

To: Masoud Milani, Associate Dean, SCIS

From: SCIS Undergraduate Committee:
Peter Clarke, Tim Downey, Vagelis Hristidis, Norman Pestaina,
Nagarajan Prabakar (chair)

Date: 4/6/09

The undergraduate committee reviewed the annual assessment report 2008-2009. The committee's recommendations are contained in the attached document.

Undergraduate Committee's Recommendations on the 2008-2009 Assessment Report

In this document, the relevant sections of the assessment report are reproduced (in italics) to facilitate referencing to the assessment report. The following acronyms are used throughout the report:

AC – Assessments Coordinator

UGC – Undergraduate Committee

SCIS – School of Computing and Information Sciences

SURVEY RESULTS

AC observation: CGS 1920 Introduction to Computing was first offered in the Fall 2007 semester, and again in both Fall and Spring semesters of 2008. This is a 1 credit course and is required of students in all SCIS undergraduate majors. There are no numeric data for this course.

UGC recommends the addition of the course outcome assessment survey section to Course Outcome Survey by Students for CGS1920.

UGC recommends the inclusion of this course in the subject area “Communications and Ethics”.

Subject Area: Communications & Ethics (Reported by Pat McDermott-Wells)

The Coordinator observes that some students may be taking CGS 3092 prematurely and recommends that the prerequisites be adjusted to require either ENC 3211 or COM 3011.

The UGC recommends: ENC3211 (Report and Technical Writing) as an additional prerequisite for CGS3092 (Professional Ethics and Social Issues in Computer Science).

Subject Area: Computer Systems (Reported by Masoud Sadjadi)

CDA 4101 Structured Computer Organization

Recommendation: I recommend no changes to the outcome of this course. Referring back to the reports of the past three years for this course, you can see that there are two minor issues with this course: first, students are not adequately exposed to the shared memory and MPI concepts at the end of the class as suggested; and second, there is no homework assignment, except for the term project. Unfortunately, the same exact problems have persisted for the past three years.

UGC recommended the subject area coordinator to take appropriate action in consultation with the faculty in the computer systems area. The course syllabus has been updated.

COP 4225 Advanced UNIX Programming

Recommendation: I recommend major change to the syllabus. Based on the complaints by the students, the contents of this course need serious revisiting and a more up-to-date textbook should be selected.

UGC recommended the subject area coordinator to take appropriate action in consultation with the faculty in the computer systems area. The course syllabus and the catalog description have been updated **pending approval from the SCIS faculty.**

COP 4610 Operating Systems Principles

Recommendation: I recommend removing the fourth outcome of this course, namely, "Disc Allocation and Arm Scheduling". Also, the other outcomes should be revisited to include the following topics: Processes and Threads, Deadlocks, Memory Management, Input/Output, and File Systems. Also, an extensive term paper in addition to a term project seems to be too much of work for the students.

UGC recommended the subject area coordinator to take appropriate action in consultation with the faculty in the computer systems area. The course syllabus has been updated.

COP 4226 Advanced Windows Programming

Recommendation: I recommend that the outcomes of this course to be revisited and up-to-date with the current Windows framework.

UGC recommended the subject area coordinator to take appropriate action in consultation with the faculty in the computer systems area. The course syllabus and the catalog description have been updated and have been approved by the CEC curriculum committee.

Subject Area: Foundations (Reported by Geoff Smith)

Recommendation: It seems possible that COP 4555's more concrete nature could make it helpful in preparing students for the more abstract mathematical logic in COT 3420. So perhaps it would be better for students to take COP 4555 before taking COT 3420.

UGC recommends, with the concurrence of Foundation area faculty, to change the prerequisite of COT3420 to MAD3512 and COP3337. **This requires the approval of SCIS faculty.**

Subject Area: Programming (Reported by Mark Weiss)

COP 2210 Computer Programming I

Recommendation: Since this course is primarily for computer science majors we should require a passing grade in college algebra. Please note that this recommendation was made last year also.

This recommendation was withdrawn by the subject area coordinator. No action is recommended by UGC.

COP 3337 Computer Programming II

Recommendation: The curriculum committee should investigate the feasibility of making COP-3337 into a four-credit lab lecture format, with a Tue/Thu/Fri schedule.

Recommendation: COP-3337 instructors should be encouraged to evaluate whether their grading systems can make more use of in-class exams and quizzes to ensure that all the objectives have been met for each individual student, rather than the class as a whole.

UGC recommends adding a one credit lab as a required component of COP3337. **This requires the approval of SCIS faculty.**

COP 4338 Computer Programming III

Recommendation: Perhaps more time could be spent on C/C++ or threading if the Java Reflection outcome was removed.

UGC recommends the subject area coordinator to take appropriate action in consultation with the faculty in the programming area.

AC Recommendation: SCIS should re-evaluate the course outcomes of COP 2210, COP 3337 and COP 3350 with a view to re-aligning the programming outcomes and syllabi of these 3 courses in the programming sequence.

AC Recommendation: SCIS should consider the feasibility of having standardized final examinations for COP 2210 or/and COP 3337.

