CSU Channel Islands
Program Assessment and Review Committee (PARC)
Report to the Provost and Dean of Faculty
PARC Comments and Recommendations for

Computer Science
April 13, 2010

With the program's self-study and external review as its major data sources, the Program Assessment and Review Committee (PARC) reviewed the undergraduate major in Computer Science and offers the following comments and recommendations. Organizationally, this review follows the four elements of review of these earlier assessments, and should be read in conjunction with them.

Members of PARC are: Simon Aloisio, Don Rodriguez, Harley Baker, Mike Riley, Scott Frisch, Liz King, Nelle Moffett, Steve Lefevre (co-chair), Alex McNeill, Amy Denton, Stephen Clark, Peter Smith, Tiina Itkonen, Jesse Elliot, Betsy Quintero, Dennis Downey, Jaye Smith, Marie Francois, Karen Jensen, Greg Wood, Ed Nuhfer (co-chair), and Luda Popenhagen.

Element I: Program Purpose and University Goals.

Comments: The explicit effort to build Computer Science in accordance with ABET accreditation standards undergirds program goals and is commendable.

The Computer Science program has strong ties to the University mission, the GE program, and strategic initiatives of Academic Affairs, despite the external reviewers' and the self-study's silence on this point. The curriculum integrates ways of knowing from math, science, engineering, innovation, and daily challenges of modern living. There are cross-listed classes in Biology, Mathematics, Physics, and Psychology. Working in interdisciplinary teams is built into student learning outcomes. Interdisciplinarity is evident in program's offerings in General Education. Internationalism is incorporated through Study Abroad. As for alignment with strategic goals of Academic Affairs and the University, the development and application of technology promotes sustainability; student's mastery of computer skills in lower division GE will enhance student success; and Computer Science is embedded in the STEM disciplines.

The website is well-designed, engaging, and generally informative.

It is not clear that students in the program are able to avail themselves of General Education courses *outside* CS and STEM fields, with so many units required in the major and specific GE

courses recommended. The multicultural pillar of the mission is the least integrated into the Computer Science program, though recent positive change in this direction is noted.

Recommendations:

- *Consideration of why the program exists addressed in its mission statement.*
- *Facilitate majors' access to exposure to non-Computer Science, non-STEM courses and experiences. Continue to build in mission pillars of multicultural and community engagement more deliberately.*
- *More clarity on the website about number of units and required classes for the B.S. Add a summary of requirements, and hyperlink to current catalog page.*
- *As called for in the self-study and external review, more resources to fund outreach. Invite the community to attend CS events and competitions held on campus.*

I. Element One: Program Purpose and University Goals

CRITERION FOR REVIEW	**INQUIRY**	**SCORE**
A. Program Mission and Operating Practices	Does the program have a mission statement or statement of program goals that is appropriate? Does the program have an organizational structure and procedures for its key activities such as advising, scheduling, chair selection and review?	3

Comments:

The mission statement is about *what* the program does -- training students in cutting edge technology, hardware and software, and interdisciplinary applications--but there is little emphasis on *why* it does it beyond preparing them for the workforce or graduate school. External reviewers noted a lack of clarity on student preparation for graduate study, but themselves were unclear as to whether they are referring to what specific preparation is offered or required (math and science are specified in the self-study), or what kind of graduate work the program prepared students for, or whether or not this should be part of the program mission. The narrative following the mission statement is clearer than the mission statement itself in this regard.

There is no statement specific in the self-study as to the day to day operating practices of the program, though the chart in the Executive Summary clearly illustrates the structure and the need for multiple faculty directors for degrees offered by the program. Program by-laws addressing governance issues such as program committee formation and duties have been drafted since the self-study, and are pending administrative approval.

There is no formal procedure for review of the achievement of broad program goals and learning outcomes (to be further discussed in Part 2 below). The program has undertaken indirect assessment through a survey of faculty perceptions regarding coverage of learning outcomes in courses and a student survey on the strengths and weaknesses of the program. The faculty have been engaged in on-going modifications to the curriculum and specific courses.

Recommendations:
Consideration of why the program exists addressed in its mission statement (as is true on the BCSC page of the program webpage).

More tenure-track faculty to rotate all the administrative areas in the organizational chart.

