

# Computer Science

*Note: Faculty from CS and CIS generally met together at the onset of IMPAC regional and statewide discussions and then moved to independent discussions as the day progressed. However, because the teaching responsibilities of many community college faculty overlap between these two disciplines, we urge all faculty to review the comments contained in both CS and CIS IMPAC reports. Readers will find that content in these summaries of regional meetings may be repeated in the CIS Annual Report.*

## SUMMARY OF IDENTIFIED ISSUES

### CS/CIS JOINT DISCUSSIONS

Joint discussions with Computer Information Systems (CIS) identified these issues:

- ▶ While the differences seem to be in the support courses (calculus and science as opposed to accounting and management), there are many common courses; it may be possible to teach a common Java or programming course.
- ▶ The graduates of each of the programs seem to compete for many of the same jobs.
- ▶ On smaller campuses, there is only one department and the faculty teach in both areas. At some larger campuses, the two reside in a school of computation.

### ACADEMIC INTEGRITY

A discussion of cheating revealed that it is widespread. It is felt that students are unclear as to what constitutes cheating. Instructors should make clear what is expected. For reviewing programs for similarities systems like MOSS (<http://www.cs.berkeley.edu/~aiken/moss.html>) for plagiarism detection might be a good tool to use. While cooperative learning is sometimes useful and team projects may be needed they must be well coordinated and team projects are best reserved to upper division and capstone courses

### PLATFORM PREPARATION

There is a perceived problem concerning platform (language/operating system) preparation, though faculty agreed that introduction courses should be introduction to computers rather than introduction to a program language. Similarly, assembly language should be an introduction to organization.

### CURRICULUM AND ACCREDITING

Computing Curricula 2001 (CC 2001) for Computer Science has been completed for four-year programs this year, developed by a joint task force on computing curricula of the International Electrical and Electronic Engineering (IEEE) Computer Society and the Association for Computing Machinery ACM. The intent is to follow up with a two-year curriculum. We

expect accreditation standards to reflect these curricula. Accreditations of computer science, computer engineering, information systems, and software engineering are being developed.

#### CERTIFICATION PROGRAMS

The benefits of certification were also discussed. While many community colleges offer certification programs through their auspices, CSU does not regard certification courses as an endeavor for the academic departments.

#### CURRICULAR REMEDIES TO STUDENT UNDERPREPARATION

Because some transfer students do not complete a sequence of courses that the four-year institution believes essential, possible remedies were discussed

- ▶ Separate the lab from the lecture in CS1 at upper division schools allowing community college transfers to take the lab (alone) in order to learn the second language (CSUDH)
- ▶ Provide one unit courses in several languages (CSUN)
- ▶ Include the second language in the upper division survey of programming languages.
- ▶ Require the student learn new language independently [N.B. there is an analogous problem in regard to platforms: Windows, UNIX, MAC, etc.]

#### OTHER INITIATIVES TO ASSIST STUDENT TRANSFER

Transfer Articulation Guarantees (TAG's) and pre-major descriptions will assist in transferring students. Credit by examination and short courses or separate labs to prepare transfer students in new programming languages or operating systems were discussed as a way to assist the transfer students. It would help if the ETS Advanced Placement (AP) exam were more flexible (it allows only Java). It was pointed out that 60% of the students entering the CSU are transfers from community college. This illustrates the importance of the IMPAC project and its ongoing discussions.

#### CAN DESCRIPTORS

While there are CAN descriptors for computer programming courses, they are minimal and not sufficient to articulate computer science courses. No courses have been certified (perhaps because of the weak descriptions). Barry Pasternack has prepared a CAN BIS 6 description.

#### IDENTIFIED TRENDS/FUTURE DIRECTIONS

There undoubtedly will be major changes in the computer science area; rapid changes have been a hallmark of the discipline for years. The new CC2001 curriculum will be important, as will new accreditation standards. Both of them could be useful in creating a core of articulated programs. These should be further considered as a way to achieve the stated goal of IMPAC for computer science.

The issue of which language to use in the introductory course is always a challenge. However, languages will change much quicker than programming paradigms. The emphasis should be on good programming methodologies rather than the language itself. Several schools currently require more than one language.

Distance learning is becoming more attractive as budgets become tighter. However, the quality of the courses is still being discussed and explored by IMPAC faculty.

