Computing Curricula 2001
For Computer Science and Engineering

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Computing Curricula 2001 (CC2001)

Charter: To review the Joint ACM and IEEE/CS Computing Curricula 1991 and develop a revised and enhanced version for the year 2001 that will match the latest developments of computing technologies in the past decade and endure through the next decade.

Target date for final draft: summer 2001

http://www.computer.org/education/cc2001

CC2001 Task Force

ACM	IEEE Computer Society
Education Board chair:	*VP for Education:*
Peter Denning	James Cross
Task Force co-chairs:	*Task Force co-chairs:*
Eric Roberts (*editor*)	Carl Chang
Russ Shackelford	Gerald Engel (*editor*)
Steering committee members:	*Steering committee members:*
Richard Austing	Doris Carver
Fay Cover	Dick Eckhouse
Gordon Davies	Willis King
Andrew McGettrick	Francis Lau
Michael Schneider	Robert Sloan (*secretary*)
Ursula Wolz	Pradip Srimani

History of Curriculum Reports

1967 COSINE report (Commission on Engineering Education)

1968 *Curriculum '68* (ACM)

1977 *A Curriculum in CS and Engineering* (IEEE-CS)

1978 *Curriculum '78* (ACM)

1983 *Model Program in CS and Engineering* (IEEE-CS)

1989 *Computing as a Discipline*

1991 *Computing Curricula '91* (IEEE-CS + ACM)

2001 *Computing Curricula 2001* (IEEE-CS + ACM)

Problems with Computing Curricula ’91

- The curriculum gave institutions too little guidance.
- Knowledge units are often not as useful as courses.
- The set of common requirements was too large.
- The structure made it difficult to incorporate new areas into the curriculum.
- The curriculum emphasized specific pedagogical approaches for which there had been inadequate testing and development.

Computing Curricula 2001
Meeting Schedule

- Initial meeting (Chicago, November 1998)
- Coordinating session with chairs (Atlanta, April 1999)
- Steering Committee (Richmond, June 1999)
- Steering Committee (Palo Alto, August 1999)
- Coordinating session (San Juan, November 1999)
- Steering Committee (Colorado Springs, January 2000)
- Coordinating session (Boston, February 2000)
- Coordinating session (Austin, March 2000)
- Steering Committee (Washington, April 2000)
- Steering Committee + focus groups (Minneapolis, June 2000)
- Steering Committee (Los Alamitos, August 2000)
- Steering Committee (Kansas City, October 2000)

Computing Curricula 2001 Accomplishments

- Completed a survey and evaluation of the impact of CC'91
- Assessed the major changes in the discipline
- Articulated a set of principles to guide our work
- Developed an organizational structure and strategy
- Established knowledge area focus groups
- Created pedagogy focus groups to consider broad issues
- Reviewed the reports of those working groups
- Drafted a body of knowledge for computer science
- Proposed a set of core topics for undergraduates in CS
- Conducted a working session for the PFGs and KFG chairs
- Compiled a preliminary set of course syllabi

Computing Curricula 2001
Pedagogy Focus Groups

1. Introductory topics and courses
2. Supporting topics and courses
3. The computing core
4. Professional practices
5. Advanced study and undergraduate research
6. Computing across curricula

Computing Curricula 2001
Principles

1. Computing has become an extremely broad discipline that extends well beyond the traditional boundaries of computer science.
2. Despite its growing breadth, computing remains an integrated field of study that draws its foundations from many well-established disciplines.
3. The rapid evolution of the computing discipline requires an ongoing review of the corresponding curriculum.
4. Curriculum 2001 must go beyond knowledge units to offer significant guidance in terms of individual course design.