B. Program Relation to University Mission	Is the program supportive of the University's mission and strategic goals? Is its program integrated and supportive of the campus's four mission centers, its general education program, and Academic Affairs and University's strategic priorities?	3

Comments:

While the external reviewers did not see the mission as integrated into curriculum, the self-study notes the emphasis on learning within the discipline, which is part of the mission. The curriculum (and the "discipline" of Computer Science itself) is also interdisciplinary, integrating ways of knowing from math, science, engineering, innovation, and the daily challenges of modern living. There are cross-listed classes in Biology, Mathematics, Physics, and Psychology. Working in interdisciplinary teams is built into the student learning outcomes. Interdisciplinarity is also evident in the program's offerings in the General Education program. The program offers four lower division and four upper division courses in the B4 General Education category (Computers and Information Technology), as well as an UD course in Area B1 (Physical Sciences), one UD course in Area D (Social Perspectives), one UD course in Area E (Human Psychological and Physiological Perspectives), and five UD Interdisciplinary courses. It is not clear the extent that students in the program are able to avail themselves of General Education courses *outside* CS and STEM fields, with so many units required in the major and specific GE courses recommended.

Many students do projects in the community, especially web-page development. There is also a strong international component to the program, both through use of UNIV 398 course for study abroad, or the internationality of the faculty. Perhaps the multicultural pillar of the mission is the least integrated into the Computer Science program, though after the self-study, faculty in the program have made use of workshops offered by the Center for Multicultural Engagement for STEM faculty to work on strategies to incorporate multicultural perspectives into their courses, and a recent student Capstone project focused on teaching the Korean language through a computer program.

As for synergy with the strategic goals of Academic Affairs and the University (not commented on at all in the external review), the development and application of technology is key to **sustainability**; student's mastery of computer skills in lower division GE will enhance **student success** in school; and Computer Science is, of course, embedded in the **STEM** disciplines.

Recommendations:
Facilitate majors' access to exposure to non-Computer Science, non-STEM courses and experiences.
Continue to build in mission pillars of multicultural and community engagement more deliberately.

C. Dissemination of Program Mission and Goals	Has the program disseminated information about itself to key constituencies, including faculty, professional colleagues, current and prospective students, and the community?	4
Comments: While the website is terrific, the high number of units required for the B.S. is not clearly articulated in that venue.		
Recommendations: *Be clear on the website about total number of units that are on the chart on required classes for the B.S. For prospective students shopping for a program, this information should be there. Add a summary of requirements, and hyperlink to the current catalog page for Computer Science.* *As called for the self-study and external review, more resources to go to fund outreach: open houses, high school and community college visitations, invitations to members of the community to attend CS events and competitions held on campus.*		

Element II: Achieving Educational Outcomes

Comments: The external reviewers identified one area in which the Computer Science major was determined to be highly developed, namely, in the involvement of students in curricular activities, although they provided no comments to support their observation. PARC commends the CS faculty for the consistent and careful integration of real-world experiences throughout the CS curriculum and the exposure of its CS students to the CS industry. Most CS majors graduate already having had significant industry experience.

The external reviewers also acknowledged and recognized the high performance expectations established by the faculty for Computer Science majors as they were reflected in the scope and currency of the major content. The members of PARC concur.

Additional areas of strength identified include the advising and support mechanisms available to the CS students and the efforts extended by the University and the CS faculty in developing and disseminating articulation agreements with feeder colleges. These practices and the efforts taken by program faculty to treat native students and transfer students equally all work to positively influence student retention and degree completion.

As is the case with many of the academic programs at CI, the Computer Science major would benefit from additional faculty.

Examination of the CS Self Study and the external reviewers' comments suggest that the CS program has some significant remaining challenges. The most pressing is in the area of program assessment especially as it relates to student achievement of program learning outcomes, and the manner in which the CS program faculty use student learning outcome data to inform the development and modification of the CS curriculum. Essentially, at the time of this review, there is no real evidence that the CS program has any data that would support a systematic assessment of student achievement of program learning outcomes, or any data other than "informal conversations" to guide program modification and development. Indeed, it would appear from the self study that there is not a clear understanding of the relationship between the so called "lower learning course goals" and the program learning outcomes, and key performance indicators have not been identified for determining the degree to which program learning outcomes are being achieved by the CS majors. No doubt this is a result of several factors including insufficient resources in terms of faculty FTE, and insufficient reassigned time specifically in the area of assessment. Furthermore, specific faculty development activities in the area of program assessment may also be helpful in moving the assessment program forward.

