



# Curriculum 2001: Issues and Questions



Eric Roberts  
Professor and Associate Chair  
Department of Computer Science  
Stanford University

Frontiers in Education '99  
San Juan, Puerto Rico  
November 11, 1999

# 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)
- 1991 *Curriculum '91* (IEEE-CS + ACM)
- 2001 *Curriculum 2001* (IEEE-CS + ACM)

# Problems with Curriculum '91

- The curriculum gave institutions too little guidance.
- Knowledge units are often not as useful as courses.
- The curriculum advanced certain largely untested approaches.
- The structure made it difficult to incorporate new areas.



Curriculum 2001



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: December 2000

# Curriculum 2001

## Accomplishments of Past Year

- Define Task Force structure and membership
- Develop general principles (see SIGCSE 1999)
- Identify expanded set of knowledge areas
- Appoint knowledge area and pedagogy focus groups
- Review reports from knowledge area focus groups
- Adopt definition of “core”
- Develop 60-page draft of Strawman document
- Present reports at several conferences
- Publish article in *IEEE Computer* and *SIGCSE Inroads*



# Curriculum 2001 Task Force



## ACM

*Education Board chair:*

Peter Denning

*Task Force co-chairs:*

Eric Roberts (*editor*)

Russ Shackelford

*Steering committee members:*

Richard Austin

Fay Cover

Andrew McGettrick

Michael Schneider

Ursula Wolz

## IEEE Computer Society

*VP for Education:*

James Cross

*Task Force co-chairs:*

Carl Chang

Gerald Engel (*editor*)

*Steering committee members:*

Doris Carver

Dick Eckhouse

Willis King

Michel Israel

Francis Lau

Robert Sloan (*secretary*)

Pradip Srimani

# Curriculum 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 (Austin, March 2000)

# Curriculum 2001 Principles

1. Computing is an integrated field of study that draws its foundations from mathematics, science, and engineering.
2. Knowledge units are valuable in the process of curriculum design.
3. Curriculum 2001 must go beyond knowledge units to offer significant guidance in terms of individual course design.
4. Curriculum 2001 must identify a relatively small set of core concepts and skills that are required of all computing students.
5. Curriculum 2001 must provide guidelines for courses beyond the required core.

# Curriculum 2001 Principles (continued)

6. Curriculum 2001 must be international in scope.
7. The development of Curriculum 2001 must involve significant industry participation.
8. Curriculum 2001 must include professional practice as an integral component of the undergraduate curriculum.
9. Curriculum 2001 must strive to be useful for its intended audience.

# Curriculum 2001

## Definition of “Core”

*The core will consist of those topics for which there is a broad consensus that the topic is essential to undergraduate degrees that include computer science, computer engineering, and other similarly named programs.*

# Curriculum 2001 Knowledge Areas

1. Discrete Structures (DS)
2. Programming Fundamentals (PF)
3. Algorithms and Complexity (AL)
4. Languages and Translation (LT)
5. Architecture (AR)
6. Operating Systems (OS)
7. Human-Computer Interaction (HC)
8. Graphics, Visualization, and Animation (GR)
9. Intelligent Systems (IS)
10. Information Management (IM)
11. Net-Centric Computing (NC)
12. Software Engineering (SE)
13. Computational Science (CN)
14. Social, Professional, and Ethical Issues (SP)

# Curriculum 2001 Pedagogy Focus Groups

1. The first year
2. Supporting courses
3. The computing core
4. Professional practices
5. Advanced study
6. Computing across the curriculum

# Curriculum 2001

## Concerns about Current Draft

1. Does the draft reflect the breadth of the discipline?
2. Do the knowledge units make clear what level of understanding is required?
3. Does the report provide sufficient strategic help to institutions seeking to implement the curriculum?

# Curriculum 2001

## Breadth of Discipline

The IT profession comprises a surprising variety of professional specialties, most all the children of computer science. . . . I counted two dozen such fields and suspect I have omitted others who would like to be included:

—Peter Denning, 1999

Artificial Intelligence  
Bioinformatics  
Cognitive Science  
Computational Science  
Computer Science  
Database Engineering  
Digital Library Science  
Graphics  
HCI (Human Computer Interaction)  
Information Science  
Information Systems  
Instructional Design

Knowledge Engineering  
Learning Theory  
MIS (Management Information Systems)  
Multimedia Design  
Network Engineering  
Performance Analysis  
Scientific Computing  
Software Architecture  
Software Engineering  
System Administration  
System Security And Privacy  
Web Service Design