP 3530)	Linked Structures (COP 3530)	Abstraction (COP 3530)	Inheritance (COP 3337)	Exceptions (COP 3337)
Sample Size	14	17	16	14	15	14
N >= 75%	13	17	13	14	14	10
% >= 75%	93%	100%	81%	100%	93%	71%

Table 4-1: Results of application of the Java Programming rubrics

Students' facility in a second language is evaluated by application of the C-Language Programming rubric to completed early programming project(s) in COP 4338. The projects are scored against several rubric points to obtain a rating expressed as a % of the maximum. Later projects are also evaluated against the Computer Systems Multithreading rubric in similar fashion. In either case, the acceptable rating is set at 75%. These data are summarized in the following table:

	C-Language	Multithreading
Sample Size	21	21
N >= 75%	21	20
% >= 75%	100%	95%

Table 4-2: Results of application of the C-Language and Multithreading rubrics

Expectation:

a. ***For each Java-based Programming rubric, 75% of projects should be rated at 75% or better.***
b. ***For each of the C-Language Programming and Computer Systems rubrics, 75% of projects should be rated at 75% or better.***

<u>Observation</u>:

a. ***Only on the Exceptions rubric are fewer than 75% of rated projects below the 75% acceptability threshold, and marginally so. On all other 5 rubrics, significantly more than 75% of rated projects score above the 75% threshold, including 2 rubrics at the maximum 100% rate.***
b. ***On the C-Language Programming rubric, all projects are rated at or above the 75% threshold. On the Multithreading rubric, only 1 of the 21 rated projects falls below 75%.***

Embedded Assessment of BS in CS Student Outcome (e) in CGS 3092 Social and Ethical Concerns in Computing

An assessment rubric is applied to student projects, requiring both written and oral presentation. The written and oral (Power Point) presentations of each project are separately analyzed to determine whether the presentations address a) issues of Social Concern and b) issues of Ethical Concern. For each facet the analysis identifies whether an assertion about that facet is supported by evidence, and whether counter arguments on that assertion are provided. This analysis yields 8 binary (0/1) scores, 4 Social, 4 Ethical, for an overall outcome rating in the range 0 .. 8.

		SOCIAL	ETHICAL	OVERALL
PROJECT NO. & TITLE (abbreviated)		**4**	**4**	**8**
1	Chinese Surveillance: An Ethical Dillema	4	4	8
2	SOPA/PIPA	4	4	8
3	Computer Privacy	4	4	8
4	GPS Enabled Devices – Privacy?	4	4	8
5	Google and Privacy	4	4	8
6	Is hacking ever ethical?	4	4	8
7	Virtual Goods as Intellectual Property	4	4	8
8	Do Games Teach Ethics?	4	4	8
9	First Amendment Rights in Cyberspace	4	2	6
10	Advanced Imaging Technology TSA	4	4	8
11	Digital Trade Act - SOPA/PIPA?	4	2	6
12	Do programmers Have Responsibility?	4	0	4
13	Software Patent Conflicts	4	4	8
14	Biometrics: The Effects on Insurance etc	4	2	6
15	Illegal Downloading and the Impact	4	4	8
16	Ethical Considerations- Japanese Anime	4	4	8
17	Gaming – Player Ethics	4	4	8
18	The First Amendment- Cyber Hate etc	4	4	8
18	Profiling Potential Employees	4	4	8
20	Internet Cross Dresser	4	0	4
21	GPS Enabled Devices – Privacy?	4	4	8
22	Forms of Online Aggression	4	0	4

		SOCIAL	ETHICAL	OVERALL
	# Ratings >= 75% (3/4 or 6/8)	22 of 22	16 of 22	19 of 22
	% Ratings >= 75% (3/4 or 6/8)	100.0%	72.7%	86.4%

TABLE 5: Summary of Ethics & Social Issues Assessment Rubric ratings, Spring 2012

Expectation:

a) ***For the Social Concerns facet of this outcome, 75% of the projects should be rated at 75% (3 of 4) or higher.***
b) ***For the Ethical Concerns facet of this outcome, 75% of the projects should be rated at 75% (3 of 4) or higher.***
c) ***75% of the projects should have overall ratings of 75% (6 of 8) or higher.***

Observation:

a) ***100% of projects are rated at 100% (4 of 4) on the Social Concerns facet of this outcome.***
b) ***72.7% of projects are rated at 75% (3 of 4) or higher on the Ethical Concerns facet of this outcome.***
c) ***86.4% of projects achieve overall ratings 75% (6 of 8) or higher.***

Discussion:

The 72.7 % of projects attaining the expected 75% rating on the Ethical Concerns facet are, in fact, all rated at 100% (4 of 4). A lower level inspection of the raw data reveals that the deficiencies are predominantly in the oral presentation aspect, while the written components adequately address the Ethical Concerns facet. This suggests reasonable attainment of this facet.

Direct Assessment of all BS in CS Student Outcomes via CIS 4911 Senior Project

Each of the three projects was observed for the purpose of obtaining ratings of attainment of BS-CS outcomes by at least 2 faculty members. The ratings are on a scale of 1 .. 5, or 0 if the project provided insufficient evidence about a particular outcome. A mediation rating was obtained when the initial ratings differed by more than 1 point. The scoring rubric followed by the raters is attached.

	Outcome (a)	Outcome (b)	Outcome (c)	Outcome (d)	Outcome (e)	Outcome (f)	Outcome (g)	Outcome (h)
Project 1	2	5	5	5	3	3	5	5
QRS Codes	1	5	5	5	3	3	5	5
Project 2	4	5	5	5	5	5	5	5
vMoodle	1	5	5	5	2	5	5	5
(M)	**2**				**4**			
Project 3	3	4	5	3	2	5	5	5
GME Database	1	4	5	4	3	5	5	5
(M)	**2**							
	Outcome (a)	**Outcome (b)**	**Outcome (c)**	**Outcome (d)**	**Outcome (e)**	**Outcome (f)**	**Outcome (g)**	**Outcome (h)**
Mean	***1.83***	***4.67***	***5.00***	***4.50***	***3.17***	***4.33***	***5.00***	***5.00***

*The means expressed in the final row of the table are averaged over the six **project outcome ratings**, using either the moderated rating or the average of the 2 un-moderated ratings.*

TABLE CIS 4911-1: Summary of Student Outcome ratings in Senior Project

***Reliability**: Prior to mediation, all 3 projects were each rated across all 8 student outcomes by 2 raters. The consistency of the un-mediated outcome attainment ratings is summarized in the following table.*

Identical Ratings	Ratings differing by 1	Ratings differing by 2+
18/24	3/24	3/24
75%	12.5%	12.5%

TABLE CIS 4911-2: Consistency of Student Outcome ratings in Senior Project

The following standard is applied to all BS-BC Student Outcome ratings via the Senior Project. <u>Expectation</u>: Attainment of all outcomes should be 75% or 3.75 on a 1 — 5 scale, or better.

- <u>Outcome (a)</u>: *Demonstrate proficiency in the foundation areas of Computer Science…* ***1.83***

<u>Observation</u>: Project specifications appear to miss several opportunities to incorporate foundations aspects, for example, statistical measures, stem or box plots, hypothesis testing, error estimation, flow graphs, etc.

Moderator's comment: "I think both projects could have had more foundation points with just some better documentation and perhaps this rubric needs to be communicated at the START of senior project and students can get their checklists earlier if this is not already being done."

- <u>Outcome (d)</u>: *Demonstrate mastery of at least one modern programming language…* ***4.50***

<u>Observation</u>: Project 3 received a rating of 3 for this outcome from the first evaluator.

- <u>Outcome (e)</u>: *Demonstrate understanding of the social and ethical concerns …* ***3.17***

<u>Observation</u>: This aspect is not sufficiently documented in project artifacts. The Moderator's remarks re the Foundations outcome a) probably also apply to this outcome.

- <u>Outcome (f)</u>: *Demonstrate the ability to work cooperatively in teams…* ***4.33***

<u>Observation</u>: Student's peer evaluations, and anecdotal evidence, indicate some difficulties with the participation of one of the Project 1 team members.

- <u>Outcome (b)</u>: *Demonstrate proficiency in various areas of Computer Science…* ***4.67***
- <u>Outcome (c)</u>: *Demonstrate proficiency in problem solving and application of software engineering techniques…* ***5.00***
- <u>Outcome (g)</u>: *Demonstrate effective communication skills…* ***5.00***
- <u>Outcome (h)</u>: *Have experience with contemporary environments and tools…* ***5.00***

<u>Observation</u>: For each of these outcomes, all individual ratings were either 4 (very good) or 5 (excellent).

APPENDIX E-3: Course-Embedded Assessment Summaries (AY 2012-2013)

Summary of Direct Assessment Data for the BS in Computer Science
Academic Year 2012 -2013

Prepared by Norman Pestaina, Undergraduate Programs Assessments Coordinator. August 18, 2013

In accordance with the SCIS Assessment Plan for the BS in Computer Science, several direct measures of attainment of Student Outcomes were undertaken.

BS in CS Student Outcomes (Revised Fall 2010)

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) Have experience with contemporary environments and tools necessary for the practice of computing.

The Direct Assessment Schedule for AY 2012-13 is attached as an appendix.

The Course Outcomes for the BS-CS courses are included into the common course syllabi and may be viewed at http://www.cis.fiu.edu/courses.php

Drafts (Spring 2012 vintage) of the Student Learning Outcomes for the BS-CS courses may be viewed at: http://users.cis.fiu.edu/~pestaina/learning_outcomes.html

The raw data summarized in this report, and the assessment rubrics utilized to derive the data, may be inspected at http://users.cis.fiu.edu/~pestaina/cis4911.html

BS-CS Student Outcome (a): Foundation Areas

Course-embedded Assessment in MAD 2104 Discrete Mathematics, Fall 2012

The final examination responses in one section of MAD 2104 were analyzed by applying the Discrete Structures Assessment rubric. On each exam, the response to each of 16 questions was rated 1 (substantially correct answer) or 0. Ratings of the exams of 19 Computer Science majors who passed the course (C or higher grade) are summarized:

# answers rated 1	16	15	14	13	12	11	10	<= 9
% answers rated 1	**100%**	**94%**	**88%**	**81%**	**75%**	**69%**	**63%**	**<= 56%**
# exams	1	1	1	2	1	5	3	5
Cumulative # exams	1	2	3	5	6	11	14	19
Cumulative % exams	5%	11%	16%	26%	32%	58%	74%	100%

TABLE 1-1: MAD 2104, Rubric Score by Number of Exams

The following table shows, for each rubric item, the associated MAD 2104 Student Learning Outcome, and the number and percentage of exam responses that were rated 1:

Rubric Item #	Student Learning Outcome	Discrete Structures Rubric Item Description	Answers rated 1 #	Answers rated 1 %
1	1.1	Understand Terminology of SETS	13	68
2	1.2	Write SET Theory Proof	7	37
3	1.1	Understand Terminology of RELATIONS	17	89
4	1.2	Perform Operations on RELATIONS	11	58
5	1.1	Understand Terminology of FUNCTIONS	18	95
6	1.2	Perform Operations on FUNCTIONS	10	53
7	2.1	Understand Notation of LOGIC	19	100
8	2.1	Apply Methods of LOGIC	17	89
9	3.1	Know Structure of PROOFS	11	58
10	3.2	Apply MATHEMATICAL INDUCTION	3	16
11	4.1	Compute PERMUTATIONS	14	74
12	4.1	Compute COMBINATIONS	14	74
13	5.1	Know Terminology of GRAPHS	16	84
14	5.2	Apply Methods of GRAPHS	15	79
15	6.1	Use Disjunctive Normal Form in BOOLEAN ALGEBRA	13	68
16	6.2	Apply Minimization Techniques in BOOLEAN ALGEBRA	18	42

TABLE 1-2: MAD 2104, Rubric Ratings by Rubric Item

Expectation:

a. 75% of the completed exams should achieve a rubric rating total of at least 75%.

b. Each of the 16 rubric items should be rated 1 on at least 75% of exams.

Observations:

a. 32 % of the completed exams achieved a rubric rating total of 75% or better.

b. 8 of the 16 rubric items were rated 1 on at least 74% of exams.

BS-CS Student Outcome (a): Foundation Areas

Course-embedded Assessment in MAD 3512 Theory of Algorithms, Fall 2012

33 students enrolled in MAD3512 completed a 10-question multiple choice assessment quiz. Results of only the 27 students who passed the course are considered. The results are summarized as follows:

# correct answers	10, 9	8	7	6	5	4	3	<= 2
% correct answers	**>= 90%**	**80%**	**70%**	**60%**	**50%**	**40%**	**30%**	**<= 20%**
# quizzes	0	6	8	6	4	1	2	0
Cumulative # quizzes	0	6	14	20	24	25	27	27
Cumulative % quizzes	**0%**	**22%**	**52%**	**74%**	**89%**	**93%**	**100%**	**100%**

TABLE 2-1: MAD 3512, Quiz Score by Number of Students

The following table shows for each quiz question, the associated MAD 3512 Student Learning Outcome, and the number and percentage of correct answers:

Quiz Question	Student Learning Outcome	Correct Answers	
		#	%
1	1.1	25	93
2	1.2	27	100
3	1.3	16	59
4	1.4	14	52
5	2.1	14	52
6	1.3	24	89
7	3.2	5	19
8	4.1	11	41
9	3.1	17	63
10	2.2	19	70

TABLE 2-2: MAD 3512, Scores for each Quiz Question

Expectation:

a. 75% of the quizzes should be scored 75% or higher

b. Each of the 16 rubric items should be scored 1 on at least 75% of the quizzes.

Observations:

a. 32 % of the quizzes were scored 75% or better. 74% achieved a score of 63%.

b. 8 of the 16 rubric items were answered correctly on at least 74% of the quizzes.

BS-CS Student Outcome (b) (CS Core: Data Structures and Algorithms) Course-embedded Assessment in COP 3530 Data Structures

17 students enrolled in one section of COP 3530 answered a 7-question multiple choice assessment quiz in their mid-term exam, and a 7-question multiple choice quiz in their final exam. The results of these quizzes are combined to form a single course-embedded assessment event comprising 14 quiz questions. The results may be summarized as follows:

# of Correct Answers	14	13	12	11	10	9	8
%-score	**100%**	**93%**	**86%**	**79%**	**71%**	**64%**	**57%**
# of quizzes	0	1	4	2	5	4	1
Cumulative **#** of quizzes	0	1	5	7	12	16	17
Cumulative **%** of quizzes	**0%**	**6%**	**29%**	**41%**	**71%**	**94%**	**100%**

TABLE 3-1: COP 3530, Number of Correct Answers by Number of Quizzes

The following table summarizes the COP 3530 quiz results by individual question. The midterm quiz questions are labeled M1 … M7, while the quiz questions from the final exam are labeled F1 … F7. Each is mapped to a COP 3530 Student Learning Outcome.