It is becoming even more important for having a forum for the faculty of higher education institutions to have a better method of communication.

#### SCIENCE ALTERNATIVE TO IGETC

An intersegmental science and engineering transfer curriculum was discussed with other disciplines. The idea is, like IGETC, to provide the student with certification of a portion of the four-year degree requirements. The existence of such a curriculum would communicate to prospective science and engineering students, the necessity of starting on the major requirements early.

Such a curriculum might include: (12 SCH—semester credit units) of writing, speaking, critical thinking, information competence, and computer literacy; a full year of calculus for science and engineering majors (8-10 SCH); at least one course for majors from Biology, Chemistry, Geology, and Physics (16-20 SCH); two full year sequences from Engineering and the disciplines in the previous list (this requirement might overlap the previous one and would thus be about 8-12 SCH); 6 SCH in fine arts and humanities; 9 SCH in social science to include US and California History and Government. The total number of units above is 59-69 SCH. It may be politically expedient to require an additional 6 SCH from the arts, humanities, and social science upon matriculation at the four-year institution in addition to any current upper division GE requirement.

The CS and CIS faculty suggested adding to the pre-major, two courses from arts-humanities and two courses from social sciences. Additionally, students must have this work certified with the receiving campus requiring no more than two additional lower division GE courses (arts-humanities-social science). The idea is to encourage major preparation as well as work towards the GE.

#### RECOMMENDATIONS FOR THE DISCIPLINE

- ▶ Revise the proposed CAN 6 descriptor and resubmit to the CAN Board.
- ▶ Develop CAN descriptors for courses in VB.Net, C++, and JAVA programming languages.
- ▶ Develop a process by which CAN descriptors can be reviewed on an annual basis.
- ▶ Continue to have a forum in which CSU, UC, and community college faculty can discuss the changing field of information systems.
- ▶ Hold regional articulation meetings among community college faculty. This will also give faculty a chance to share ideas and experiences.
- ▶ Work on local campuses to include a computer literacy component within every degree.
- ▶ Support the science transfer curriculum's inclusion of a computer science component.
- ▶ Coordinate with professional societies in the areas of curriculum and accreditation

#### RECOMMENDATIONS FOR SUPPORT COURSES

While most programs require physics, there was no consensus favoring this requirement. Physics has been the traditional requirement for computer science because of accreditation. However, the Accreditation Board for Engineering and Technology (ABET) no longer requires Physics as its science discipline.

1. Better preparation in communication is (reading, writing, speaking, and critical thinking) is also imperative.
2. Many are supportive of discrete structures and linear algebra (matrix manipulations) prior to calculus. Discrete mathematics is appearing in the lower division of many programs, although it is not offered at many community colleges.
3. Statistics, discrete structures, and linear algebra were recommended prior to transfer.

#### TOPICS FOR FURTHER DISCUSSION

IMPAC must coordinate with the accrediting efforts now underway and with other professional programs (ACM, IEEE, Mathematical Association of America (MAA), etc.) as well as other articulation efforts (e.g., CSU Core Alignment Project). The participants agreed to identify core elements in CC2001 that can or should be done in the first two years of the computer science curriculum. IMPAC will ask for a similar analysis from all upper division campuses and at future regional meetings.

To be pursued:

1. Specific science requirements, e.g. physics.
2. Cooperation with IEEE/ACM curriculum efforts (CC2001)
3. Cooperation with accrediting bodies
4. Communication with CS/CIS chair group from the CSU
5. Indisciplinary discussions (with English, ESL, speech, reading faculty) on how to improve students' communication skills.
6. Tracking of transfer students by major

#### RECOMMENDATIONS TO BE FORWARDED TO

CAN

This IMPAC group should formalize new descriptors of courses and sequences; should seek to certify courses and sequences; and should annually review

CAN descriptors and certifications as part of the IMPAC discussions.

ASSIST

Seek to have CAN courses noted in ASSIST database upon CAN certification.

CIAC

The presence of articulation members increased effective communication; these officers' participation should be continued.

#### OUTREACH PRESENTATIONS MADE BY MEMBERS OF THIS GROUP

ORGANIZATION	DATE/PLACE	PRESENTER'S NAME	NUMBER PRESENT
ASCSU	Each of four plenaries	Dick Williams	70
Presidential Summit	May 3/ Walnut, CA	Dick Williams	12