

Introduction to CS2023

History

Several successive curricular guidelines for computer science have been published over the years as the discipline has continued to evolve. They are identified here.

- Curriculum 68 [1]: The first curricular guidelines were published by the Association for Computing Machinery (ACM) over 50 years ago as a classification of subject areas and courses.
- Curriculum 78 [2]: The curriculum was revised and presented in terms of core and elective courses.
- Computing Curricula 1991 [3]: The ACM teamed up with the Institute of Electrical and Electronics Engineers – Computer Society (IEEE-CS) for the first time to produce revised curricular guidelines.
- Computing Curricula 2001 [4]: For the first time, the guidelines focused only on Computer Science, with other disciplines such as computer engineering and software engineering being spun off into their own distinct curricular guidelines.
- Computer Science Curriculum 2008 [5]: This was presented as an interim revision of Computing Curricula 2001.
- Computer Science Curricula 2013 [6]: This was the most recent version of the curricula published by the ACM and IEEE-CS.

CS2023 is the latest revision of computer science curricular guidelines. It is a joint effort among the ACM, IEEE-CS, and, for the first time, the Association for the Advancement of Artificial Intelligence (AAAI).

Since 2013, the focus of curricular design has moved from what is taught (a knowledge model) to what is learned (a competency model). All prior versions of computer science guidelines used a knowledge model where related topics were grouped into a knowledge unit, and related knowledge units were grouped into a knowledge area. Computer Science Curricula Guidelines 2013 [6] contained 163 knowledge units grouped into 18 knowledge areas. Learning outcomes were identified for each knowledge unit. Distinction was made between core topics that every computer science graduate must know and elective topics that were considered optional. Core topics were further divided into Tier 1 topics that were to be covered completely and Tier 2 topics, at least 80% of which had to be covered.

Some early efforts to design a competency model of a curriculum were for Software Engineering [14] and Information Technology [7]. The broader Computing Curricula CC2020 report [8] proposed a competency model for various computing disciplines, including Computer Science, Information Systems, and Data Science. Competency models followed for Information Systems [9], Associate-degree CyberSecurity [13] and Data Science [10].

A knowledge model with its initial emphasis on content and a competency model with its primary emphasis on outcomes are complementary views of the same learning continuum. For computer science, neither model is a substitute for the other. The two models complement each other and work

better together than apart. So, the CS2023 task force has both revised the CS2013 knowledge model [6] and proposed a framework for the competency model that maintains consistency with it [15].

Other recent model undergraduate curricula for computer science include that of the All India Council for Technical Education [11] and the “101 plan” of the Ministry of Education in China [16]. Similarly, professional bodies have drafted curricular guidelines on specific areas of computer science such as parallel and distributed computing [12].

This report limits itself to computer science curricula. But a holistic view requires consideration of the interrelatedness of computer science with other computing disciplines such as Software Engineering, Security, and Data Science. For an overview of the landscape of computing education, please see the section “Computing Interrelationships” in the CC 2020 report [8: pp. 29-30].

Vision Statement

The vision for CS2023 curricular revision includes the following:

- An updated knowledge model of the computer science curriculum—explained in the chapter *Introduction to Knowledge Model* in this section, (Section 1);
- An appropriate competency model for computer science—explained in the chapter *Introduction to Competency Framework* in this section;
- Consistency between the knowledge model and the competency model—as explained in [15];
- Well-researched articles by experts on curricular practices—included in Section 4;
- A live online version of the curriculum in addition to a hardcopy version—presented at the csed.acm.org website.

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