Quiz Question	Student Learning Outcome	Correct Answers	
		#	%
M1	1.1	14	82%
M2	1.1	15	88%
M3	1.1	15	88%
M4	1.2	9	53%
M5	1.1	15	88%
M6	3.2	15	88%
M7	2.2	12	71%
F1	2.1	16	94%
F2	4.1	13	76%
F3	4.2	12	71%
F4	5.1	13	76%
F5	6.1	3	18%
F6	4.2	16	94%
F7	7.1	8	47%

TABLE 3-2: COP 3530, Scores for each Quiz Question

Expectation:

a. 75% of the quizzes should have 10 or more correct answers (71% score or higher).

b. Each quiz question should be answered correctly on at least 75% of quizzes.

Observations:

a. 71% (12 of 17) of quizzes have 10 or more correct answers.

b. 9 of 14 quiz questions were answered correctly on at least 75% of quizzes.

BS-CS Student Outcome (b) (CS Core: Concepts of Programming Languages)

Embedded Assessment in COP 4555 Principles of Programming Languages, Spring 2013

30 students enrolled in one section of COP 4555 completed a 10-question multiple choice assessment quiz. The results are summarized as follows:

# of Correct Answers	**10**	**9**	**8**	**7**	**6**	**5**	**4**
%-score	**100%**	**90%**	**80%**	**70%**	**60%**	**50%**	**40%**
# of quizzes	0	3	5	8	11	1	2
Cumulative **#** of quizzes	0	3	8	16	27	28	30
Cumulative **%** of quizzes	**0%**	**10%**	**27%**	**53%**	**90%**	**93%**	**100%**

TABLE 4-1: COP 4555, Number of Correct Answers by Number of Students

The following table shows for each quiz question the associated COP 4555 Student Learning Outcome, and the number and percentage of correct answers:

Quiz Question	Student Learning Outcome	Correct Answers	
		#	%
1	1.1	20	67%
2	2.1	17	57%
3	6.3	8	27%
4	1.1	24	80%
5	1.1	16	53%
6	3.1	24	80%
7	3.1	27	90%
8	4.1	15	50%
9	5.1	24	80%
10	6.2	27	90%

TABLE 4-2: COP 4555, Scores for each Quiz Question

Expectation:

a. 75% of the quizzes should have 7 or more correct answers (70% score or higher)..

b. Each quiz question should be answered correctly on at least 75% of quizzes.

Observations:

a. 53 % (16 of 33) quizzes have 7 or more correct answers.

b. 5 of 10 quiz questions were answered correctly on at least 75% of quizzes.

BS-CS Student Outcome (b) (CS Core: Computer Systems - Database)

Course-embedded Assessment in COP 4710 Database Management, Fall 2012

20 students enrolled in one section of COP 4710 completed a 5-question multiple choice assessment quiz. The results are summarized as follows:

# of Correct Answers	**5**	**4**	**3**	**2**
%-score	**100%**	**80%**	**60%**	**<= 40%**
# of quizzes	9	10	1	0
Cumulative **#** of quizzes	9	19	20	20
Cumulative **%** of quizzes	**45%**	**95%**	**100%**	**100%**

TABLE 5-1: COP 4710, Number of Correct Answers by Number of Quizzes

The following table shows for each quiz question the associated COP 4710 Student Learning Outcome, and the number and percentage of correct answers:

Quiz Question	Student Learning Outcome(s)	Correct Answers	
		#	%
1	1.1, 2.1, 3.1	20	100%
2	4.1	20	100%
3	3.2, 5.1	16	80%
4	5.2, 7.1	13	65%
5	6.1	19	95%

TABLE 5-2: COP 4710, Scores for each Quiz Question

Expectation:

a. 75% of the quizzes should have 4 or 5 correct answers (80% score or higher)..

b. Each quiz question should be answered correctly on at least 75% of quizzes.

Observations:

a. 95% (19 of 20) of quizzes have 4 or 5 correct answers.

b. 4 of 5 quiz questions were answered correctly on at least 75% of quizzes.

BS in CS Student Outcome (b) (CS Core: Computer Systems - Operating Systems) Course-embedded Assessment in COP 4610 Operating Systems, Fall 2012

Course-embedded Assessment in COP 4338 Computer Programming III, Fall 2012

This outcome criterion is evaluated by application of 2 rubrics, *Computer Systems Memory Management Rubric* and *Computer Systems Information Management Rubric,* to 22 and 21 completed projects respectively in COP 4610. A third rubric, *Computer Systems Multithreading* is applied to 15 completed projects in COP 4338. All rubrics evaluate 12 rubric-points.

Rubric Raw Score →	**12**	**11**	**10**	**9**	**8**	**7**	**<= 6**
Rubric Percentage Score →	**100%**	**92%**	**83%**	**75%**	**67%**	**58%**	**<= 50%**
Computer Systems Memory Management							
# of Projects (Max = 22)	18	0	4	0	0	0	0
Cumulative # of Projects	18	18	22	22	22	22	22
Cumulative % of Projects	**82%**	**82%**	**100%**	**100%**	**100%**	**100%**	**100%**
Computer Systems Information Management							
# of Projects (Max = 21)	10	7	2	0	0	2	0
Cumulative # of Projects	10	17	19	19	19	21	21
Cumulative % of Projects	**48%**	**81%**	**90%**	**90%**	**90%**	**100%**	**100%**
Computer Systems Multithreading							
# of Projects (Max = 15)	6	2	3	1	1	2	0
Cumulative # of Projects	6	8	11	12	13	15	15
Cumulative % of Projects	**40%**	**53%**	**73%**	**80%**	**87%**	**100%**	**100%**

Table 6: Results of application of the Computer Systems Rubrics

Expectation:

On each 12-point rubric, 75% of rated projects should be rated at 75% (9 of 12) or higher.

Observations:

a. On the *Memory Management Rubric*, 100% of projects are rated at 75% or higher.
b. On the *Information Management Rubric*, 90% of projects are rated at 75% or higher.
c. On the *Multithreading Rubric*, 80% of projects are rated at 75% or higher.

BS-CS Student Outcome (c): Software Engineering

Course-embedded Assessment in CEN 4010 Software Engineering I , Fall 2012

Completed projects in CEN 4010 were evaluated by application of the 3 Software Engineering rubrics: Requirements & Analysis Rubric, Design Document Rubric, and Implementation & Validation Rubric. On each rubric, the projects are scored against 10 rubric-points to obtain a rating expressed as a % of the maximum possible rating. These data are summarized in the following table. The Projects were completed by 8 groups or 2, 3 or 4 students each.

Rubric Raw Score →	**10**	**9**	**8**	**7**	**<= 6**
Rubric Percentage Score →	**100%**	**90%**	**80%**	**70%**	**<= 60%**
Requirements & Analysis Rubric					
# of Projects (Max = 8)	4	1	1	1	0
Cumulative # of Projects	4	5	6	8	8
Cumulative % of Projects	**50%**	**63%**	**75%**	**100%**	**100%**
Design Document Rubric					
# of Projects (Max = 8)	5	1	0	2	0
Cumulative # of Projects	5	6	6	8	8
Cumulative % of Projects	**63%**	**75%**	**75%**	**100%**	**100%**
Implementation & Validation Rubric					
# of Projects (Max = 8)	3	0	1	3	1
Cumulative # of Projects	3	3	4	7	8
Cumulative % of Projects	**38%**	**38%**	**50%**	**88%**	**100%**

Table 7: Results of application of the Software Engineering Rubrics

Expectation:
On each Software Engineering rubric, 75% of projects should be rated at 75% or better.

Observation:

a. On the *Requirements & Analysis Rubric*, 75% of evaluated project achieved an 80% rating.
b. On the *Design Document Rubric*, 75% of evaluated project achieved an 80% rating.
c. On the *Implementation & Validation Rubric*, 50% of evaluated project achieved an 80% rating, while 88% of evaluated projects achieved a 70% rating.

BS-CS Student Outcome (d): Computer Programming

Course-embedded Assessment in COP 3530 Data Structures, Spring 2013
Course-embedded Assessment in COP 3337 Computer Programming II, Spring 2013 Course-embedded Assessment in COP 4338 Computer Programming III, Fall 2012

For the "*mastery of one programming language*" facet of outcome (d), completed COP 3530 Java programming assignments were evaluated via 4 rubrics: *Programming: Abstraction Rubric*, *Programming: API Usage Rubric*, *Programming: Recursion Rubric*, and *Programming: Linked Structures Rubric*. A 5th, *Programming: Inheritance Rubric* was applied to one Java assignment in COP 3337. All rubrics utilize an 8-point scale except for the API Usage Rubric which uses a 16-point scale, normalized to 8 for this report. These data are summarized in the following table.

Rubric Raw Score →	**8**	**7**	**6**	**5**	**<= 4**
Rubric Percentage Score →	**100%**	**87.5%**	**75%**	**62.5%**	**<= 50%**
Programming: Abstraction Rubric					
# of Projects (Max = 17)	15	0	0	0	2
Cumulative # of Projects	15	15	15	15	17
Cumulative % of Projects	**88%**	**88%**	**88%**	**88%**	**100%**
Programming: API Usage Rubric					
# of Projects (Max = 17)	11	6	0	0	0
Cumulative # of Projects	11	17	17	17	17
Cumulative % of Projects	**65%**	**100%**	**100%**	**100%**	**100%**
Programming: Recursion Rubric					
# of Projects (Max 17)	17	0	0	0	0
Cumulative # of Projects	17	17	17	17	17
Cumulative % of Projects	**100%**	**100%**	**100%**	**100%**	**100%**
Programming: Linked Structures Rubric					
# of Projects (Max = 17)	15	0	1	0	1
Cumulative # of Projects	15	15	16	16	17
Cumulative % of Projects	**88%**	**88%**	**94%**	**94%**	**100%**
Programming: Inheritance & Polymorphism Rubric					
# of Projects (Max = 19)	1	9	4	4	1
Cumulative # of Projects	1	10	14	18	19
Cumulative % of Projects	**5%**	**53%**	**74%**	**95%**	**100%**

Table 8-1: Results of application of the Computer Programming Rubrics

For the "*proficiency in at least one other*" facet, completed COP 4338 C Language programming assignments were evaluated via the 12-point *Programming: C_Language Proficiency Rubric*:

Rubric Raw Score →	**12**	**11**	**10**	**9**	**<= 8**
Rubric Percentage Score →	**100%**	**92%**	**83%**	**75%**	**<= 67%**
Programming: C_Language Proficiency Rubric					
# of Projects (Max = 15)	1	9	3	2	0
Cumulative # of Projects	1	10	13	15	15
Cumulative % of Projects	**7%**	**67%**	**87%**	**100%**	**100%**

Table 8-2: Results of application of the C_Language Proficiency Rubric

Expectation:

On each Computer Programming rubric, 75% of projects should be rated at 75% or better.

Observations:

a. On the *Programming: Abstraction Rubric*, 88% of evaluated projects achieved a 75% rating.
b. On the *Programming: API Usage Rubric*, 100% of evaluated projects achieved a 75% rating.
c. On the *Programming: Recursion Rubric*, 100% of evaluated projects achieved a 75% rating.
d. On the *Programming: Linked Structures Rubric*, 94% of evaluated projects achieved a 75% rating.
e. On the *Programming: Inheritance & Polymorphism Rubric*, 74% of evaluated project achieved a 75% rating.
f. On the *Programming: C_Language Proficiency Rubric*, 100% of evaluated project achieved a 75% rating.

BS in CS Student Outcome (e): Social & Ethical Concerns

Course-embedded Assessment in CGS 3095 Technology in the Global Arena, Fall 2012

An assessment rubric is applied to CGS 3095 student projects, requiring both written and oral presentation. These are separately analyzed to determine whether the presentations address a) issues of Social Concern and b) issues of Ethical Concern. For each facet, the analysis identifies whether an assertion is supported by evidence, and whether counter arguments are provided. This analysis yields 8 scores, 4 Social, 4 Ethical, for an overall outcome rating in the range 0 .. 8.

Rubric Raw Score →	**4**	**3**	**2**	**1**	**0**
Rubric Percentage Score →	**100%**	**75%**	**50%**	**25%**	**0%**
Social Issues in Computing					
# of Projects (Max = 31)	31	0	0	0	0
Cumulative # of Projects	31	31	31	31	31
Cumulative % of Projects	**100%**	**100%**	**100%**	**100%**	**100%**
Ethical Issues in Computing					
# of Projects (Max = 31)	8	0	13	7	3
Cumulative # of Projects	8	8	21	28	31
Cumulative % of Projects	**26%**	**26%**	**68%**	**90%**	**100%**
Rubric Raw Score →	**8**	**7**	**6**	**5**	**4**
Rubric Percentage Score →	**100%**	**87.5%**	**75%**	**62.5%**	**50%**
Social & Ethical Issues in Computing					
# of Projects (Max = 31)	8	0	13	7	3
Cumulative # of Projects	8	8	21	28	31
Cumulative % of Projects	**26%**	**26%**	**68%**	**90%**	**100%**

TABLE 9: Summary of Ethics & Social Issues Assessment Rubric ratings, Fall 2012

Expectation:

On the Ethics *and Social Issues Asessment Rubric* each facet, Social and Ethical, 75% of projects should be rated at 75% or better.

Observations:

a) Social Issues: 100% (31 of 31) of projects were rated at 75% or higher.

b) Ethical Issues: 26% (8 of 31) of projects were rated at 75% or higher.

c) On the issues taken together, 68% (21 of 31) of projects were rated at 75% or higher.

