

Computer Engineering Curriculum Guidelines

Eric Durant (Moderator)

Electrical Engineering and Computer Science Department
Milwaukee School of Engineering
Milwaukee, Wisconsin, USA
durant@msoe.edu

John Impagliazzo

Computer Science Department
Hofstra University
Hempstead, New York, USA
John.Impagliazzo@Hofstra.edu

Susan Conry

Department of Electrical and Computer Engineering
Clarkson University
Potsdam, New York, USA
conry@clarkson.edu

Andrew McGettrick

Department of Computer and Information Sciences
University of Strathclyde
Glasgow, Scotland, UK
Andrew.McGettrick@cis.strath.ac.uk

Mitchell Thornton

Department of Computer Science and Engineering
Southern Methodist University
Dallas, Texas, USA
mitch@lyle.smu.edu

Timothy Wilson

Electrical, Computer, Software, & Systems Engineering
Embry-Riddle Aeronautical University
Daytona Beach, Florida, USA
Timothy.Wilson@erau.edu

Abstract— Participants of this pre-conference workshop will learn about the development of computer engineering curricula reports. They will also learn about the revision process and will have the opportunity to provide comment and opinion on drafting an update of the joint ACM and IEEE Computer Society document from 2004 titled, “Curriculum Guidelines for Undergraduate Degree Programs in Computer Engineering” known also as CE2004. The authors of this workshop welcome all participation including overall comments and targeted editing assistance from the computer engineering education community. This activity will ensure that an updated document is a forward-looking summary of state-of-the-art educational practices in the computer engineering field.

Keywords—Computer engineering; curriculum guidelines; CE2004; ACM; IEEE Computer Society

I. BACKGROUND

In early 2011, the ACM and the IEEE Computer Society created the CE2004 Review Task Force (RTF) and charged it with reviewing and determining the extent to which the document titled, “Curriculum Guidelines for Undergraduate Degree Programs in Computer Engineering” (CE2004) [1] required revision. The RTF developed and issued survey invitations to over twenty thousand industry and academic constituents in the computer engineering field. It also contacted some ABET industry program evaluators to solicit their input. Although the survey default was anonymity, over sixty respondents provided contact information indicating they were interested in further participation in the revision process.

The RTF reported on its survey of academic and industry constituents in July of 2011. Part of the report included some new or expanded technical skill areas such as system on a chip

(SoC) technologies, networking, software engineering agile methods and tools, embedded system design, parallel programming, and hardware/software co-design. It also recommended specific contemporary topics to be strengthened or added while de-emphasizing other topics that appeared to be waning from the mainstream of computer engineering topics.

The RTF found that the majority of what the constituencies believe is important is already covered rather well in CE2004. However, the RTF did identify significant deviations that could guide the revision process toward a document that is appropriately forward looking given the continuing changes in the computer engineering landscape. Thus, this preconference workshop is an effort to engage the computer engineering education community in evaluating the current draft for recommended changes and in planning further revisions to the guidelines with the hope of issuing a preliminary report in 2014 or in 2015.

Additionally, the RTF recommended that the two societies form a joint committee to update and edit the earlier document and to seek input and review from the computer engineering industrial and academic communities through workshops co-located at major conferences [2,3]. At an RTF meeting in Raleigh, North Carolina, the RTF recommended that a team of volunteers lead the revision effort with interim updates as necessary. This new team or special committee would consist of at least sixteen representatives divided equally between ACM and the IEEE Computer Society. At the same meeting the RTF indicated the importance of having international representation. It also recommended that this special

committee should include representatives from academia, industry, government, and community college groups.

The RTF largely affirmed the contents of the CE2004 report compiled nearly a decade ago. However, the RTF recognized that several significant advances in computer engineering have occurred since that time. The special committee should make key drafts of their revisions available to a wide constituency, including all respondents to the survey who expressed interest in having further input. The special committee should make efforts to include a presence at key conferences both within and outside of the United States.

II. WORKSHOP FORMAT

Discussions and questions will be encouraged throughout this interactive workshop session. The major topics to be covered are:

- Background, goals, and timeline of the revisions effort
- Curriculum types targeted with brainstorming (*e.g.*, Should other degree types be targeted? Should the document address master's degree programs?)
- Body of Knowledge (BoK) structure, changes, size, required and elective topics, with brainstorming regarding the utility of the structure
- Seven key BoK revision areas with brainstorming in areas of participant interest
- Overview of non-technical areas addressed in the document based on the 2011 survey and the FIE'12 special session
- Small group discussions: key technical and non-technical skills needed for computer engineers graduating over the next several years. Groups will share results and the RTF will collect notes from all groups that wish to share them.
- Additional discussion of items of audience interest to include: plans for publishing the next draft, ways to involve more people, access to drafts, opportunities to provide feedback, and opportunities to lead revisions of specific sections.

III. WORKSHOP PRESENTERS

Eric Durant (Milwaukee School of Engineering) is the lead IEEE-CS member of the team and the de facto leader of

the RTF. In addition to conducting the workshop, Eric will summarize the activities of the group and key changes contemplated in the current draft of the CE2004 revisions.

John Impagliazzo (Hofstra University) is the lead ACM member of the RTF team and was a member and principal co-author of CE2004 committee. In addition to participating in the workshop, John will present a brief overview of the CE2004 document, describe the evolution and components of the 2004 report, and focus on its body of knowledge.

Susan Conry (Clarkson University) is a RTF member and is the past chair of the Engineering Accreditation Commission (EAC) of ABET. In addition to participating in the workshop, Susan will discuss ways in which the computer engineering curriculum complements the current ABET criteria. She will highlight the essential elements of the criteria and show how the new curriculum satisfies those criteria.

Andrew McGettrick (University of Strathclyde) is the Chair of the ACM Education Board and the ACM Education Council. Andrew is an RTF member and was a member of the CE2004 committee. He will summarize the specific BoK changes in the current draft.

Mitch Thornton (Southern Methodist University) is a RTF member and he is a member, past chair, and past vice chair of the EPE subcommittee working group for the National Council of Examiners for Engineering and Surveying. Mitch is also the vice chair, past chair, and a member of the IEEE-USA Committee on Licensure and Registration. He will focus on the results of the surveys and contrast the suggestions received from industry with those received from academia.

Timothy Wilson (Embry-Riddle Aeronautical University) is the Past Chair of ASEE's Electrical Engineering division for the Southeast region. Timothy is a RTF member and will discuss the revisions timeline.

REFERENCES

- [1] D. Soldan *et al.* "Curriculum guidelines for undergraduate degree programs in computer engineering," (CE2004). December 12, 2004. Retrieved April 14, 2013 from http://www.acm.org/education/education/curric_vols/CE-Final-Report.pdf
- [2] J. Impagliazzo, S. Conry, E. Durant, A. McGettrick, T. Wilson, and M. Thornton, "Special session: computer engineering review task force report," ACM Special Interest Group on Computer Science Education (SIGCSE) Conference, March 2, 2012, Raleigh, NC.
- [3] E. Durant, J. Impagliazzo, S. Conry, A. McGettrick, M. Thornton, and T. Wilson, "Special session: CE2004 revisions (computer engineering curriculum guidelines)," Frontiers in Education (FIE) Conference, October 6, 2012, Seattle, WA.