AC Recommendation: SCIS should formalize a process for recommending placement of transfer students into either COP 2210 or COP 3337 as appropriate.

UGC recommends the subject area coordinator to take appropriate action in consultation with the faculty in the programming area.

Subject Area: Software Engineering (Reported by Peter Clarke)

CEN 4010 Software Engineering I

Recommendation: There is a need to have students take a programming course that contains web-based programming and working with databases before taking CEN 4010.

UGC recommends the subject area coordinator to take appropriate action in consultation with the faculty in the software engineering area. UGC also recommends making COM3110 an additional prerequisite to CEN4010.

CEN 4012 Software Design and Development Project

Recommendation: Currently the students in the software design and development track take the CEN 4012 Software and CIS 4911 Senior Project classes. This issue needs to be resolved so that the students only take one project course.

UGC referred this to the faculty in software engineering area. UGC's recommendation, after having taken into account the response from software engineering faculty, is attached as Appendix SDD to the report.

CEN 4021 Software Engineering II

Recommendation: There is a need to resolve the issue of cross listing of CEN 4021 an undergraduate course with CEN 5064 a graduate course with a different syllabus. Some undergraduate students are finding it difficult both in the volume of work and the teaching style used by the professor. Note graduate courses entail a small element of research in the class projects.

UGC referred this to the faculty in software engineering area. UGC's recommendation, after having taken into account the response from software engineering faculty, is attached as Appendix SDD to the report.

The Assessment Coordinator's observation in Section III A of this report is restated here to emphasize the urgency of the Subject Area Coordinator's recommendation: The level of student satisfaction with the coverage in CEN 4021 is at 3.35, also well below the 75% threshold. A similarly unsatisfactory level, 3.38, was recorded in 2007. Obviously, there is an urgent problem here that must be remedied at once.

UGC referred this to the faculty in software engineering area. UGC's recommendation, after having taken into account the response from software engineering faculty, is attached as Appendix SDD to the report.

C. Program Outcomes Survey by Graduating Students

AC Recommendation: The combined responses for spring and summer 2008 are shown in Appendix D and summarized in the following table. No data are available for the fall semester. The response rate to this survey is extremely low, only 4 respondents, even fewer than in previous years. This situation therefore still merits urgent attention.

UGC recommends:

1. *Improving the existing indirect measure.* Increase the student participation in the program outcome survey by conducting the survey when the student completes the senior project.
2. *Creating a direct measure.* Incorporate the assessment of the program outcomes by integrating the assessment mechanism into the senior project evaluation.
3. *Increasing the student participation.* During the survey period, SCIS web page should have a prominent link to the course outcome survey.

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

AC recommendation: After an apparent improvement to a barely acceptable level of 76% (in last year's report), the attainment level for this outcome has returned to the 70% level recorded in the 2006 and 2007 reports. This outcome is consistently perceived by our students to have very high relevance. The continuing low attainment level argues strongly for investigation. If SCIS is confident that our students are being offered acceptable environments, it may be the case that this outcome is being evaluated inappropriately. In either case, some corrective action must be taken.

UGC recommends rewording the outcome "j" as "Have experience with contemporary environments and tools necessary for the practice of computing".

Outcome k: Success in applying for entry-level positions

AC recommendation: The data from this survey is insufficient to allow any meaningful conclusions to be drawn. We repeat our opinion from last year's report, "This evidence suggests that our students are employable when just out of school, but the timing of the exit survey is probably too early to allow a complete assessment." It is essential to put in place a system of tracking a statistically meaningful proportion of our recent graduates.

UGC recommends the undergraduate program director to take appropriate action.

UGC further recommends the use of social networking websites (facebook, LinkedIn) to maintain contact with the alumni. The tools (email, personal messages) available in these websites can be used to encourage the alumni to participate in the annual alumni survey.

RECOMMENDATIONS FROM OTHER CONSTITUENTS

ACM Student Chapter recommendation: I believe that the SCIS should provide funding for tutoring. We have labs with computers, but no in-person support for the students. In the other colleges I have taught at (Miami Dade College and University of Miami), help desk personnel were situated in the labs for least 8 hours per day. Similarly, the Math department at FIU provides 16 hours per week of in-person tutoring to students, as well as extensive online help. If we are to provide a quality education to undergraduates, I believe we should provide at least the same level of support as the Math department.

UGC has referred this to the SCIS Dean.

V. ASSESSMENT

AC Recommendation: A subset of high demand List-1 elective courses should be identified and offered on a fixed, published rotation.

AC Recommendation: SCIS should consider creating a Special Topics slot in the regular schedule. Lower-demand List-1 elective courses should be offered in this slot on at least a biennial basis. A course that is not offered within a 2-year period should be removed from List-1.

UGC concurs and refers this to the undergraduate program director.

Program Outcomes Survey by Graduating Students (Exit Survey)

AC Recommendation: Our first group of graduating students completed the Senior Project, CIS 4911, in Fall 2008. There are already in place tools for measuring attainment of CS program outcomes from student performance in CIS 4911. The mechanisms for assessing these metrics and incorporating the results into the annual assessment process should be formalized and utilized during the next assessment cycle.