Direct Assessment of all BS in CS Student Outcomes in CIS 4911 Senior Project

Each project was evaluated by 2 faculty members to obtain ratings of attainment of each BS-CS outcome. The ratings are on a scale of 1 to 5, or 0 if the project provided insufficient evidence about a particular outcome. A mediated rating was obtained when the paired ratings differed by more than 1 point. The scoring rubric followed by the raters is attached. 6 projects were evaluated in Fall 2012 and 9 in Spring 2013. The summarized ratings are presented here:

	(a) Math	(b) Data	(b) Prog	(b) Dbase	(b) Oper	(c) Softw	(d) Comp	(e) Social	(f) Team	(g) Comm	(h) Envr
FL 2012	**Found**	**Struct**	**Langs**	**Systms**	**Systms**	**Eng**	**Prog**	**Ethical**	**Work**	**Skills**	**Tools**
PR.1	**2**	**2.5**	**4**	**4.5**	**4.5**	**5**	**4.5**	**2.5**	**5**	**5**	**5**
PR.2	2	2.5	2	4	3	5	4	3	5	5	5
PR.3	3.5	4.5	4	5	5	5	5	3	5	5	5
PR.4	1.5	1	2.5	4.5	2	5	5	3.5	4	5	5
PR.5	5	3	3	3.5	2	3.5	5	1.5	4	5	5
PR.6	1	1	3	5	1	5	4.5	2.5	n/a	5	5
FL 2012	**2.33**	**2.42**	**3.08**	**4.42**	**2.92**	**4.75**	**4.67**	**2.67**	**4.60**	**5.00**	**5.00**

TABLE 10-1: Summary of BS-CS Outcome ratings in Senior Projects, Fall 2012

	(a) Math	(b) Data	(b) Prog	(b) Dbase	(b) Oper	(c) Softw	(d) Comp	(e) Social	(f) Team	(g) Comm	(h) Envr
SP 2013	**Found**	**Struct**	**Langs**	**Systms**	**Systms**	**Eng**	**Prog**	**Ethical**	**Work**	**Skills**	**Tools**
PR.1	2	3.5	3	5	4	5	4.5	3.5	2	5	5
PR.2	2	3	2.5	5	4.5	5	4.5	5	5	5	5
PR.3	2	2	3	5	2	5	4	5	5	5	5
PR.4	2	2	4	5	1	5	5	4	5	5	5
PR.5	*2*	*3*	3.5	5	*2*	5	5	5	5	5	5
PR.6	2	1	3	5	3	5	4	5	5	5	5
PR.7	2	2	3	5	2	5	2	4	5	5	5
PR.8	2	3	3	1.5	1.5	5	4	2.5	5	5	4
PR.9	1	2	3	5	3	5	3	1	1	5	5
SP 2013	**1.89**	**2.39**	**3.11**	**4.61**	**2.56**	**5.00**	**4.00**	**3.89**	**4.22**	**5.00**	**4.89**

TABLE 10-2: Summary of BS-CS Outcome ratings in Senior Projects, Spring 2013

	(a) Math	(b) Data	(b) Prog	(b) Dbase	(b) Oper	(c) Softw	(d) Comp	(e) Social	(f) Team	(g) Comm	(h) Envr
AY 2012	**Found**	**Struct**	**Langs**	**Systms**	**Systms**	**Eng**	**Prog**	**Ethical**	**Work**	**Skills**	**Tools**
ALL	**2.13**	**2.40**	**3.10**	**4.53**	**2.70**	**4.90**	**4.27**	**3.40**	**4.36**	**5.00**	**4.93**

TABLE 10-3: Summary of BS-CS Outcome ratings in Senior Projects, Academic Year 2012-13

APPENDIX E-4: Course-Embedded Assessment Summaries (Sum 2011 and Sum 2012)

Summer 2011 & Summer 2012 Summary of Direct Measure Assessment Data - BS in CS

BS in CS Student 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 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) Have experience with contemporary environments and tools necessary for the practice of computing.

Direct Assessment of all BS in CS Student Outcomes via CIS 4911 Senior Project

Each of the three projects was observed for the purpose of obtaining ratings of attainment of BS-CS outcomes by at least 2 faculty members. The ratings are on a scale of 1 to 5, or 0 if the project provided insufficient evidence about a particular outcome. A mediation rating was obtained when the initial ratings differed by more than 1 point. The scoring rubric followed by the raters is attached.

Direct Assessment of all BS in CS Student Outcomes via CIS 4911 Senior Project

SUM-2011	Outcome (a)	Outcome (b)	Outcome (c)	Outcome (d)	Outcome (e)	Outcome (f)	Outcome (g)	Outcome (h)
PR-1	1	5	5	5	3	5	5	5
PR-1	1	5	5	5	4	4	5	5
SUM-2012								
PR-1	1	5	5	5	4	5	5	5
PR-1	1	5	5	5	5	5	5	5
PR-2	1	4	5	5	3	5	5	5
PR-2	4	5	5	5	5	5	5	5
(M)	2				4			
	Outcome (a)	Outcome (b)	Outcome (c)	Outcome (d)	Outcome (e)	Outcome (f)	Outcome (g)	Outcome (h)
Mean	1.33	4.83	5.00	5.00	4.00	4.83	5.00	5.00

TABLE CIS 4911: Summary of Student Outcome ratings in Senior Project

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

The *"C Language Proficiency*" was measured in COP 4338 through embedded questions. The raw results for 25 students are as follows:

Correct Answers	**# of Students**	**Cumulative %**	
12 = 100%	19	76	(19/25)
11 = 92%	1	80	(1/25)
8 = 67%	2	88	(2/25)
7 = 58%	2	96	(2/25)
4 = 33%	1	100	(1/25)

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

The *"multithreading"* concept was measured in COP 4338 through embedded questions. The raw results for 21 students are as follows:

Correct Answers	**# of Students**	**Cumulative %**	
12 = 100%	13	62	(13/21)
11 = 92%	2	72	(2/21)
9 = 67%	3	86	(3/21)
6 = 50%	2	95	(2/21)
5 = 42%	1	100	(1/21)

APPENDIX F: Course-Embedded Assessment Raw Data

The summarized Course Embedded Assessment Data is already presented in APPENDIX – E. The raw data for individual semesters is available from http://users.cis.fiu.edu/~pestaina/cis4911.html

APPENDIX G: Senior Project Assessment Instruments

Rating-Sheet

Senior Project
Assessment of Student Outcomes of the BS in Computer Science of the FIU School of Computing and Information Sciences

Project Title _____

Number of team members: _____ Semester & Year _____

Project origination: _____

_____

Evaluator	Affiliation
_____	_____
_____	_____
_____	_____
_____	_____

==========

Your responses to this survey instrument will be used solely for the purpose of assessing the Student Outcomes of the BS in Computer Science program of the School of Computing and Information Sciences at FIU. The survey is expressly NOT for assessment of student performance in the SCIS Senior Project course, nor for assessment of the instructor(s).

For each Student Outcome, decide whether this project provides sufficient evidence to make a judgment about the students' attainment of that Student Outcome. If so, please indicate your assessment of the level of attainment of that Student Outcome demonstrated in this project:

Rating	Criterion
n/a	The project does not provide clear evidence about this particular outcome
1	The project demonstrates **poor** attainment of this outcome
2	The project demonstrates **fair** attainment of this outcome
3	The project demonstrates **good** attainment of this outcome
4	The project demonstrates **very good** attainment of this outcome
5	The project demonstrates **excellent** attainment of this outcome

BS in CS Student Outcomes Assessment via Senior Project

	Student Outcomes	Rating
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)	Have experience with contemporary environments and tools necessary for the practice of computing.	

Rubric (Spring 2011)

Senior Project
Assessment of Student Outcomes of the BS in Computer Science of the School of Computing and Information Sciences Florida International University

The School of Computing and Information Sciences evaluates the Senior Projects of its graduating seniors for the purpose of assessing the level of attainment of the Student Outcomes of the BS in Computer Science program.

Your responses to this survey will be used solely for the purpose of assessing the Student Outcomes of the BS in Computer Science program of the School of Computing and Information Sciences at FIU. This survey is expressly NOT for assessment of student performance in the SCIS Senior Project course for assignment of letter grade, nor for assessment of the instructor(s).

Rating Instructions

For each program outcome, you are provided with a check-list of 7 or more criteria that evidence attainment of that outcome. Please check all criteria that are presented in this project. You may include additional criteria that are not explicitly listed; if so, please record the additional criteria in the spaces provided. Unless noted otherwise, the number of checked criteria, up to a maximum of 5, should be recorded as your rating of attainment of that outcome evidenced in the project.

Project Title _____

Semester & Year _____

Moderator (Faculty / Industry Sponsor): _____

Evaluators: _____

_____

_____

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

____ Project incorporates elements of mathematical reasoning or proof
(Lemma, Theorem, Propositional Logic, First Order Logic, Mathematical Induction)

____ Project utilizes elements of discrete mathematics
(Set Theory, Boolean Algebras, Combinatorics, Graph Theory)

____ Project utilizes some statistical procedure(s) to represent or summarize test data
(Mean, Standard Deviation, Stem Plot/Histogram, Box Plot/Percentile-Graph)

____ Project utilizes some statistical measure(s) of system behavior or performance
(Probability Distributions, Confidence Intervals, Hypothesis Testing)

____ Project design utilizes finite state diagrams to model system behavior

____ Project utilizes some aspect(s) of formal computer science
(Automata, Turing Machines, Recursive Function Theory, Recursive Unsolvability)

____ Project utilizes some technique(s) of numerical analysis
(Error Estimation, Interpolation, Numerical Calculus, Linear Systems, Matrix Algebra)

____ OTHER: _____

____ OTHER: _____

Student Outcome (b): *Demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems.*
Data Structures & Algorithms

____ Project utilizes an advanced data structure, e.g. search tree, hash table, priority queue

____ Project utilizes some graph algorithm, e.g. shortest path, minimum spanning tree

____ Project documents runtime analysis of selected algorithms

Concepts of Programming Languages

____ Project utilizes knowledge of programming language syntax
(Context-Free Grammars, Parse Trees, Ambiguity, Recursive Descent)

____ Project utilizes knowledge of programming language semantics
(Natural Semantics, Interpreters, Expressions, L- and R- Value, Environments)

____ Project demonstrates familiarity with design issues such as scoping rules, dynamic type checking, static type checking

Computer Systems (Database)

____ Project utilizes or designs an appropriate database management system

____ Project utilizes conceptual and/or relational schema

____ Project utilizes a database query language such as SQL

Computer Systems (Operating Systems)

____ Project implementation utilizes knowledge of memory management

____ Project implementation utilizes knowledge of process synchronization

____ Project documents analysis of tradeoffs in selection of system characteristics

____ OTHER: _____

____ OTHER: _____

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

____ Project demonstrates knowledge of the Software Development Life Cycle

____ Project deliverables include Project Specification

____ Project deliverables include Feasibility Study and/or Project Plan

____ Project deliverables include Requirements Documentation

____ Project deliverables include Design Documentation

____ Project documents testing and/or evaluation of the implementation

____ Project incorporates system walkthroughs

____ OTHER: _____

____ OTHER: _____

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

____ Project is implemented using an appropriate high level language

____ Project implementation is reasonably efficient rather than "brute force"

____ Project implementation is modular and/or re-usable

____ Project implementation uses a modern API or Tool-Kit

____ Project implementation utilizes recursion

____ Project implementation utilizes some advanced features, e.g. polymorphism

____ A project sub-system or module utilizes an appropriate programming language other than the primary implementation language, e.g. SQL, ML, assembly language

____ OTHER: _____

____ OTHER: _____

Student Outcome *(e)*: *Demonstrate understanding of the social and ethical concerns of the practicing computer scientist*

____ Project documents sources and references

____ Project identifies and addresses any relevant social issues

____ Project identifies and addresses any relevant ethical issues

____ Project identifies and addresses relevant legal issues

____ Project identifies and addresses any relevant privacy issues

____ Project documents anticipated impact on users/clients

____ Project documents and addresses any anticipated technology impact issues

____ OTHER: _____

____ OTHER: _____

Student Outcome (f): *Demonstrate the ability to work cooperatively in teams*

____ Project completion evidences equitable participation by team members

____ Project presentation(s) included all team members

____ Project team activity is documented

____ Project team set out and followed a schedule for timely completion

____ Project team negotiated consensus when needed

____ Team members roles were clearly defined and executed

____ Team members shared responsibility for success and failure

____ OTHER: _____

____ OTHER: _____

Program Outcome *(q)*: *Demonstrate effective communication skills*

____ Presentations described the essential features of the project

____ Presentations utilized good quality slides and presentation aids

____ Presenters utilized their time effectively

____ Presenters spoke directly to the audience

____ Technical features were communicated clearly

____ Project artifacts clearly document all project features

____ Project reports are well organized and written

____ OTHER: _____

____ OTHER: _____

Program Outcome (h): *Have experience with contemporary environments and tools necessary for the practice of computing*

____ Project utilized contemporary design tools

____ Project implementation utilized a modern IDE(s)

____ Project utilized appropriate validation/testing tools

____ Project was demonstrated using appropriate presentation tools

____ Project utilized appropriate project management tools (e.g., MS Project)

____ Project utilizes appropriate version control/document sharing tools

____ Project documents consideration of trade-offs in selection of tools

____ OTHER: _____

____ OTHER: _____

ABET Student Outcome

The program must enable students to attain, by the time of graduation:
(j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices. [CS]

Please comment on how this project "*demonstrates comprehension of the tradeoffs involved in design choices"*:

APPENDIX H: Student Organization Reports

ACM Activities

Report date: 3/23/2014, by Kip Irvine
This report was compiled from annual reports submitted by the local ACM student chapter Officers to the ACM National Organization.

General:
The ACM student chapter currently has consistently maintained an active membership of about 30-40 students during the time period of this report. This would include students who: (1) serve as officers, (2) attend general meetings, and (3) participate in the special-interest group meetings. Overall, there has been a steady increase in both membership and student activity over the past eight years.

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 (Advised by Dr. Prabakar)

Summer 2011
- During Summer 2011, under the leadership of its faculty advisor, tutors logged 54 hours of volunteer tutoring.

Fall 2011
- During Fall 2011, under the leadership of its faculty advisor, 26 tutors logged 176 hours of volunteer tutoring.
- 9/1/2011 - XNA Game creation workshop.
- 9/13/2011 - Ultimate Software Information Session
- 9/17/2011 - Beach Barbeque picnic
- 9/30/2011 - ACM Tutoring Session
- 10/3/2011 - IBM Master the Mainframe contest
- 10/5/2011 - Build an Arduino Workshop, Part I
- 10/28/2011 - Build an Arduino Workshop, part II
- 11/9/2011 - Build an Arduino Workshop, part III
- 11/14/2011 - Information Session by Alexis Jefferson about her REU Experience
- 11/18/2011 - Mini-Programming contest for FIU students
- 11/19/2011 - Tutors appreciation party
- 12/1/2011 - ACM Tutoring Session

Spring 2012
- 2/2/2012 - Interactive lecture on creating games for XNA Framework
- 2/4/2012 - ACM Programming Team competition

- 2/7/2012 - Open Forum for SCIS Directors and students
- 2/20/2012 - ACM Tutoring session for programming classes
- 2/21/2012 - Ultimate Software information session
- 2/28/2012 - Women in Computer Science Meeting
- 3/2/2012 - Hands-on workshop to build a computer
- 3/24/2012- Annual High School Programming Competition. 60 attendees.
- 4/1/2012 - BBQ Beach Event for faculty and students
- 4/20/2012 - ACM Tutoring Session for programming classes

Fall 2012 Activities:
Each of the following activities were attended by 15-20 students, except where otherwise noted.

- 9/20/2012 - Taking Things Apart Workshop. Students get the opportunity to take various electronics apart to learn about their inner components.
- 9/30/2012 - Midterm Tutoring Session. Session where tutors review Java programming concepts to prepare students for their midterm exams.
- 10/9/2012 - REU Lecture. Lecture explaining the benefits of REUs and how to apply for them.
- 11/15/2012 - Finals Tutoring Session. Session where tutors review Java programming concepts to prepare students for their final exams.
- 11/27/2012 - ACM Final Party. A party to celebrate the end of the semester and to reward students for their hard work in their classes.
- 12/9/2012 - Welcome Back Game Night. Gaming party to welcome students back from Winter vacation.