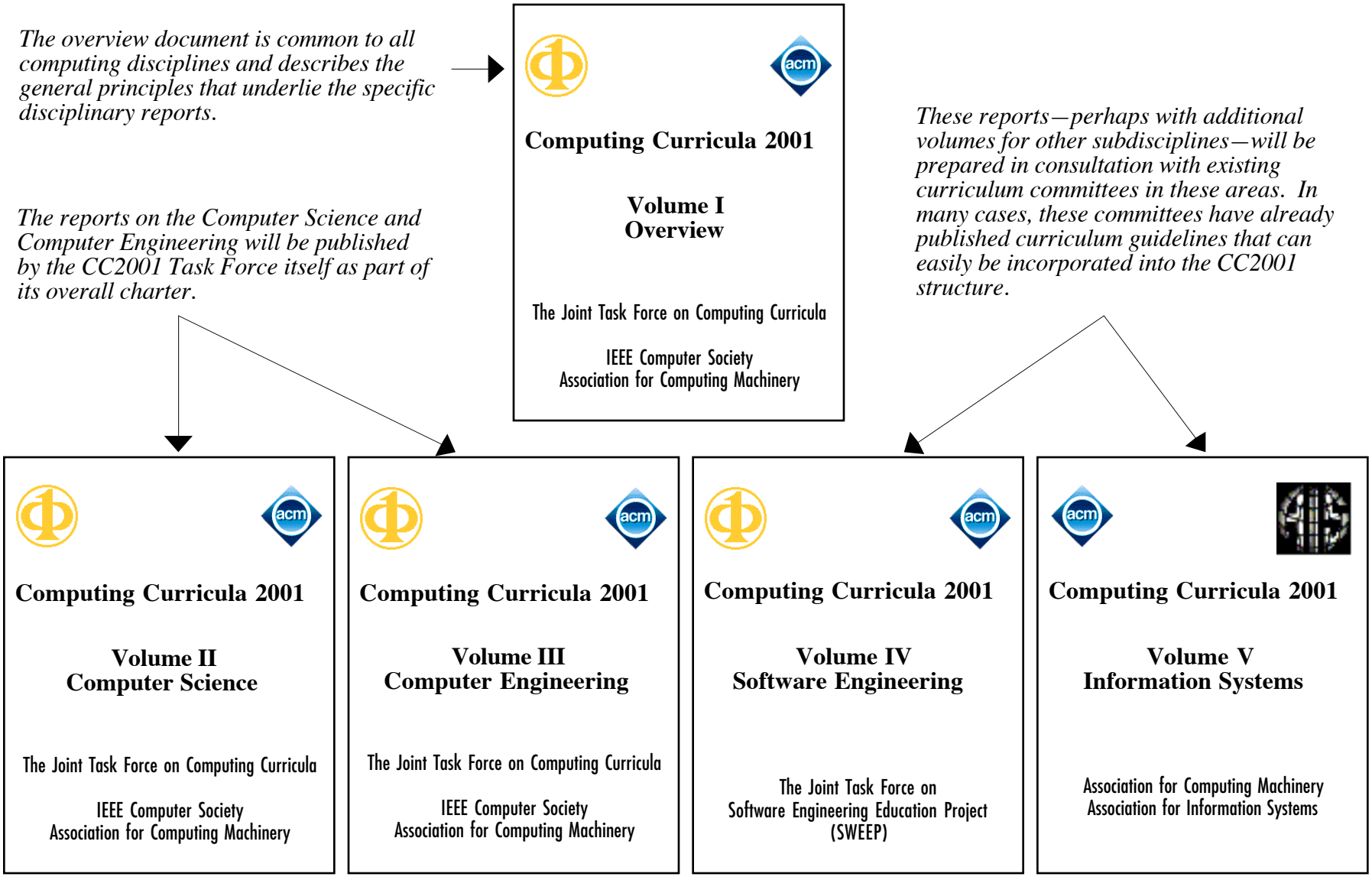
Computing Curricula 2001 Principles (continued)

5. Curriculum 2001 must identify a relatively small set of core concepts and skills that are required of all computing students.
6. Curriculum 2001 must provide guidelines for courses beyond the required core.
7. Curriculum 2001 must be international in scope.
8. The development of Curriculum 2001 must involve significant industry participation.
9. Curriculum 2001 must include professional practice as an integral component of the undergraduate curriculum.
10. Curriculum 2001 must be useful for its intended audience.

The overview document is common to all computing disciplines and describes the general principles that underlie the specific disciplinary reports.

The reports on the Computer Science and Computer Engineering will be published by the CC2001 Task Force itself as part of its overall charter.

These reports—perhaps with additional volumes for other subdisciplines—will be prepared in consultation with existing curriculum committees in these areas. In many cases, these committees have already published curriculum guidelines that can easily be incorporated into the CC2001 structure.



Outline for Overview Volume

Executive summary
1. Introduction
2. Lessons from past reports
   - 2.1 Historical background
   - 2.2 Evaluation of previous curriculum efforts
3. Computing and change
   - 3.1 Technological changes
   - 3.2 Cultural changes
4. Scope of computing
   - 4.1 The expansion of the discipline
   - 4.2 Overview of the major subfields
   - 4.3 Commonalities among the fields
5. Principles
6. Defining a curriculum
   - 6.1 Defining the body of knowledge
   - 6.2 Defining the pedagogical framework
   - 6.3 Strategy and tactics
7. Computing across the curriculum