The external reviewers also expressed concern regarding the accessibility of some of the stations in the CS laboratories for students with disabilities.

<u>Recommendations</u>: Recognizing that the current state budget makes it difficult to anticipate when enrollments will increase, PARC makes the following recommendations:

- *Consider increasing the FTE faculty assigned to the Computer Sciences Program as soon as it is deemed possible and appropriate;*
- *That the Computer Science faculty work with the Faculty Development Officer to identify the elements of a comprehensive assessment plan for their degree program;*
- *That reassigned time be identified within the CS program to provide leadership for, and faculty participation in, developing and implementing a comprehensive assessment program;*
- *That the Computer Science faculty develop a systematic assessment program with appropriate key indicators to allow for assessment of the degree to which the program learning outcomes for CS majors are being realized;*
- *That the University examines the accessibility of the Computer Sciences laboratory stations and take the appropriate actions to ensure access for students with disabilities.*
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II. Element Two: Achieving Educational Outcomes		
CRITERION FOR REVIEW	**INQUIRY**	**SCORE**
A. Curriculum Requirements and Expectations for Learning	Do the program's curriculum and degree requirements reflect high expectations of students? Is that curriculum reflective of current standards in the discipline?	3
Comments: Why is a "C-" required rather than "C"? Some reviewed syllabi are out of compliance with university regulations.		

Recommendations: Department should review syllabi. Students need hands on lab time in courses like "Operating Systems".		
B. Course and Program Learning Outcomes	Has the program developed assessable learning outcomes for its courses and for the program? Are course learning outcomes aligned with program outcomes?	1
Comments: The assessment plan does not appear to be well developed. The "IT" program does not appear well integrated.		
Recommendations: Assistance should be provided to help the dept in developing an assessment plan that measures student outcomes across individual courses. Consider replacing math coverage in BS in IT with business coverage.		
C. Learning Outcome Data and Analysis	Does the program regularly collect course and program learning data? Is that data analyzed, available, and used for program improvement?	1
Comments: No evidence provided.		
Recommendations: A true assessment plan should be developed.		
D. Timeliness of Degree Attainment	Do students in the program attain the degree in a timely fashion?	2
Comments: Lack of resources delays graduation of some students		
Recommendations: Develop a multiyear schedule, and consider course sharing. The department needs additional faculty resources.		
E. Involvement of Students in Curricular Activities	Are students active participants in the learning process? Does the program provide opportunities for students to participate in curricular-related activities, such as clubs, fieldtrips, competitions, research and creative opportunities, service learning experiences, performances, and internships?	4
Comments: Commendable.		
Recommendations:		
F. Advising and Academic Support	Does the program provide adequate student advising? Are its students supported in other venues such as EOP, career services, and disability accommodation?	3
Comments: Special Workstations in labs, courses serve students with special needs. The dept attempts to make other accommodations.		
Recommendations:		
G. Articulation, Transfer and Retention	Does the program have policies and procedures that facilitate articulation with community colleges? Are transfer students accommodated and integrated into the program? Are native and transfer students in the program being retained in the major and by the University?	3
Comments: Transfer students indicated that they felt they were treated the same as native students and not disadvantaged. It did appear, however, that some lower division computer science course work was only taken once they arrived at CI.		
Recommendations:		

Element III: Developing Resources to Ensure Sustainability

Comments: Regarding the question of the evaluators about Information Technology, "Does the program have access to information resources, technology, and expertise sufficient to deliver its academic offerings and advance the scholarship of its faculty?" external evaluators scored the evidence a level of 4 of 5.

The Computer Science Program reported that "The new library and its staff have been huge resources in supporting our programs," and this is commendable that the Program has maintained the level of scholarship of faculty and been able to provide up-to-date experiences for the students.

There are significant challenges in the area of resources. The outside evaluators acknowledged that resources are needed for hiring of more tenure-track faculty both to sustain the program curricula and also to support accreditation. In addition, resources are required to sustain lab equipment, both hardware and software, and physical space.