Spring 2013 Activities:
Each of the following activities were attended by 15-20 students, except where otherwise noted.

- 25-Jan-2013. Taking Things Apart Laptops Workshop. Workshop that allows students to learn the various components inside laptops.
- 15-Feb-2013. Midterm Tutoring Session. Tutoring session to help students prepare for their Java midterms.
- 22-Feb-2013. Soldering Workshop. Workshop to teach students the basics of soldering.
- 23-Feb-2013 - Build a Computer Workshop. Workshop to teach students how to assemble components into a working computer.
- 28-Feb-2013 - Build a computer workshop. Workshop to teach students how to assemble a working computer
- 01-Mar-2013. High School Programming Competition. Number in Attendance: 60. The 2013 Web site has not been updated yet. This is an annual event that has been going on for eight years.
- 09-Mar-2013. Networking workshop. Workshop to teach students the basics of computer networking.
- 21-Mar-2013. Game Night. Gaming party to help promote social skills among students.
- 29-Mar-2013. Taking Things Apart Workshop II. For those students who missed our previous Taking Apart Workshop, we offer another opportunity.

- 11-Apr-2013 - Finals Tutoring Session. Workshop to help students prepare for their Java final exams.
- 15-Apr-2013 - Student Appreciation Banquet. Banquet to celebrate students' hard work during the semester.
- 19-Apr-2013 - Taking Laptops Apart. Workshop to teach students the various components inside laptops

WICS ACTIVITIES SUMMARY: AUG. 2013 TO MARCH 23rd, 2014

- Beach BBQ (collaboration with ACM): Sun. Sept 29th, 2013 12:00pm – 1:00pm
    - This social event occurred at Crandon Park. Students, alumni, and guests attended, and free refreshments were provided.
- IBM's Master the Mainframe Power On: Mon. Oct 7th, 2013 12:00 – 2:00pm
    - This event was held to kick-off IBM's Master the Mainframe Competition and to encourage students to participate. Most attendees completed Part 1 of the competition in under an hour at the event.
- Soldering Workshop: Fri. Oct 18th, 2013 7:00pm – 8:00pm
    - Attendees were taught the basics of soldering. The final project was correctly assembling soldering lights to a soldering board.
- Java Tutoring Sessions 1 and 2: Mon. Oct. 21, 2013 4:30pm – 6:30pm & Tues. Oct. 22, 2013 3:30pm – 5:30pm
    - Students of Java courses about to take respective midterms and those interested in learning Java were tutored.
- IBM @ FIU Information Session: Tues. Oct. 29th, 2013 3:30pm – 8:00pm
    - IBM Recruiters spoke about the company and opportunities available to students. On site interviews were conducted for those who submitted resumes.
- Javascript/JQuery Workshop: Tues. Nov. 12th 2013 3:30pm – 4:30pm
    - Basic web development was taught.
- Miami Mini Maker Faire: WICS Soldering Workshop Booth: Sat. Nov. 16th, 2013 10:00am – 6:00pm
    - Members of WICS volunteered at the first ever Miami Mini Maker Faire, teaching attendees of various ages soldering techniques by demonstrating how to assemble a simple USB flashlight.
- C++ Workshop: Thurs. Nov 21st, 2013 3:30 – 4:30pm
    - The basics of C++ programming were taught.
- Movie Night: Wed. Dec. 4th, 2013 8:00pm – 10:00pm
    - The movie, The Conjuring, was watched. Free refreshments were provided.
- Java Tutoring Session 1 and 2: Thurs Dec. 5th, 2013 and Fri. Dec 6th, 2013 3:30pm – 5:30pm
    - Students of Java courses about to take respective finals and those interested in learning Java were tutored.
- (Note: most scheduled events so far for Spring 2014 to occur after this date of report:
    - Women Who Lead Conference (Attending): Tues. March 25th, 2014 8:15pm – 3:00pm
    - Movie Night: Wed. March 26th , 2014 8:00pm – 10:00pm
    - Soldering Workshop: Thurs. April 3rd, 2014 8:00pm – 9:00pm
    - How to Create a Programming Language: Tues. April 8th, 2014 3:30pm – 5:30pm
    - Beach BBQ (collaboration with ACM): Sun. April 13th, 2014 12:00pm – 6:00pm
    - Java Tutoring Session: Wed. April 16th, 2014 3:30pm – 7:30pm

Upsilon Pi Epsilon Report
Summer 2011 – Spring 2013

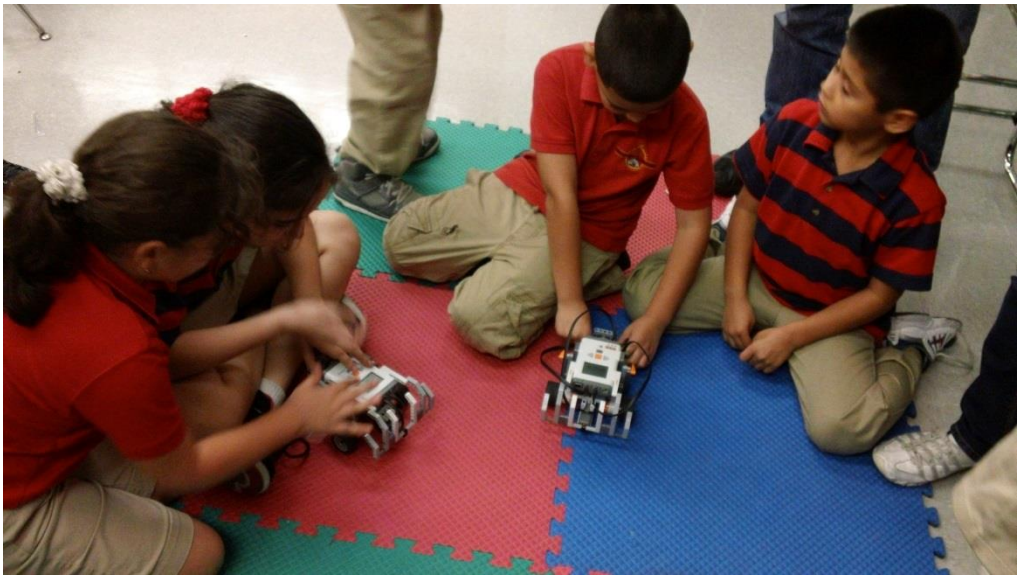
Upsilon Pi Epsilon (UPE) is the international honor society for students in computer science, information technology, computer engineering, and management information systems. Between summer 2011 and spring 2013 the Florida International University (FIU) UPE honors society continued to engage students in activities such as workshops, social events, and collaborative projects with other student organizations in the School of Computing and Information Sciences (SCIS).

IBM Mastering the Mainframe Contest

In fall 2011, UPE hosted IBM's Mastering the Mainframe Contest for FIU students. UPE collaborated with IBM's Michael Todd, creator of the contest, and Juan Caraballo, Program Director of IBM's Latin American Grid program to provide FIU students with the opportunity to have their questions answered regarding skills necessary for a career working with mainframes. Participation in the event was high and FIU was one of the top ten schools in the country with the most student participants.

Robotics Ceremony at Sweetwater Elementary School

In spring 2012 UPE together with the STARS and FIU Honors College continued the robotics program at Sweetwater Elementary school. The robotics program was sponsored in part by IBM. The objective with the 4th grade robotics program at Sweetwater Elementary school was to spark children's imagination, creativity, and interest in technology. This was achieved through a series of "hands on" activities with four small electric and completely customizable robots. Towards the end of the semester, there was a prize giving ceremony where the students were given the opportunity to display their projects to the school principal and faculty from the FIU Honors College and School of Computing and Information Sciences. Mr. Juan Caraballo from IBM gave the featured address at the ceremony.



Chapter Report at National Upsilon Pi Epsilon Meeting

In March 2012, the FIU UPE president, Ms. Laura Alonso, traveled to the 2012 ACM Special Interest Group for Computer Science Education (SIGCSE) conference to present the annual report at the National UPE meeting. FIU's UPE chapter was one of several UPE chapters across the nation to present the club's academic activities to an audience of CS faculty and students.

Chapter Induction Ceremony

In spring 2012 we held our annual induction ceremony and 21 members were inducted for the first time in our history.

SCIS Town Hall Meeting

UPE coordinated the SCIS town hall meeting, spring 2013, where students met the Director, Associate Director and faculty of SCIS. During the meeting the Directors presented the vision of the school, inform students of any changes to the degree programs, and more importantly, were available to answer any questions the students may have pertaining to the school. The town hall meeting is held annually and was a collaborative effort with the other student organizations in SCIS including ACM@FIU, PLUG, STARS, and WICS.

Laura Alonso	Alfonso Boza	Peter Clarke
UPE President	UPE President	UPE Faculty Advisor
Summer 2011-Fall2012	Spring 2013	

Summary of STARS Activities

Florida International University

Summer 2011-Spring 2013

Overseen by faculty advisors, Patricia McDermott-Wells, Tiana Solis, Masoud Milani, Florida International University's student-led chapter of Students in Technology, Academia, Research and Service have been working tirelessly on providing excellent tutors and mentors to students. In addition, we have been focusing on providing educational and hands on workshops on different skills necessary to function properly in the workforce.

- FIU's STARS chapter received a "Gold" rating, the highest rating awarded by the STARS National Alliance.
- FIU's student paper, The Beacon, published an article on STARS activities such as robotics outreach(Wesley Matthews Elementary), joint industry event with Microsoft(Mobile App Challenge), and a workshop conducted by STARS at a national conference.(http://fiusm.com/2013/10/08/fiu-aims-high-with-the-stars-alliance/)
- STARS conducted a multi-week outreach robotics program at Wesley Middle School, to encourage interest in STEM education and employment.
- STARS established a website to facilitate students requesting tutoring in individual classes. STARS handles hundreds of tutoring requests annually representing over 100 courses, with over 200 hours per semester.
- In addition to the regular weekly volunteer tutoring listed above, STARS conducts midterm and finals reviews each semester in several critical & required courses boosting student retention.
- STARS also attends Freshmen Orientations to promote and recruit new students to the SCIS programs.
- STARS' website and server has enabled students to get hands on experience with current technologies, designs and strategies – our members totally designed and implemented our interactive website which allows students to view tutor availability and request appointments. http://stars.cs.fiu.edu/tutors1.php
- STARS experience and findings resulting from the website were shared at the STARS annual national conference.
- STARS developed mobile device apps to facilitate student interactions(currently pending approval and app store submission).
- STARS has applied for external funding to create video tutorials to aid students in addition to the student tutors available.
- STARS members have gone on to internships and employment with:
    - Miami-Dade County Mayors Office
    - Miami-Dade County Schools
    - Ultimate Software
    - Microsoft
    - Lockheed Martin
    - Kaseya

Appendix-I: Minutes of SCIS Industrial Advisory Board Meetings

INDUSTRY ADVISORY BOARD
Florida International University
School of Computing and Information Sciences

Board Meeting Actions and Summary (DRAFT)
Sept. 16th, 2011
Florida International University
Miami, FL

Board Member Attendance:

- Pete Martinez, Board Chairman, Palm Beach Medical College (IAB Chair)
- Michael Buchenhorner, P. A., Patent Law
- Christopher Fleck, V.P., Platform Development, Citrix
- Dr. Hanafy Meleis, President of Palmetto Capital Fund, LLC
- Dr. Marek Rusinkiewicz, V.P. Research, Telcordia Technologies
- John Nygard III, CIO, Lennar Corp.

FIU Representation:

- Dr. Ram Iyengar, Director and Ryder Professor, FIU School of Computing and Information Sciences (SCIS)
- Steven Luis, Director of Technology and Business Relations, FIU SCIS
- Dr. Susan Jay, Director of Development, FIU CEC

Summary of Board Actions

1. 4/29/11: Board members offer to assist school reach out to local companies to broaden participation in the school development. Terremark and Cruise Lines are suggested as the first companies to approach. School to obtain FIU Foundation approval to begin discussions with these companies. Continue development with incoming Director. 9/16/11: We have Foundation approval to open discussion with RCL.
2. 4/29/11: Board members express interest to participate as COIL mentors. Program is awaiting final approval. Mr. Luis to provide information to the Board regarding mentoring opportunity. 9/16/11: Waiting for final approval of program via External Programs/University College.
3. 9/16/11: Board schedules next meeting on Dec. 2nd, 2011. The meeting will be held at FIU Modesto A. Maidique Campus at 5pm.
4. 9/16/11: Board members request to know the key metrics the school is tracking for improving national ranking.
5. 9/16/11: Board members request to know more about intellectual property/patents efforts in the school.

Board Meeting Summary

1. Mr. Martinez begins the meeting at 5:30 pm and asks members to introduce themselves.
2. Mr. Martinez makes his opening remarks. He welcomes Board members and thanks them for taking the time to participate on a Friday evening. He appreciates and encourages the lively and interactive conversation with faculty and students. He points out the rapid growth of the School and states with the leadership of the new Director Dr. Iyengar, we are ready to take the school to the next level.
3. Dr. Ram Iyengar presents his report to the Board. (See materials for presentation).
    a. Dr. Iyengar stress the need to focus our efforts on the education of our students and "make them shine". He speaks about his talk with President Rosenberg and how we should offer our students life changing experiences.
    b. He discusses his journey in developing LSU CS Dept. and making it a top ranking Dept.
    c. A key of accomplishing an improved ranking is showing the quality of our faculty and students and the impact of their work to the field.
    d. He points out that our students are very good and our location is excellent to attract outstanding faculty.
    e. He states that he wants our school to be recognized as not only the top CS Dept. in the state but to receive national recognition--- that is our ultimate goal.
    f. We should pursue challenging problems which will be of interest to collaborators all over the world.
    g. We should communicate our work through brochures and newsletters so that our peers are aware of our activities.
    h. Board members discuss different strategies related to challenges in the Healthcare domain with Dr. Iyengar. Dr. Meleis points out how some medical schools are using problem based education techniques.
    i. Dr. Iyengar discusses different challenging problems he has worked on as an example of making an impact.
    j. Mr. Fleck points out that one of the metrics we should consider is job placement and startup activity related to students and faculty of the school.
    k. Board members agree, job placement is an important selling point.
    l. Dr. Iyengar discusses the need to increase our graduate student population to expand our research impact.
    m. Mr. Martinez suggests that the school identify the key metrics and setup benchmarks for the next 5 years so that we can navigate a process to be in the top 50.
    n. Dr. Iyengar discusses the NRC rankings/metrics he used at LSU. The placement of students is very important. A discussion ensues about the School's current ranking.
    o. By increasing the number of PhD graduates we can bring more connections and recognition to our school.
    p. He is hoping to improve our PhD production to 10 per year in the next few years. To do so we need enforce a 5-year time limit and increase the pipeline. We will increase our recruitment efforts to achieve this and focus our funding efforts to support many of the outstanding students.
    q. Dr. Iyengar explains that the school should explore development of a training center for Hispanic PhDs because of the interest in Latin America to increase skills in this area.
    r. We must increase our patents-- assist them to pursue patent applications.

s. Mr. Martinez suggests that the board can give feedback on the research activities and their potential for patent and commercialization.