UGC recommends

1. Updating the Assessment Mechanisms and Procedures document to include senior project evaluations into the annual assessment process. The recommendation for updating the document is attached as Appendix AMP to this report.
2. Rewriting the Assessment Plan document.
3. Adding guidelines to the current rubric for assessing senior project. Sample guidelines are attached as Appendix SPG to this report.
4. Adding CGS3092 as an additional prerequisite to CIS4911.

AC Recommendation: SCIS should consider instituting embedded questions in the final examinations of selected required courses, at least one in each subject area of the CS major. A procedure for assessing attainment of program outcomes from student performance on these embedded questions should be developed and put in place.

UGC recommends no action at this time since this would fill the same need addressed by the inclusion of the senior project.

AC Recommendation: The SCIS Assessment Plan (Appendix A) and Assessment Procedures and Mechanisms (Appendix C) should be amended to incorporate these direct measures.

This is addressed in the preceding UGC recommendations.

AC Recommendation: SCIS must find means of elevating the response rates to the student surveys, Course Outcomes Surveys by Students, and Program Outcomes Survey by students. Alternatively, SCIS may consider discontinuing some or all of these surveys.

Please see the recommendations under Program Outcomes Survey by Graduating Students.

Appendix SDD

UGC recommendations for SDD track:

After having taken into account the response from software engineering area faculty:

It appears to be difficult to offer the courses required for the SDD track on a regular rotation. This suggests that it is not feasible to continue offering this track, and it should be discontinued until such time as enrollments justify it.

Assuming the SDD track continues, UGC recommends:

1. Students in the SDD track should focus on a software-intensive Senior Project
2. Students in the SDD track should take any two courses from the following list of three courses:
 - CEN 4021 Software Engineering II
 - CEN 4023 Component-Based Software Development
 - CEN 4XXX Fundamentals of Software Testing
3. The required and elective courses for this or any track must be made available on a published schedule.

These changes to the SDD track require the approval of SCIS faculty.

Appendix ASM

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. SENIOR PROJECT

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.

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 SPG

**Senior Project
Assessment of BS in CS Program Outcomes
of the
School of Computing and Information Sciences
Florida International University**

Project Title _____

Number of team members: _____ Semester & Year _____

Project origination: Industry _____ Faculty _____ Other (specify) _____

Date of observation: _____

Observation Team

Name

Affiliation

_____	_____
_____	_____
_____	_____

=====
Your responses to this survey instrument will be used solely for the purpose of assessing the program 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) of the course, and will not be construed as such.

For each Program Outcome, you are asked to indicate your assessment of the extent to which attainment of that outcome is demonstrated in this Senior Project. Please provide an assessment score from 1 to 5 on the following scale:

<u>Rating</u>	<u>Criterion</u>
5	The project provides excellent indication of attainment of this outcome
4	The project provides a good indication of attainment of this outcome
3	The project provides fair indication of attainment of this outcome
2	The project provides minimal indication of attainment of this outcome
1	The project provides zero indication of attainment of this outcome
0	The project does not address this particular outcome, (i.e. N/A)

In order to assist you in your evaluation, a number of checkpoints are provided for each program outcome. These are not exhaustive and you are not limited to solely these checkpoints. You should apply any others that you observe, but please do list them.

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

- _____ Project utilized some knowledge of mathematics
- _____ Project utilized some statistical techniques
- _____ Project utilized some elements of computational or mathematical logic
- _____ Project utilized some aspects of theoretical computer science (e.g. automata)
- _____

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

- _____ Project demonstrated knowledge of data structures
- _____ Project demonstrated knowledge of algorithmic development
- _____ Project demonstrated knowledge of programming language concepts
- _____ Project demonstrated knowledge of computer systems
- _____

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

- _____ Project objectives were clearly specified and analyzed
- _____ Project evidenced consideration of design alternatives
- _____ Project utilized sound implementation techniques
- _____ There is evidence that the implementation was tested and/or evaluated
- _____

Program Outcome (d): *Demonstrate mastery of at least one modern programming language [and proficiency in at least one other]*

_____ Project was implemented using a modern programming language

_____ Code is modular and/or reusable and documented

_____ Code appears to be reasonably efficient rather than “brute force”

_____ Code is understandable and meets specifications

Program 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 ethical issues

_____ Project identifies and addresses any relevant social issues

_____ Project documents anticipated impact on users and/or clients

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

_____ Project evidences equitable participation by team members

_____ Project team members negotiated consensus and/or compromise

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

_____ Project team activity is documented

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

- _____ Student's presentations captured the essential features of their project
- _____ Project artifacts communicate and/or project essentials
- _____ Project reports are well organized and written
- _____ Students are able to communicate their ideas to a non-CS audience
- _____

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

- _____ Contemporary design tools were utilized in the project
- _____ Project implementation utilized a modern IDE
- _____ Automated validation/testing tools were employed
- _____ Appropriate presentation aids were used to demonstrate/present the project
- _____

Your further observations re attainment of the BS in CS program outcomes **evidenced in this project** would be appreciated.

Outcomes Assessment via Senior Project

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