Curriculum Committee
Minutes

October 12, 2006

Attendees: Tom Doeppner, Chad Jenkins, Claire Kenyon, Franco Preparata, Steve Reiss, John Savage (Chair)

1 Curriculum Discussion

The committee devoted its meeting to a general discussion of teaching in computer science. The starting point was the Threads™ curriculum that has been adopted by the College of Computing at Georgia Tech in an article entitled Creating Symphonic-Thinking Computer Science Graduates for an Increasingly Competitive Global Environment.

1.1 Georgia Tech Threads

Georgia Tech has re-organized their courses and degree requirements so that bachelor of science candidates can pursue one of eight different threads in the areas of a) Computational Modeling (in the physical sciences), b) Embodiment (embedded computing in the physical world), c) Information Internetworks (representing, transforming, transmitting, and presenting information), d) Intelligence (top-to-bottom models of human-level intelligence), e) Media (systems to exploit computing for creative outlets), f) People (human-computer interaction), and g) Platforms (computer architectures, systems and languages).

They also identify roles that graduates might expect to pursue as computer scientists. These are a) Master Practitioner, b) Entrepreneur, c) Innovator, and d) Communicator. These role models are used to help students choose their courses.

It appears that the Threads program is designed primarily to help students choose their electives. It continues to require that students meet core requirements. These include the following.
1. Humanities
   
   Two English composition courses plus six hours of Humanities.

2. Mathematics
   
   Three calculus courses, one applied combinatorics course, and one course in probability and statistics.

3. Lab Sciences
   
   Three lab science courses and a two-course physical science sequence.

4. Social Sciences
   
   Nine hours of social sciences

5. Miscellaneous
   
   Four courses including one each on technical communications, computers and society, and a research or studio project.

   The offer three study plans, namely, a) the Traditional (28 combinations of two of the eight threads, each with its own prescribed course schedule), b) the International (28 thread combinations plus a foreign language and two semesters of study abroad), and c) Research (28 thread combinations that prepares students for graduate study).

1.2 The Role of Applications in Computer Science

Chad noted that our current approach to instruction is to give students an education in depth in programming skills. When they are fully qualified, we then introduce them to applications.

This was not seen as desirable for all students and may result in some students opting not to study computer science. For others this approach is seen as attractive. For the former they draw their motivation from applications whereas for the latter programming is a way of thinking about problems.

We discussed John Hughes successful experiment in teaching CS4 in Matlab as a step toward addressing applications. However, there is also sentiment to design a new course that would expose students to applications early and more directly.

Some ideas for an applications course were discussed. We could offer a seminar for first year students that would treat a few topics. We could start with a problem, do some programming, and then illustrate the value of theory and analysis. Examples for problems, which come from a course taught by Steve, include Ebay for charities.

It is thought that it would be desirable to have a modeling thread in our curriculum that begins early. Both discrete and continuous math are seen as important in this
context. Franco cited operations research in the ’50s as a model for what is needed. Problems, methods of formulating them, and methods of solving them directly as well as learning about them through experiments were treated.

Claire proposed that we might co-teach a freshman seminar such as this with colleagues from other departments as a way to explicitly expand the horizons of our students. We might also involve alumni of the department. Steve noted that freshman seminars can’t assume much background so argues for a higher level applications course.

### 1.3 A New ScB Computer Science Concentration

We also considered briefly the need for a new computer science ScB concentration that would encourage students to pursue an education that involved applications of computer science. Steve noted that such a concentration could essentially combine a computer science AB with one from an application area. The CS AB portion must be flexible enough to accommodate such a combined degree. If done correctly, the joint ScB might be able to accommodate our current ScB concentration.

### 1.4 Action Items

Our next meeting will be Thursday, October 19. For this meeting Chad will draft a description of a freshman seminar on computing applications and Steve will draw up a draft set of requirements for a “flexible AB” that can be combined with another set of AB requirements to form an interdepartmental ScB.