4. Susan Jay presents information concerning the Worlds Ahead Campaign.
5. Steve Luis discusses the industry campaign projects including a new High Technology Building concept.
6. Mr. Martinez discusses calendaring with the Board and it is agreed to meet on Dec. 2nd, 2011, 5pm at FIU.
7. Mr. Martinez and Dr. Iyengar thank the Board members for attending the meeting.
8. Mr. Martinez adjourns the meeting at 8:10pm.

Summary of Closed/Tabled Actions

1. **FL Governor Discussion:** 8/19/05: Mr. Braun has requested Dr. Deng investigate the cost of a study to better understand IT employment attraction and retention issues in South Florida. The study will be used as a basis for a discussion with Florida's Governor, Mr. Braun, Board members and Dr. Maidique/FIU. 12/9/05: The cost for the IT employment study request by Mr. Braun is $60K. The Board defers this item to Mr. Braun for further discussion. 5/26/06: Board members expressed concern regarding the $60K needed to conduct the survey. Board members agreed to postpone discussion on action until next Governor takes office.
   Board Action: 12/09/05 Tabled, till 2007.

2. **Industry Center**: 8/19/05: The Board supports the new direction for boot-strapping funding for an industry center by creating an "umbrella" of research projects that members can fund and/or pursue funding joint funding from Federal agencies. The Board requests to be informed with progress in this area. 12/9/05: The school and Board members are having ongoing discussions regarding joint projects and funding opportunities. The LA Grid Program is the outcome of conversations with IBM. The school will update Board members going forward. *Board Action: 12/09/05 Closed*

3. **Marketing:** 8/19/05: The Board requests that the school develop marketing materials to promote FIU, the school and its accomplishments. The Board suggests that this effort occur jointly with member companies with the goal of producing joint press releases. Mr. Braun offers the assistance of his staff for developing marketing and communications strategy. Mr. Braun felt that the marketing materials would be useful for recruiting new board members as well. Mr. Borras has also offered marketing assistance. Dr. Prasad is hiring a publications/publicity staff member. Mr. Braun suggests that the three of these staff members meet to coordinate marketing efforts. The timing for this effort will depend on the resolution of the reorganization. 12/09/05: Ms. Santana offers assistance with marketing effort. School is working on new marketing materials and will follow-up with companies reporting progress as requested.
   Board Action: 12/09/05 Closed

4. **NSF Award:** 8/19/05: Mr. Braun requests that if NSF awards the School with the BPC grant, the school should prepare joint press releases to promote the award to the community. 12/9/05: Grant was denied. Reviewer's comments were positive. School to reapply in Spring '06. School will update Board on progress.
   Board Action: 12/09/05 Closed

5. **LA Grid**: 8/19/05: The Board expresses approval of the LA Grid initiative, a partnership between IBM, FIU and other universities. The Board asks to be kept informed of the activity. 12/9/05:

Pete Martinez provides Board with overview of the LA Grid Program. School will update Board on progress.
Board Action: 12/09/05 Closed

6. **Board Action Procedures:** 12/9/05: The Board discussed several procedural mechanisms to process action items with the goal of closing action items out expeditiously. These procedures are:
    a. Once attending Board members, those present at the current meeting, decide to close an item it no longer needs to be discussed.
    b. If an action plan is put in place for a Board action item, the item should be closed. The party taking responsibility for the action plan should report to the Board periodically on the outcomes of the plan.
    c. It is sufficient for action to be taken on any agenda item by the attending Board members.
    d. Actions items accepted by the Board should establish a time limit with the understanding that action should be taken within that time or should be closed.
    e. The school will implement these procedures at upcoming meetings.

    Board Action: 12/09/05 Closed

7. **IT Industry Scholarship Fund**: 12/9/06: The Board agreed to review a proposal by Dr. Deng to develop an industry-based funding mechanism for student scholarships to attract high quality students. Dr. Deng will develop the proposal and distribute to Board members as soon as possible. A conference call should be scheduled thereafter to discuss the proposal. 5/25/06: Board members agreed to pursue the Scholarship Fund Campaign. Mr. Luis prepared and distributed materials for Board members to discuss with their colleagues. 04/07: Tabled to obtain more Board member feedback and direction.
    Board Action: 12/09/05 Open, pending review

8. **Business Continuity Information Network:** 12/07: Mr Braun suggests to Board members to reach out to their peers and networks to facilitate support. Board interested in sending letter of support on behalf of Centers of Excellence to lobby Gov. Board. Not pursued due to lobby rule limitations.

9. **Board Chair**: 9/12/08: Pete Martinez nominated and with a unanimous vote of the Board is elected as Board Chair. Dr. Meleis steps down as Board Vice-Chair. Mr. Martinez to nominate a Vice-Chair. 12/5/08: Dr. Roy Gerber is appointed Board Vice Chair. Closed

10. **School Move**: 12/4/09: Mr. Gerber receives a motion from the Board to create a draft letter to circulate to the Board member for comment/signature expressing concern for moving the School to the Engineering Center building. A letter was drafted, circulated, signed and delivered

to FIU Provost in Dec. 2009. Provost responded by stating that the School's future success is paramount in his decision and that the Board will be consulted before any decisions are made. *Closed.*

11. **Student Mentoring**: 9/12/08: Mr. Martinez proposes and the Board members agree to support a Student Mentoring program whereby each Board members would become a mentor of a student of the school. Mr. Martinez asks that a list of potential student candidates be drawn up. 12/5/08: Mr. Luis provides Board with resumes of students interested in the Mentoring program via web location of Board Materials. 9/10/10: Mr. Borras receives first student to mentor. *Ongoing*

12. **Board Membership**: 8/19/05: The Board has identified 8 companies to pursue for Board membership. The Board has set as a goal to have 15 total members. FIU will work with Mr. Braun to further communicate (via letter/phone) with non-active board members and potential members we would ask to join. Board members are encouraged to participate in the recruitment process. 12/9/05: Nick Bowen/IBM and Armando Garcia/IBM withdraw from the Board. Pete Martinez is added. Board members agree to pursue 4 additional members. Dr. Meleis will contact Citrix. Pete Martinez will contact Telefonica. Mr. Braun has made initial contact with Global Crossing, requires follow-up. FIU will continue discussions with PBS&J. 5/26/06: Dr. Meleis invited Mr. Cristinziano, Citrix VP, who accepted invitation. Also, Board members agreed that the Board should become larger before developing sub-committees. 12/15/06: Mr. Cristinziano steps down due to relocation. 2/26/07: Conf. Call, two new Board members are introduced, Mr. Pallin and Mr. Buchenhorner, three additional members are begin sought by April Meeting. Membership stands at 12. 4/07: Board affirms that 15 members are sought by next meeting. Dr. Meleis suggested that the Board review the objectives of the Board to assist in identifying additional members to recruit. 9/07: Three new Board members are introduced, Mr. Bravo/Microsoft, Mr. Fleck/Citrix and Mr. Ugale/Crossbow Ventures. Dr. Meleis proposed that the Board finalize objectives and create committees to work on Board objectives. 12/07: Mr. Braun requests further information about the objectives of the school going forward to better align with Board committee development. Item deferred to next meeting. *Board Action: 12/9/05, closed*

13. **Committees**: 9/12/08: Mr. Martinez proposes and the Boards passes the creation of two committees: Research and Talent Development. The Research Committee will help the school align its resources with Federal, State and local strategic investments and funding opportunities from the private and public sector. The Talent Development Committee will assist the school to develop programs to enhance student research and education experiences, further driving the competitiveness of our students. 12/5/08: Committees to meet via conf. call to formulate goals and actions. *Closed*

14.

15. *BS in Computer Science Program Educational Objectives and Student Outcomes*: 12/10/10: Dr. Navlakha presented the modified outcomes for the BS-CS program, and the Board unanimously concurred with the suggested modifications. The documents are available with Board materials. CLOSED

16. *CS Senior Projects: 12/10/10 :* Board members request that there be regular presentations from Senior Project students. The dialog is beneficial for both industry and school. Student

presentations will be evaluated for Fall and Spring agenda based on quality and relative interest of the board. CLOSED

17. *Technology Transfer Initiative*: 9/10/10: Board members approve of the School's efforts to assist faculty and students accelerate the IP development process by improving licensing options, expediting IP review process, and providing pre-incubator technical and business support. Board members offer to provide further guidance. Mr. Luis to contact Board members with next steps. CLOSED

INDUSTRY ADVISORY BOARD
Florida International University
School of Computing and Information Sciences

Board Meeting Actions and Summary (DRAFT)

December 2nd, 2011

Florida International University

Miami, FL

Board Member Attendance:

- Pete Martinez, Board Chairman, Palm Beach Medical College (IAB Chair)
- Jaime Borras, CEO, Wireless Silicon Group and Senior Fellow at Motorola Mobile Devices
- Michael Buchenhorner, P. A., Patent Law
- Christopher Fleck, V.P., Platform Development, Citrix
- Ralph MacNamara, Director of Client Services, Kaufman, Rossin & Co., Director of Client Services
- Dr. Hanafy Meleis, President of Palmetto Capital Fund, LLC
- John Nygard III, CIO, Lennar Corp.
- Steven Reid, Vice President of Software Engineering, Ultimate Software

FIU Representation:

- Dr. Ram Iyengar, Director and Ryder Professor, FIU School of Computing and Information Sciences (SCIS)
- Steven Luis, Director of Technology and Business Relations, FIU SCIS

Summary of Board Actions

6. 4/29/11: Board members offer to assist school reach out to local companies to broaden participation in the school development. Terremark and Cruise Lines are suggested as the first companies to approach. School to obtain FIU Foundation approval to begin discussions with these companies. Continue development with incoming Director. 9/16/11: We have Foundation approval to open discussion with RCL. 12/2/12: Foundation has given approval to approach RCL.
7. 12/2/12: Board Members have requested that the School begin tracking where its graduates are finding jobs and report back on findings periodically.

Board Meeting Summary

9. Mr. Martinez begins the meeting at 5:22.
10. Mr. Martinez makes his opening comments.
    a. He commends the Board members for their dedication to the school by making the time on a Friday night to participate.
    b. He recognizes the school for making tremendous progress. He states there is strong industry demand for the talent of the school.
    c. He comments on the Board agenda and discusses the value of creating and preparing products for markets and the development of IP.
    d. Mr. Martinez asks Board members to introduce themselves.
11. Dr. Iyengar introduces Laura Alonzo, President of the The Computer Honor Society
    a. Ms. Alonzo discusses the Sweetwater Robotics Program.
    b. She points out how the program is helping elementary kids to learn programming.
    c. She discusses the methods the group is using to train. Bringing equipment into the classroom.
    d. She comments how such work is helping increase awareness of computer science.
    e. Board members comment favorably about the program. Suggest students consider developing a small company for creating novel training techniques.
    f. Mr. Martinez discuss the value of investing in STEM training.
    g. Mr. Fleck points out that the Governor is very enthusiastic when discussing STEM.
12. Dr. Iyengar begins his report. See Board Materials.
    a. He presents an update on the School operations and projects.
    b. He discusses the Citrix Lecture Series. He invites the Board members to participate in lunch/dinners and talks.
    c. He discusses his vision for HPC on campus. Using a cross disciplinary approach to engage in research.
    d. Several Board members agree that HPC is an important direction for the School and University.
    e. Dr. Iyengar discusses activities at Oak Ridge National Labs and discusses the scale FIU needs to grow in order make an impact.
13. Dr. Iyengar discusses Intellectual Property Topic. See Materials.
    a. He talks about the necessity to translate research findings into IP.

b. He shares his vision of creating a lab in the School for developing innovation.
c. Board members comment on the impact of open source
d. How innovation is done with multiple parties and that the University can make a significant contribution in this area.

14. Dr. Ming Zhao presents his research activities. See Materials.
a. Dr. Zhao discusses his work in the area of virtualized computing systems.
b. He provides a summary of several projects he and his students have pursued.
c. One of his students is asked to provide details regarding his work.
d. Mr. MacNamara comments regarding Terrafly and the need to utilize some of the technology that Dr. Zhao is developing to increase it's performance.

15. Board members comment on the presentations they have experienced.
a. Members are very impressed with the work of faculty and students.
b. In the context of evaluating the Visions and Mission of the school, many Board members express an interest to learn more about where are students are being hired.
c. Board members discuss how to help in the schools effort to compete and move up in the rankings.