Recommendations:

- *Explore resource availability through the CSU system, through connections in the local business community, and through grant funding at the national, state and foundational levels.*
- *Create an advisory board to assist with the addressing of resource issues as well as program development.*

III. Element Three: Developing Resources to Ensure Sustainability		
CRITERION FOR REVIEW	**INQUIRY**	**SCORE**
A. Faculty Resources	Does the program have faculty in sufficient number, and with appropriate rank, qualification, and diversity, to support its academic program in a manner consistent with its objectives?	1
Comments: To be sustainable more faculty must be hired.		
Recommendations:		
B. Professional Staff	Does the program employ professional staff --support coordinator, technicians, lab assistants --sufficient to support the academic program?	1
Comments: There are excellent student assistants but this is not a sustainable solution.		
Recommendations: Hire a full time support technician.		
C. Faculty Workload and Evaluation	Is faculty workload aligned with the program's goals for effective teaching, scholarship, and University and community service? Are part and full time faculty evaluated regularly and according to University policies and practices?	2
Comments: Full time faculty have excellent motivation and go out of their way to provide service to		

students, but this could lead to faculty not having time to stay current in the field.		
Recommendations:		
D. Faculty Development	Do faculty have and use professional development plans (PDPs)? Does the program support faculty development opportunities sufficient to improve teaching, learning and scholarship?	2
Comments: IT is unclear how the CSU's budget situation will impact this area.		
Recommendations: More resources needed in this area.		
E. Fiscal and Physical Resources	Does the program have the budgetary resources needed to support its educational program? Are its facilities, including offices, labs, practice and performance spaces, adequate to support the program?	2
Comments: Inadequate lab space, classroom size limiting. Budget limits number of classes offered.		
Recommendations: More resources needed. Look into course sharing with other campuses.		
F. Developing External Resources	Does the program seek and receive extramural support, including grants, gifts, contracts, alumni funding?	2
Comments: No advisory board. Community support is ad hoc.		
Recommendations: Set up a formal advisory board for the department.		
G. Information Technology	Does the program have access to information resources, technology, and expertise sufficient to deliver its academic offerings and advance the scholarship of its faculty?	4
Comments:		
Recommendations:		
H. Community Involvement and Liaison	If appropriate, does the program have an advisory board or other links to community members and professionals? Does the program maintain a relationship with its alumni?	1
Comments:		
Recommendations: Department should keep in touch with alumni by developing an email list of alumni and inviting them to talks and special events. They should have an alumni newsletter.		

Element IV: Creating a Learning Centered Organization

Comments: The program faculty meet to consider program goals and engage in planning. For instance, the program made has made important recent curriculum changes (2009) reflecting input from constituencies. After a period when computer science enrollments were flat, both regionally and nationally, expectations are that the discipline will see significant growth.

Recommendations: PARC recommends that Computer Science continue in its planning vein, develop a long-term plan for projected growth and identify necessary resources to in consultation with the dean and provost. A focus for planning and resources is securing ABET accreditation.

IV. Element Four: Creating a Learning Centered Organization		
CRITERION FOR REVIEW	**INQUIRY**	**SCORE**
A. Program Planning	Does the program engage in planning activities which identify its academic priorities and examine the alignment of its core functions with those of the institution?	2
Comments: Some planning is going on and there have been recent curriculum changes reflecting this.		
Recommendations: The program needs more resources and faculty to develop a long-term assessment plan.		
B. Integration of Planning Resources	Does program planning successfully align its curricular, personnel, and budgetary resources? Are its planning goals informed by student learning outcome data? Is program planning integrated into the Academic Affairs budgeting process?	2
Comments: No student outcome data and stringent budgetary and space limitations constrain the program. Data is given on program growth since 2002.		
Recommendations: Develop a long-term plan for projected growth and necessary resources to be made available to the Dean and Provost.		
C. Professional accreditation	If the program holds or is seeking professional accreditation, are its practices and resources consistent with that objective?	1
Comments: The department needs time, resources, and faculty to prepare for ABET accreditation.		
Recommendations: Develop a long-term plan, with required resources, for securing ABET accreditation.		

Concluding Recommendations:

- *Develop a true assessment plan and use it for continuous improvement.*
- *Improve in lab space (e.g. networking), class room sizes, tutoring space, and faculty coverage.*
- *Integrate the IT degree better – consider replacing math courses with business classes.*
- *Increase lab time in the Operating System course.*
- *Develop a publicized multiyear schedule.*
- *Develop an external advisory board.*
- *Ensure syllabi are in conformance with university recommendations.*
- *Hire permanent staff for system administrator's position.*
- *Look into course sharing via distance learning with other campuses to make it easier for students to graduate in a timely fashion.*