Bibliography

Outline for Computer Science Volume

The Undergraduate CS Core

DS.	Discrete Structures	43 core hours
PF.	Programming Fundamentals	54 core hours
AL.	Algorithms and Complexity	31 core hours
PL.	Programming Languages	6 core hours
AR.	Architecture and Organization	36 core hours
OS.	Operating Systems	18 core hours
HC.	Human-Computer Interaction	6 core hours
GR.	Graphics and Visualization	5 core hours
IS.	Intelligent Systems	10 core hours
IM.	Information Management	10 core hours
NC.	Net-Centric Computing	15 core hours
SE.	Software Engineering	30 core hours
SP.	Social and Professional Issues	16 core hours
Total		280 core hours

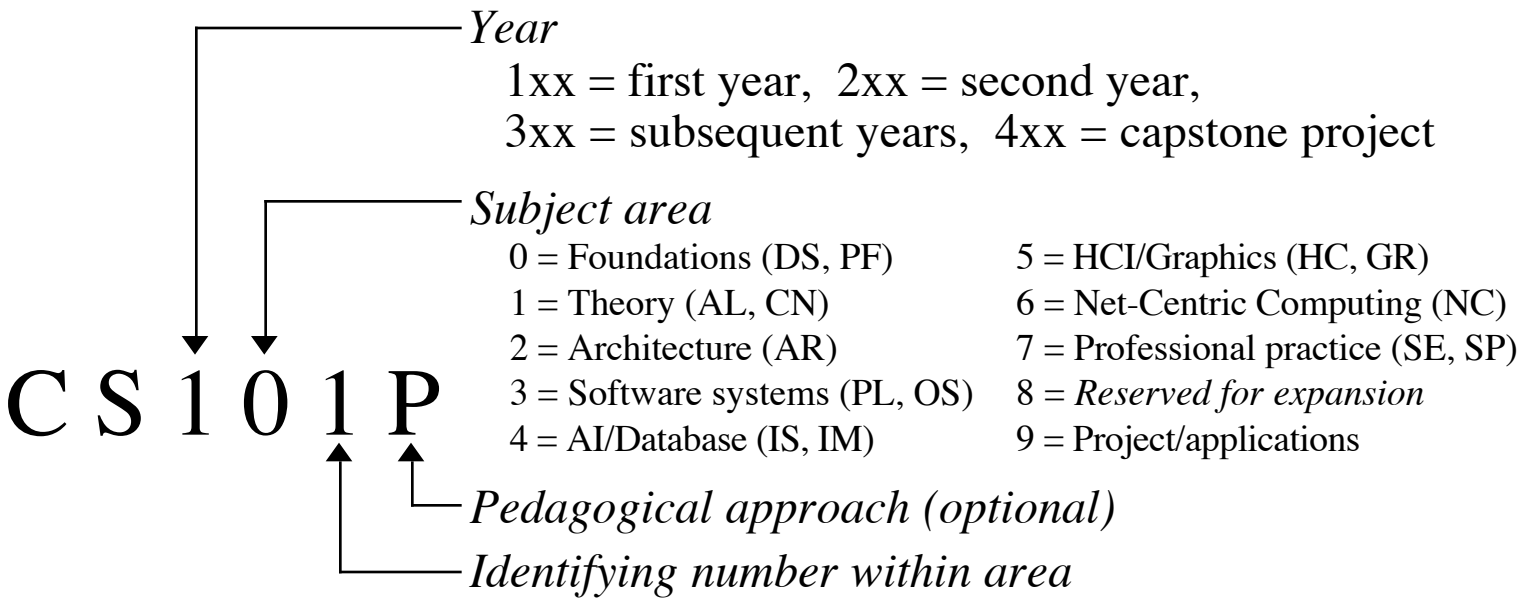
Changes in the CS Core from CC'91

- The required core is now smaller (280 vs. ~323 hours)
- Coverage of architecture, algorithms, operating systems, and programming languages has been reduced
- Coverage of graphics, HCI, and networking has been expanded
- We have emphasized that the core no longer constitutes a complete curriculum, but must be supplemented by additional topics appropriate to the specific program

Approaches to the First Year

- Programming-first
  - Programming-first will probably remain dominant
  - Despite its strengths, this approach has some weaknesses
- Objects-first
  - Programming-first with a serious early focus on objects
- Other significant approaches
  - Breadth-first
  - Algorithms-first
  - Functional style

Course Numbering Scheme



Sample Course Specifications

Course number . **Course Title**

General overview

Prerequisite: Required courses, units, or background

Syllabus:

Numbered list providing an outline of the topics covered

Learning objectives:

Bulleted list of objectives from the student point of view

Pedagogy:

Narrative description of pedagogical strategies, including assessment

Units covered:

List of units from the CS Body of Knowledge