16. Board members agree to meet again on April 27th, 21012 at FIU.

17. Meeting adjourns at 7:35pm.

Summary of Closed/Tabled Actions

18. **FL Governor Discussion:** 8/19/05: Mr. Braun has requested Dr. Deng investigate the cost of a study to better understand IT employment attraction and retention issues in South Florida. The study will be used as a basis for a discussion with Florida's Governor, Mr. Braun, Board members and Dr. Maidique/FIU. 12/9/05: The cost for the IT employment study request by Mr. Braun is $60K. The Board defers this item to Mr. Braun for further discussion. 5/26/06: Board members expressed concern regarding the $60K needed to conduct the survey. Board members agreed to postpone discussion on action until next Governor takes office.
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to FIU Provost in Dec. 2009. Provost responded by stating that the School's future success is paramount in his decision and that the Board will be consulted before any decisions are made. *Closed.*

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32. *CS Senior Projects: 12/10/10 :* Board members request that there be regular presentations from Senior Project students. The dialog is beneficial for both industry and school. Student

presentations will be evaluated for Fall and Spring agenda based on quality and relative interest of the board. CLOSED

33. *Technology Transfer Initiative*: 9/10/10: Board members approve of the School's efforts to assist faculty and students accelerate the IP development process by improving licensing options, expediting IP review process, and providing pre-incubator technical and business support. Board members offer to provide further guidance. Mr. Luis to contact Board members with next steps. CLOSED

34. *Collaborative Open Innovation Lab*: 4/29/11: Board members express interest to participate as COIL mentors. Program is awaiting final approval. Mr. Luis to provide information to the Board regarding mentoring opportunity. 9/16/11: Waiting for final approval of program via External Programs/University College. 12/2/11. Mr. Luis updates Board members that the COIL program has started activities. CLOSED

35. *National Rankings*: 9/16/11: Board members request to know the key metrics the school is tracking for improving national ranking. 12/2/11: Dr. Iyengar discusses rankings in his presentation. The NRC ranking is not due for another three years. CLOSED

36. *Intellectual Property*: 9/16/11: Board members request to know more about intellectual property/patents efforts in the school. 12/2/11: Dr. Iyegar and Mr. Luis present information about IP at FIU. No further action is requested. CLOSED

INDUSTRY ADVISORY BOARD
Florida International University
School of Computing and Information Sciences

Board Meeting Actions and Summary (DRAFT)

April 27th, 2012

Florida International University

Miami, FL

Board Member Attendance:

- Dr. Roy Gerber, Board Co-Chair, Managing Partner, L3W
- Jaime Borras, CEO, Wireless Silicon Group and Senior Fellow at Motorola Mobile Devices
- Michael Buchenhorner, P. A., Patent Law
- Christopher Fleck, V.P., Platform Development, Citrix
- Dr. Hanafy Meleis, President of Palmetto Capital Fund, LLC and Former CEO, Trendium, Inc.
- John Nygard III, CIO, Lennar Corp.
- Steven Reid, Vice President of Software Engineering, Ultimate Software
- Jorge Rey, Director of Information Security and Compliance, Kaufman, Rossin & Co., P.A.
- Dr. Marek Rusinkiewicz, V.P. Research, Applied Communication Sciences
- Bert Silvestre, IBM General Business Leader - Florida, Georgia and Puerto Rico, Senior Location Executive

FIU Representation:

- Dr. Amir Mirmiran, Dean and Professor, College of Engineering and Computing (CEC)
- Dr. Ram Iyengar, Director and Ryder Professor, FIU SCIS
- Dr. Mark Weiss, Assoc. Director and Professor, FIU SCIS
- Dr. Susan Jay, Development Director, CEC
- Dr. Ming Zhao, Assistant Professor, SCIS
- Dr. Jong-Hoon Kim, Visiting Assistant Professor, SCIS

- Steven Luis, Director of Technology and Business Relations, FIU SCIS

Summary of Board Actions

8. 4/29/11: Board members offer to assist school reach out to local companies to broaden participation in the school development. Terremark and Cruise Lines are suggested as the first companies to approach. School to obtain FIU Foundation approval to begin discussions with these companies. Continue development with incoming Director. 9/16/11: We have Foundation approval to open discussion with RCL. 12/2/12: Foundation has given approval to approach RCL. 4/27/12: Mr. Silvestre will reach out to RCCL for interest to participate on the Board.
9. 12/2/12: Board Members have requested that the School begin tracking where its graduates are finding jobs and report back on findings periodically. 4/27/12: A survey of recent graduates was presented and an Alumni listing which is posted on the website is started. Updates will continue and reports given to the Board periodically. Closed.

Board Meeting Summary

1. Dr. Gerber opens the meeting at 5:03pm.
2. He welcomes Board members and thanks them for their participation.
3. He asks if there are any modifications to the minutes from last meeting.
4. He asks members and guests to introduce themselves.
5. Dr. Gerber recognizes Dr. Mirmiran.
    a. Dr. Mirmiran thanks the Board for their continued support.
    b. He comments on how the school is moving up in the rankings and that there is much room for growth.
    c. He points to the enrollment growth and the schools increase in degree awards to be between 2nd or 3rd in the nation.
    d. He points out that improving both the research and philanthropic funding of the school is very important for its continued growth.
    e. He comments on the Beacon Council One Community One Goal and how technology companies are a future target. These are goals that the School can align with.
    f. SCIS will have 1,800 students by 2020 and will be the main engine of IT talent in the region.
    g. He points out that FIU and the industry has a shared responsibility for the development of this talent.
    h. Dr. Mirmiran introduces the Professional Masters in IT program to Board members.
    i. He discusses how it works like a one year MBA and that it is catered to professionals. Areas of interest include Trade, logistics, healthcare, cross cutting topic areas like security.
    j. The college will be conducting a market study to gauge the market.
    k. He feels the School can create a strong offering.
    l. Dr. Weiss is introduced and further discusses the details of the program.
    m. Dr. Weiss discuss potential format for the program including Saturday only, hybrid online, and evenings.

n. He points out that there are still open questions about what subject areas there will be demand and the formulation of appropriate curriculum.
o. Dr. Weiss discussed other aspects of the program such as marketing to alumni and the cost of the program.
p. Mr. Silvestre asked who is the competition? Dr. Weiss stated that our market survey will evaluate other programs like ours but that he felt there wasn't anything like this downtown.
q. Dr. Gerber suggested to engage companies downtown to develop an employer role in the program where students can work on a real project.
r. Comments were made about different projects that could be pursued by students of the program, including ecommerce.
s. Mr. Silvestre discussed the advantages of a virtual program. How it would be important to evaluate other programs that are virtual to determine what would be unique about our offering.
t. Dr. Gerber discussed some of the benefits of the physical aspect of the program.
u. Dr. Weiss discussed how the program will have an industry advisory group to consider these issues and give recommendations.
v. Dr. Meleis asked who funds this program. Dr. Weiss describes the program tuition structure.
w. Dr. Gerber thanked Dr. Weiss for his information and asked Dr. Iyengar to proceed with his report. (see materials)
x. Dr. Iyengar opens by reviewing the goals of the school to be a top program in the US. He states we are moving in that direction and will review metrics to show this.
y. He states that one of the main goals now is to build Centers that will allow us to focus on key computing areas. That these centers will be places for multi-disciplinary research and the invention of new technologies. He points out the level of research funding that is associated with such centers. That these center provide much infrastructure and allow us to engage many students.
z. He points out that our strategy is to be the best in the nation in these areas not just Florida.

6. Dr. Gerber thanks him for his presentation and asks Dr. Kim to present the Discovery Lab. (see materials).
    a. Dr. Kim discusses the genesis of the Discovery Lab. It's focus is research, commercialization, and education. The focus is on Home Automation and robotics. He show different research activities to build frameworks to be used in these areas. He provides some designs of future robots being developed in the lab that can follow users in the home using a cell phone as its brains.
    b. Dr. Kim describes another project describe as Telebot. That it mimics what we say in the movie Avatar. To allow veterns and disabled to use the robot to do meaningful jobs like patrolling.
7. Dr. Gerber thanks Dr. Kim and asks Dr. Zhao to discuss the work and that of his students.
    a. Dr. Zhao gives an overview of his virtual computing systems work and the students roles. His students give a description of the work and show demo.
    b. Board members comment on the techniques presented in areas like intelligent load balancing, modeling and simulation applications, and connection to other work on campus in the area of Hurricane.

    c. Board members comment on the activities of the lab. Describe the work as great, relevant and bridging between the cloud and premise.
8. Dr. Gerber thanked Dr. Zhao and students. He asked Mr. Luis to discuss outstanding actions.
    a. Mr. Luis discusses membership and our effort to pursue more companies for the Board. Mr. Silvestre will be contacting RCCL for their interest to participate.
9. Dr. Gerber thanks Mr. Luis for the update and asks Mr. Luis for calendaring options for the next meeting. The Board agrees to meet again on Sept. 14th, at 5pm at FIU.
10. Dr. Gerber makes his closing remarks and thanks the Board or there continued support.
11. The Board adjourns at 7:51pm.

Summary of Closed/Tabled Actions

37. **FL Governor Discussion:** 8/19/05: Mr. Braun has requested Dr. Deng investigate the cost of a study to better understand IT employment attraction and retention issues in South Florida. The study will be used as a basis for a discussion with Florida's Governor, Mr. Braun, Board members and Dr. Maidique/FIU. 12/9/05: The cost for the IT employment study request by Mr. Braun is $60K. The Board defers this item to Mr. Braun for further discussion. 5/26/06: Board members expressed concern regarding the $60K needed to conduct the survey. Board members agreed to postpone discussion on action until next Governor takes office.
Board Action: 12/09/05 Tabled, till 2007.

38. **Industry Center**: 8/19/05: The Board supports the new direction for boot-strapping funding for an industry center by creating an "umbrella" of research projects that members can fund and/or pursue funding joint funding from Federal agencies. The Board requests to be informed with progress in this area. 12/9/05: The school and Board members are having ongoing discussions regarding joint projects and funding opportunities. The LA Grid Program is the outcome of conversations with IBM. The school will update Board members going forward. *Board Action: 12/09/05 Closed*

39. **Marketing:** 8/19/05: The Board requests that the school develop marketing materials to promote FIU, the school and its accomplishments. The Board suggests that this effort occur jointly with member companies with the goal of producing joint press releases. Mr. Braun offers the assistance of his staff for developing marketing and communications strategy. Mr. Braun felt that the marketing materials would be useful for recruiting new board members as well. Mr. Borras has also offered marketing assistance. Dr. Prasad is hiring a publications/publicity staff member. Mr. Braun suggests that the three of these staff members meet to coordinate marketing efforts. The timing for this effort will depend on the resolution of the reorganization. 12/09/05: Ms. Santana offers assistance with marketing effort. School is working on new marketing materials and will follow-up with companies reporting progress as requested.
Board Action: 12/09/05 Closed

40. **NSF Award:** 8/19/05: Mr. Braun requests that if NSF awards the School with the BPC grant, the school should prepare joint press releases to promote the award to the community. 12/9/05: Grant was denied. Reviewer's comments were positive. School to reapply in Spring '06. School will update Board on progress.
Board Action: 12/09/05 Closed

41. **LA Grid**: 8/19/05: The Board expresses approval of the LA Grid initiative, a partnership between IBM, FIU and other universities. The Board asks to be kept informed of the activity. 12/9/05:

Pete Martinez provides Board with overview of the LA Grid Program. School will update Board on progress.
Board Action: 12/09/05 Closed

42. **Board Action Procedures:** 12/9/05: The Board discussed several procedural mechanisms to process action items with the goal of closing action items out expeditiously. These procedures are:
    a. Once attending Board members, those present at the current meeting, decide to close an item it no longer needs to be discussed.
    b. If an action plan is put in place for a Board action item, the item should be closed. The party taking responsibility for the action plan should report to the Board periodically on the outcomes of the plan.
    c. It is sufficient for action to be taken on any agenda item by the attending Board members.
    d. Actions items accepted by the Board should establish a time limit with the understanding that action should be taken within that time or should be closed.
    e. The school will implement these procedures at upcoming meetings.

    Board Action: 12/09/05 Closed

43. **IT Industry Scholarship Fund**: 12/9/06: The Board agreed to review a proposal by Dr. Deng to develop an industry-based funding mechanism for student scholarships to attract high quality students. Dr. Deng will develop the proposal and distribute to Board members as soon as possible. A conference call should be scheduled thereafter to discuss the proposal. 5/25/06: Board members agreed to pursue the Scholarship Fund Campaign. Mr. Luis prepared and distributed materials for Board members to discuss with their colleagues. 04/07: Tabled to obtain more Board member feedback and direction.
    Board Action: 12/09/05 Open, pending review

44. **Business Continuity Information Network:** 12/07: Mr Braun suggests to Board members to reach out to their peers and networks to facilitate support. Board interested in sending letter of support on behalf of Centers of Excellence to lobby Gov. Board. Not pursued due to lobby rule limitations.

45. **Board Chair**: 9/12/08: Pete Martinez nominated and with a unanimous vote of the Board is elected as Board Chair. Dr. Meleis steps down as Board Vice-Chair. Mr. Martinez to nominate a Vice-Chair. 12/5/08: Dr. Roy Gerber is appointed Board Vice Chair. Closed

46. **School Move**: 12/4/09: Mr. Gerber receives a motion from the Board to create a draft letter to circulate to the Board member for comment/signature expressing concern for moving the School to the Engineering Center building. A letter was drafted, circulated, signed and delivered

to FIU Provost in Dec. 2009. Provost responded by stating that the School's future success is paramount in his decision and that the Board will be consulted before any decisions are made. *Closed.*

47. **Student Mentoring**: 9/12/08: Mr. Martinez proposes and the Board members agree to support a Student Mentoring program whereby each Board members would become a mentor of a student of the school. Mr. Martinez asks that a list of potential student candidates be drawn up. 12/5/08: Mr. Luis provides Board with resumes of students interested in the Mentoring program via web location of Board Materials. 9/10/10: Mr. Borras receives first student to mentor. *Ongoing*

48. **Board Membership**: 8/19/05: The Board has identified 8 companies to pursue for Board membership. The Board has set as a goal to have 15 total members. FIU will work with Mr. Braun to further communicate (via letter/phone) with non-active board members and potential members we would ask to join. Board members are encouraged to participate in the recruitment process. 12/9/05: Nick Bowen/IBM and Armando Garcia/IBM withdraw from the Board. Pete Martinez is added. Board members agree to pursue 4 additional members. Dr. Meleis will contact Citrix. Pete Martinez will contact Telefonica. Mr. Braun has made initial contact with Global Crossing, requires follow-up. FIU will continue discussions with PBS&J. 5/26/06: Dr. Meleis invited Mr. Cristinziano, Citrix VP, who accepted invitation. Also, Board members agreed that the Board should become larger before developing sub-committees. 12/15/06: Mr. Cristinziano steps down due to relocation. 2/26/07: Conf. Call, two new Board members are introduced, Mr. Pallin and Mr. Buchenhorner, three additional members are begin sought by April Meeting. Membership stands at 12. 4/07: Board affirms that 15 members are sought by next meeting. Dr. Meleis suggested that the Board review the objectives of the Board to assist in identifying additional members to recruit. 9/07: Three new Board members are introduced, Mr. Bravo/Microsoft, Mr. Fleck/Citrix and Mr. Ugale/Crossbow Ventures. Dr. Meleis proposed that the Board finalize objectives and create committees to work on Board objectives. 12/07: Mr. Braun requests further information about the objectives of the school going forward to better align with Board committee development. Item deferred to next meeting. *Board Action: 12/9/05, closed*

49. **Committees**: 9/12/08: Mr. Martinez proposes and the Boards passes the creation of two committees: Research and Talent Development. The Research Committee will help the school align its resources with Federal, State and local strategic investments and funding opportunities from the private and public sector. The Talent Development Committee will assist the school to develop programs to enhance student research and education experiences, further driving the competitiveness of our students. 12/5/08: Committees to meet via conf. call to formulate goals and actions. *Closed*

50. *BS in Computer Science Program Educational Objectives and Student Outcomes*: 12/10/10: Dr. Navlakha presented the modified outcomes for the BS-CS program, and the Board unanimously concurred with the suggested modifications. The documents are available with Board materials. CLOSED

51. *CS Senior Projects: 12/10/10 :* Board members request that there be regular presentations from Senior Project students. The dialog is beneficial for both industry and school. Student

presentations will be evaluated for Fall and Spring agenda based on quality and relative interest of the board. CLOSED

52. *Technology Transfer Initiative*: 9/10/10: Board members approve of the School's efforts to assist faculty and students accelerate the IP development process by improving licensing options, expediting IP review process, and providing pre-incubator technical and business support. Board members offer to provide further guidance. Mr. Luis to contact Board members with next steps. CLOSED

53. *Collaborative Open Innovation Lab*: 4/29/11: Board members express interest to participate as COIL mentors. Program is awaiting final approval. Mr. Luis to provide information to the Board regarding mentoring opportunity. 9/16/11: Waiting for final approval of program via External Programs/University College. 12/2/11. Mr. Luis updates Board members that the COIL program has started activities. CLOSED

54. *National Rankings*: 9/16/11: Board members request to know the key metrics the school is tracking for improving national ranking. 12/2/11: Dr. Iyengar discusses rankings in his presentation. The NRC ranking is not due for another three years. CLOSED

55. *Intellectual Property*: 9/16/11: Board members request to know more about intellectual property/patents efforts in the school. 12/2/11: Dr. Iyegar and Mr. Luis present information about IP at FIU. No further action is requested. CLOSED

INDUSTRY ADVISORY BOARD
Florida International University
School of Computing and Information Sciences

Board Meeting Actions and Summary (DRAFT)

September 14, 2012

Florida International University

Miami, FL

Board Member Attendance:

- Pete Martinez, Board Chair, Senior Vice President for Technology Development and Board Chairman, Palm Beach Medical College
- Dr. Roy Gerber, Board Co-Chair, Managing Partner, L3W
- Jaime Borras, CEO, Wireless Silicon Group and Senior Fellow at Motorola Mobile Devices
- Ruben Bravo, Managing Partner Kennetropy, LLC
- Michael Buchenhorner, P. A., Patent Law
- Christopher Fleck, V.P., Platform Development, Citrix
- Jose Machado, Director of IT Software Engineering, Royal Caribbean Cruises Ltd.
- Steven Reid, Vice President of Software Engineering, Ultimate Software
- Max Schmidt, IT Infrastructure, Operations and Information Security, Royal Caribbean Cruises Ltd.
- Bert Silvestre, IBM General Business Leader - Florida, Georgia and Puerto Rico, Senior Location Executive

FIU Representation:

- Dr. Ram Iyengar, Director and Ryder Professor, FIU SCIS
- Dr. Nagarajan Prabakar, Associate Professor, FIU SCIS
- Dr. Radu Jianu, Assistant Professor, FIU SCIS
- Dr. Shaolei Ren, Assistant Professor, FIU SCIS
- Dr. Xin Sun, Assistant Professor, FIU SCIS
- Dr. Jong-Hoon Kim, Visiting Assistant Professor, SCIS
- Steven Luis, Director of Technology and Business Relations, FIU SCIS

Summary of Board Actions

10. 4/29/11: Board members offer to assist school reach out to local companies to broaden participation in the school development. Terremark and Cruise Lines are suggested as the first companies to approach. School to obtain FIU Foundation approval to begin discussions with these companies. Continue development with incoming Director. 9/16/11: We have Foundation approval to open discussion with RCL. 12/2/12: Foundation has given approval to approach RCL. 4/27/12: Mr. Silvestre will reach out to RCCL for interest to participate on the Board. 9/14/12: Mr. Silvestre presented two new Board members from RCCL: Max Schmidt and Jose Machado. Board members continue to pursue potential Board member prospects.

Board Meeting Summary

1. Mr. Martinez opens the meeting at 5:05pm.
2. Mr. Martinez provides his opening remarks.
    a. He states the mission of the committee to provide the School with guidance on trends in industry, industry developments, and the placement of students.
3. Mr. Martinez asks Board members to introduce themselves.
4. Mr. Martinez asks Dr. Iyengar to present his report. (see materials)
    a. Dr. Iyengar makes several points:
        i. He encourages industry members to work with us to help place our students. He points out many examples of our students at IBM, RCCL, and other companies of the Board.
        ii. He points out that graduation rates and enrollment continue to grow significantly. We are 2nd in nation for BS degress and graduate 250 per year.
        iii. He states that we have received over $4 million in external funding last fiscal year, another record year.
        iv. He says that the school is now focused on submitting large scale proposals for centers. Further FIU is in the position to take the lead such proposals which is something we have not been in the position to do before.
        v. Dr. Iyengar stated that the visibility of our school has been raised by a number of activities we have engaged in.
        vi. We are now preparing for our 25Th Anniversary Celebration which will feature leading members of the National Academy of Engineering. Also alumni who are at prestigious universities will present as well.
        vii. He reviews recent accomplishments of faculty and students. He points out that the school is interested in doing more than just publish papers but that we create innovations that are making an impact in industry.
        viii. He points out that one of the hot topic areas we are investigating is Green Computing: improving energy performance in the data center.
        ix. He reviews how our students are winning hackathons and that these students are very attractive for hiring. These competitions really stimulate our students.

x. Dr. Iyengar presents recent work from the Discovery Lab. Board members engage in discussion about the impact robotics has on both college and high school level education. The consensus is that this is an area that will have a high potential of attracting good students.
xi. Dr. Iyengar presents graduate metrics and discusses the graduate program.
xii. Board members advise to look for ways to attract graduate students from Latin American.
xiii. Dr. Iyengar completes his presentation.
xiv. Mr. Martinez asks Dr. Radu to present his research highlights. (see Materials)

5. Mr. Martinez asks PhD Student Frank Hernandez to present his work in organizing the Game Developers Guild. (see materials.)
6. Mr. Martinez asks members to provide feedback to the school regarding the presentations they have seen included below:
    a. The school's efforts to build incubators to help develop skills and engage passionate students is outstanding.
    b. Board members are interested to see how we can tie both game engine development with visualization. This is something that industry would be interested in.
    c. The school should be commended for emerging from budget cuts and show such strong growth and development. FIU is leading innovation in the area. With the new faculty we are entering a new age of our school.
    d. Sensors and internet connected devices is an area for investigation and opportunity.
    e. The graduation rate is very impressive. More publizing to local companies is needed. Also, the local companies should learn more about what the school has to offer for courses.
    f. Continue high school and middle school outreach and partner with STEM programs in County.
    g. The new hires are transformational investments. The impact of FIU will increase as a result.
    h. Growth of talent has been tremendous, very inspiring.
    i. "Really great stuff", what diversity of activities.
7. Mr. Martinez asks Mr. Luis to review outstanding Board Actions.
    a. Mr. Luis reviews how the Board is still recruiting new members. He thanks Mr. Silvestre for his assistance in recruiting Mr. Schmidt and Mr. Machado from RCCL. Additional recruitment is ongoing and all Board members are encouraged to engage.
8. Mr. Martinez asks Mr. Luis to review the calendar for the next meeting date.
    a. The Board agrees on Dec. 7th 2012 .
9. Mr. Martinez adjourns the meeting at 7:37pm.

Summary of Closed/Tabled Actions

56. FL Governor Discussion: 8/19/05: Mr. Braun has requested Dr. Deng investigate the cost of a study to better understand IT employment attraction and retention issues in South Florida. The study will be used as a basis for a discussion with Florida's Governor, Mr. Braun, Board members and Dr. Maidique/FIU. 12/9/05: The cost for the IT employment study request by Mr. Braun is $60K. The Board defers this item to Mr. Braun for further discussion. 5/26/06: Board members

expressed concern regarding the $60K needed to conduct the survey. Board members agreed to postpone discussion on action until next Governor takes office.
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via web location of Board Materials. 9/10/10: Mr. Borras receives first student to mentor. *Ongoing*

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Board Action: 12/9/05, closed

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69. *BS in Computer Science Program Educational Objectives and Student Outcomes*: 12/10/10: Dr. Navlakha presented the modified outcomes for the BS-CS program, and the Board unanimously concurred with the suggested modifications. The documents are available with Board materials. CLOSED

70. *CS Senior Projects: 12/10/10 :* Board members request that there be regular presentations from Senior Project students. The dialog is beneficial for both industry and school. Student presentations will be evaluated for Fall and Spring agenda based on quality and relative interest of the board. CLOSED

71. *Technology Transfer Initiative*: 9/10/10: Board members approve of the School's efforts to assist faculty and students accelerate the IP development process by improving licensing options, expediting IP review process, and providing pre-incubator technical and business support. Board members offer to provide further guidance. Mr. Luis to contact Board members with next steps. CLOSED

72. *Collaborative Open Innovation Lab*: 4/29/11: Board members express interest to participate as COIL mentors. Program is awaiting final approval. Mr. Luis to provide information to the Board

regarding mentoring opportunity. 9/16/11: Waiting for final approval of program via External Programs/University College. 12/2/11. Mr. Luis updates Board members that the COIL program has started activities. CLOSED

73. *National Rankings*: 9/16/11: Board members request to know the key metrics the school is tracking for improving national ranking. 12/2/11: Dr. Iyengar discusses rankings in his presentation. The NRC ranking is not due for another three years. CLOSED

74. *Intellectual Property*: 9/16/11: Board members request to know more about intellectual property/patents efforts in the school. 12/2/11: Dr. Iyegar and Mr. Luis present information about IP at FIU. No further action is requested. CLOSED

75. 12/2/12: Board Members have requested that the School begin tracking where its graduates are finding jobs and report back on findings periodically. 4/27/12: A survey of recent graduates was presented and an Alumni listing which is posted on the website is started. Updates will continue and reports given to the Board periodically. CLOSED.

INDUSTRY ADVISORY BOARD
Florida International University
School of Computing and Information Sciences

Board Meeting Actions and Summary (DRAFT)

December 7th, 2012

Florida International University
Miami, FL

Board Member Attendance:

- Pete Martinez, Board Chair, Senior Vice President for Technology Development and Board Chairman, Palm Beach Medical College
- Dr. Roy Gerber, Board Co-Chair, Managing Partner, L3W
- Jaime Borras, CEO, Wireless Silicon Group and Senior Fellow at Motorola Mobile Devices
- Christopher Fleck, V.P., Platform Development, Citrix
- Jose Machado, Director of IT Software Engineering, Royal Caribbean Cruises Ltd.
- Dr. Hanafy Meleis, President of Palmetto Capital Fund, LLC and Former CEO, Trendium, Inc.
- John Nygard III, CIO, Lennar Corp.
- Thomas Packert, VP of Information Management, Orthosensor
- Steven Reid, Vice President of Software Engineering, Ultimate Software

FIU Representation:

- Dr. Ram Iyengar, Director and Ryder Professor, FIU SCIS
- Dr. Nagarajan Prabakar, Associate Professor, FIU SCIS
- Dr. Xin Sun, Assistant Professor, FIU SCIS
- Steven Luis, Director of Technology and Business Relations, FIU SCIS

Summary of Board Actions

11. 4/29/11: Board members offer to assist school reach out to local companies to broaden participation in the school development. Terremark and Cruise Lines are suggested as the first companies to approach. School to obtain FIU Foundation approval to begin discussions with these companies. Continue development with incoming Director. 9/16/11: We have Foundation approval to open discussion with RCL. 12/2/12: Foundation has given approval to approach RCL. 4/27/12: Mr. Silvestre will reach out to RCCL for interest to participate on the Board. 9/14/12: Mr. Silvestre presented two new Board members from RCCL: Max Schmidt and Jose Machado. 12/7/13: Dr. Gerber introduces new Board member Thomas Packert, VP of Information Management, Orthosenor. Board members continue to pursue potential Board member prospects.

Board Meeting Summary

10. Mr. Martinez opens the meeting at 5:12pm by phone.
11. Mr. Martinez provides his opening remarks.
    a. He speaks about Max Plank Inauguration Ceremony and the impact of the bioscience industry is having in South Florida. He illustrates how companies like Scripps in the corridor are hiring the nation's best researchers to pursue their innovation at many of these bioscience companies.
12. Dr. Gerber continues the meeting by asking Board members to introduce themselves.
13. Dr. Gerber recognizes new Board member Thomas Packert and thanks him for joining the Board.
14. Dr. Gerber recognizes Dr. Iyengar to provide his report to the Board. See powerpoint materials for specific details of the report.
    a. Dr. Iyengar provide his update of school activities since the last Board meeting in September 2012.
    b. He reviews research activities including plans for a center of excellence in Cyber Security.
    c. Dr. Iyengar reviews various school benchmarks and accomplishments for faculty and students.
    d. He discusses academic programs and discusses the opportunities the school will be exploring to partner with other colleges to build joint degree programs.
    e. Dr. Iyengar presents some of the recent work of the faculty in different computing areas.
15. Dr. Gerber recognizes Dr. Sun who presents his current research activities. See powerpoint materials for specific details.
16. Dr. Gerber recognizes Dr. Prabakar who presents the current research, education and outreach. Please see his powerpoint slides for details
17. Dr. Gerber asks Board members for their feedback regarding the presentations they have seen.
    a. Dr. Meleis comments that the research areas the school is pursuing are very good, especially the area of visualization and cloud are going to be very important for the growth of the school.

b. Mr. Fleck comments that he feels the school is making great progress toward its goals.
c. Mr. Packert feels that the school will need more personnel to continue to grow to address the agenda laid out.
d. Mr. Reid was very impressed with the quality of the research projects especially the Telebot project.
e. Several board members discuss the value of having a Cyber Security Center at FIU and how it is very relevant to the needs of industry.
f. Mr. Machado commented that RCCL has hired several students in the last year. Specifically, newly hired students showed very good technical skills in completing a mobile application development project in two months.
g. Mr. Borras commented he found the senior projects to be of high quality and suggested some have commercial value.
h. Dr. Iyengar commented that we are encouraging our students to seek commercialization outcomes with their projects and also noted that we are working with the University Technology Management Office to develop opportunities for students to receive assistance in such matters.

18. Dr. Gerber asks Mr. Luis to review outstanding Board Actions.
    a. Mr. Luis reviews how the Board is still recruiting new members. He acknowledges the addition of Mr. Packert to the Board. Additional recruitment is ongoing and all Board members are encouraged to engage.
19. Dr. Gerber asks Mr. Luis to review the calendar for the next meeting date.
    a. The Board agrees on April 26th, 2013.
20. Dr. Gerber makes his final remarks thanking Board members for their attendance and participation and adjourns the meetings at 7:15pm

Summary of Closed/Tabled Actions

76. FL Governor Discussion: 8/19/05: Mr. Braun has requested Dr. Deng investigate the cost of a study to better understand IT employment attraction and retention issues in South Florida. The study will be used as a basis for a discussion with Florida's Governor, Mr. Braun, Board members and Dr. Maidique/FIU. 12/9/05: The cost for the IT employment study request by Mr. Braun is $60K. The Board defers this item to Mr. Braun for further discussion. 5/26/06: Board members expressed concern regarding the $60K needed to conduct the survey. Board members agreed to postpone discussion on action until next Governor takes office.
Board Action: 12/09/05 Tabled, till 2007.

77. Industry Center: 8/19/05: The Board supports the new direction for boot-strapping funding for an industry center by creating an "umbrella" of research projects that members can fund and/or pursue funding joint funding from Federal agencies. The Board requests to be informed with progress in this area. 12/9/05: The school and Board members are having ongoing discussions regarding joint projects and funding opportunities. The LA Grid Program is the outcome of conversations with IBM. The school will update Board members going forward. *Board Action: 12/09/05 Closed*

78. **Marketing:** 8/19/05: The Board requests that the school develop marketing materials to promote FIU, the school and its accomplishments. The Board suggests that this effort occur jointly with member companies with the goal of producing joint press releases. Mr. Braun offers the assistance of his staff for developing marketing and communications strategy. Mr. Braun felt that the marketing materials would be useful for recruiting new board members as well. Mr. Borras has also offered marketing assistance. Dr. Prasad is hiring a publications/publicity staff member. Mr. Braun suggests that the three of these staff members meet to coordinate marketing efforts. The timing for this effort will depend on the resolution of the reorganization. 12/09/05: Ms. Santana offers assistance with marketing effort. School is working on new marketing materials and will follow-up with companies reporting progress as requested.
    Board Action: 12/09/05 Closed

79. **NSF Award:** 8/19/05: Mr. Braun requests that if NSF awards the School with the BPC grant, the school should prepare joint press releases to promote the award to the community. 12/9/05: Grant was denied. Reviewer's comments were positive. School to reapply in Spring '06. School will update Board on progress.
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80. **LA Grid**: 8/19/05: The Board expresses approval of the LA Grid initiative, a partnership between IBM, FIU and other universities. The Board asks to be kept informed of the activity. 12/9/05: Pete Martinez provides Board with overview of the LA Grid Program. School will update Board on progress.
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81. **Board Action Procedures:** 12/9/05: The Board discussed several procedural mechanisms to process action items with the goal of closing action items out expeditiously. These procedures are:
    a. Once attending Board members, those present at the current meeting, decide to close an item it no longer needs to be discussed.
    b. If an action plan is put in place for a Board action item, the item should be closed. The party taking responsibility for the action plan should report to the Board periodically on the outcomes of the plan.
    c. It is sufficient for action to be taken on any agenda item by the attending Board members.
    d. Actions items accepted by the Board should establish a time limit with the understanding that action should be taken within that time or should be closed.
    e. The school will implement these procedures at upcoming meetings.

    Board Action: 12/09/05 Closed

82. **IT Industry Scholarship Fund**: 12/9/06: The Board agreed to review a proposal by Dr. Deng to develop an industry-based funding mechanism for student scholarships to attract high quality students. Dr. Deng will develop the proposal and distribute to Board members as soon as possible. A conference call should be scheduled thereafter to discuss the proposal. 5/25/06: Board members agreed to pursue the Scholarship Fund Campaign.

Mr. Luis prepared and distributed materials for Board members to discuss with their colleagues. 04/07: Tabled to obtain more Board member feedback and direction. *Board Action: 12/09/05 Open, pending review*

83. Business Continuity Information Network: 12/07: Mr Braun suggests to Board members to reach out to their peers and networks to facilitate support. Board interested in sending letter of support on behalf of Centers of Excellence to lobby Gov. Board. Not pursued due to lobby rule limitations.

84. Board Chair: 9/12/08: Pete Martinez nominated and with a unanimous vote of the Board is elected as Board Chair. Dr. Meleis steps down as Board Vice-Chair. Mr. Martinez to nominate a Vice-Chair. 12/5/08: Dr. Roy Gerber is appointed Board Vice Chair. Closed

85. School Move: 12/4/09: Mr. Gerber receives a motion from the Board to create a draft letter to circulate to the Board member for comment/signature expressing concern for moving the School to the Engineering Center building. A letter was drafted, circulated, signed and delivered to FIU Provost in Dec. 2009. Provost responded by stating that the School's future success is paramount in his decision and that the Board will be consulted before any decisions are made. *Closed.*

86. Student Mentoring: 9/12/08: Mr. Martinez proposes and the Board members agree to support a Student Mentoring program whereby each Board members would become a mentor of a student of the school. Mr. Martinez asks that a list of potential student candidates be drawn up. 12/5/08: Mr. Luis provides Board with resumes of students interested in the Mentoring program via web location of Board Materials. 9/10/10: Mr. Borras receives first student to mentor. *Ongoing*

87. Board Membership: 8/19/05: The Board has identified 8 companies to pursue for Board membership. The Board has set as a goal to have 15 total members. FIU will work with Mr. Braun to further communicate (via letter/phone) with non-active board members and potential members we would ask to join. Board members are encouraged to participate in the recruitment process. 12/9/05: Nick Bowen/IBM and Armando Garcia/IBM withdraw from the Board. Pete Martinez is added. Board members agree to pursue 4 additional members. Dr. Meleis will contact Citrix. Pete Martinez will contact Telefonica. Mr. Braun has made initial contact with Global Crossing, requires follow-up. FIU will continue discussions with PBS&J. 5/26/06: Dr. Meleis invited Mr. Cristinziano, Citrix VP, who accepted invitation. Also, Board members agreed that the Board should become larger before developing sub-committees. 12/15/06: Mr. Cristinziano steps down due to relocation. 2/26/07: Conf. Call, two new Board members are introduced, Mr. Pallin and Mr. Buchenhorner, three additional members are begin sought by April Meeting. Membership stands at 12. 4/07: Board affirms that 15 members are sought by next meeting. Dr. Meleis suggested that the Board review the objectives of the Board to assist in identifying additional members to recruit. 9/07: Three new Board members are introduced, Mr. Bravo/Microsoft, Mr. Fleck/Citrix and Mr. Ugale/Crossbow Ventures. Dr. Meleis proposed that the Board finalize objectives and create committees to work on Board objectives. 12/07: Mr. Braun requests further information about the objectives of

the school going forward to better align with Board committee development. Item deferred to next meeting.
Board Action: 12/9/05, closed

88. **Committees**: 9/12/08: Mr. Martinez proposes and the Boards passes the creation of two committees: Research and Talent Development. The Research Committee will help the school align its resources with Federal, State and local strategic investments and funding opportunities from the private and public sector. The Talent Development Committee will assist the school to develop programs to enhance student research and education experiences, further driving the competitiveness of our students. 12/5/08: Committees to meet via conf. call to formulate goals and actions. *Closed*

89. *BS in Computer Science Program Educational Objectives and Student Outcomes*: 12/10/10: Dr. Navlakha presented the modified outcomes for the BS-CS program, and the Board unanimously concurred with the suggested modifications. The documents are available with Board materials. CLOSED

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93. *National Rankings*: 9/16/11: Board members request to know the key metrics the school is tracking for improving national ranking. 12/2/11: Dr. Iyengar discusses rankings in his presentation. The NRC ranking is not due for another three years. CLOSED

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95. 12/2/12: Board Members have requested that the School begin tracking where its graduates are finding jobs and report back on findings periodically. 4/27/12: A survey of recent graduates was presented and an Alumni listing which is posted on the website is started. Updates will continue and reports given to the Board periodically. CLOSED.

INDUSTRY ADVISORY BOARD
Florida International University
School of Computing and Information Sciences

Board Meeting Actions and Summary (DRAFT)

April 26th, 2013

Florida International University

Miami, FL

Board Member Attendance:

- Pete Martinez, Board Chair, Senior Vice President for Technology Development and Board Chairman, Palm Beach Medical College
- Dr. Roy Gerber, Board Co-Chair, Managing Partner, L3W
- Jaime Borras, CEO, Wireless Silicon Group and Senior Fellow at Motorola Mobile Devices
- Dr. Khaled El-Maleh, Principal Engineer/Manager, Multimedia & User Experience Engineering, Qualcomm
- Christopher Fleck, V.P., Platform Development, Citrix
- Jose Machado, Director of IT Software Engineering, Royal Caribbean Cruises Ltd.
- John Nygard III, ClO, Lennar Corp.
- Thomas Packert, VP of Information Management, Orthosensor

FIU Representation:

- Dr. Ram Iyengar, Director and Ryder Professor, FIU SCIS
- Linnell Bickford, Development Officer, FIU CEC
- Steven Luis, Director of Technology and Business Relations, FIU SCIS
- Dr. Nagarajan Prabakar, Associate Professor, FIU SCIS
- Dr. Shaolei Ren, Assistant Professor, FIU SCIS
- Dr. Naphtali Rishe, Professor, FIU SCIS

Summary of Board Actions

12. 4/29/11: Board members offer to assist school reach out to local companies to broaden participation in the school development. Terremark and Cruise Lines are suggested as the first companies to approach. School to obtain FIU Foundation approval to begin discussions with these companies. Continue development with incoming Director. 9/16/11: We have Foundation approval to open discussion with RCL. 12/2/12: Foundation has given approval to approach RCL. 4/27/12: Mr. Silvestre will reach out to RCCL for interest to participate on the Board. 9/14/12: Mr. Silvestre presented two new Board members from RCCL: Max Schmidt and Jose Machado. 12/7/13: Dr. Gerber introduces new Board member Thomas Packert, VP of Information Management, Orthosenor. Board members continue to pursue potential Board member prospects.

Board Meeting Summary

1. Mr. Martinez opens the meeting at 5:10pm.
2. Mr. Martinez begins by making his opening remarks. He thanks members for taking the time to attend the meeting on a Friday Evening. He acknowledges many of the School's achievements over the past years. He expresses interest on behalf of the Board to get more involved by mentoring faculty and students on entrepreneurial projects.
    a. Dr. Iyengar introduces Dr. Khaled El-Maleh as our new Board Member. He thanks El-Maleh for participating in our Board and expresses his interest to work with him to build a mutually beneficial collaboration with our faculty.
    b. Board Members introduce themselves.
    c. Addendums to the minutes are accepted.
3. Dr. Iyengar presents his Report to the Board (See materials per below).
4. Dr. Rishe provides an update on NSF AIR and Industry Consortium activities.
5. Student Senior Project presentations are made by:
    a. Michael Montaque presents Mobile Clinic
    b. Gregory Jean-Baptise presents Vmoodle Social
    c. Jesse Domack presents Shout
    d. Mr. Martinez remarked that he would like to see an Industry mentor for each project.
    e. Mr. Packard remarking about the use of industry standard technology by students that "all the technologies used I am familiar with. It is good to see."
6. Dr. Ren gives his presentation on Green Computing related topics.
7. Discovery Lab students present the Telebot Project Update.
    a. Mr. Martinez states that the team should get medical students involved to better understand how the human body moves.
8. Mr. Martinez asks Board members to provide their assessment and feedback.
    a. Mr. Martinez starts by commending the Discovery Lab for creating a project that has long term vision and provides a living lab for collaborations with different disciplines.

b. Dr. El-Maleh comments on the skill sets needed to conduct such student projects including communication skills, leadership, and teamwork. He is impressed with the quality of the students and the focus of the projects presented.
c. Mr. Machado agrees with Dr. El-Maleh's comments. He too is impressed with the work. He especially like the collaboration and the thinking-outside-of-the-box of the projects. Overall, he rates the projects totally outstanding. He acknowledges RCCL interest in recruiting FIU students and working on increasing our partnership with FIU. He congratulates the students.
d. Mr. Packard remarks that he "loves the Telebot project". He has not seen any like this from students in SFL before. The project exposes students to many real world problems and the tools to solve them.
e. Dr. Iyengar responds that the students have a passion for the project and work very late hours. They are very committed to seeing the project completed.
f. Mr. Fleck states that the technologies like cloud services, API development/REST, are skills (displayed by the student projects) that Citrix is looking for and are in high demand in the industry.
g. Dr. Gerber he expresses his enjoyment watching the work in progress. Especially the teamwork that is displayed in the projects.
h. Mr. Martinez reiterates his earlier remarks that the Industry Board should be engaged to mentor the student teams: Board members could spend a couple of hours with each team. He wants the students to see how industry would approach some of the projects.
i. Mr. Nygard congratulates the students and faculty on some exciting work and great progress.

9. The Board agrees on Sept. 13, 2013 as the date for the next Board meeting.
10. Mr. Martinez makes his closing remarks thanking Board member, faculty and students.
11. Mr. Martinez closes the meeting at 8:03pm.

Summary of Closed/Tabled Actions

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graduates was presented and an Alumni listing which is posted on the website is started. Updates will continue and reports given to the Board periodically. CLOSED.

APPENDIX J: Examples of Learning Outcomes

CDA 3103 Fundamentals of Computer Systems

Course Outcomes:

1. Master the representations of numeric and character data
2. Master the implementation of some basic combinational circuits, registers and memories
3. Be familiar with the data path of a simple von Neumann architecture and its relation to the instruction execution cycle
4. Master simple machine and assembly language programming
5. Master the implementation of high-level language constructs in lower levels: selection, iteration, function call/return

Learning Outcomes:

1.1 Derive and interpret the two's-complement representation of signed integers
1.2 Derive and interpret at least one representation of real numbers, e.g. IEEE Short Real
1.3 Interpret the representation of character data in some standard format, e.g. ASCII

2.1 Demonstrate the effect of NOT, AND, OR and XOR operations on binary data
2.2 Analyze a simple circuit using fundamental building blocks
2.2 Characterize the operation of the decoder, multiplexer, adder and simple memory circuits

3.1 Describe the organization and components of a simple von Neumann architecture
3.2 Demonstrate the implementation of simple machine language instructions using register transfer notation

4.1 Write programs in machine and assembly language employing flow-of-control and subroutine call and return constructions
4.2 Describe the operation of a simple 2-pass assembler

5.1 Demonstrate how conditional operations and transfer of control are implemented at the machine level
5.2 Demonstrate how parameters are passed to subroutines and how local workspace is created and accessed at the assembly language level

Sources:
CDA 3103 Syllabus: http://www.cis.fiu.edu/programs/undergrad/courses/COP_3402.pdf
ACM CS 2008: http://www.acm.org//education/curricula/ComputerScience2008.pdf

COP 4710 (COP 4540) Database Management

Course Outcomes

1. Be exposed to information systems
2. Be familiar with database system and database architecture
3. Master the design conceptual schemas
4. Master normalization theory and the mapping of a conceptual schema to a relational schema
5. Master the expression of queries in SQL, relational algebra, and relational calculus
6. Be familiar with physical database design
7. Be familiar with writing application programs that use SQL

Learning Outcomes

1.1 Explain basic information storage and retrieval concepts
1.2 Describe issues of information privacy, integrity, security and preservation

2.1 Describe the goals, components and functions of a database system
2.1 Explain the concept of data independence and its importance in a database system

3.1 Characterize the various data models
3.2 Design the conceptual schema for a database

4.1 Prepare a relational schema from a conceptual model

5.1 Demonstrate queries in relational algebra using union, intersection, difference, and Cartesian product operations
5.2 Demonstrate queries in tuple relational calculus, domain relational calculus, and SQL

6.1 Evaluate functional dependencies between two or more attributes in a relation

7.1 Describe database queries (insert, update, retrieve, and delete) using SQL statements

Sources

COP 4710 (COP 4540) Syllabus: http://www.cis.fiu.edu/programs/undergrad/courses/COP_4540.pdf
ACM CS 2008: http://www.acm.org//education/curricula/ComputerScience2008.pdf