Revision Report

Foundations of Programming Languages received 3 comprehensive reviews in 2022. All reviews were handled in the same manner:

1. Comments were incorporated into the draft KA document
2. The revised draft was circulated to all members of the subcommittee
3. Over the course of 3 meetings, all sections of the KA draft were revisited and discussed
4. Discussion led to several bullet points in knowledge units being removed, combined, or moved to another KU to ensure that the KU’s were:
   a. Appropriate for undergraduate students
   b. At the appropriate level of exposure (CS-core, KA-core, or elective)
   c. Self-consistent
   d. Did not overlap excessively or unnecessarily.

Feedback comment:

Reviewers 1-3 suggested some minor changes to the preamble

How incorporated:

Suggestions generally accepted with some minor wordsmithing.

Why not incorporated:

Date considered: July-August 2022

Feedback comment:

Reviewer 2 suggested redistribution of hours between CS-Core and KA-Core

How incorporated:

Discussed and considered during the regular discussion the subcommittee had on the number and distribution core hours.

Why not incorporated:

Date considered: July-August 2022

Feedback comment:

Reviewer 2 suggested a teaching sequence for the KU's in the KA.
How incorporated:
There is a section at the end of the KA that provides some course packaging suggestions. The reviewer’s comments helped influence the course packaging suggestions that were later developed by the subcommittee.

Why not incorporated:

Date considered: July-August 2022

Feedback comment:
Reviewers 1-3 suggested changes to names of KU’s

How incorporated:
Discussed and generally rejected.

Why not incorporated:
The subcommittee felt that the KU names we had were appropriate and not too narrow or excessively broad. Some of the suggested changes made KU’s too narrow and overemphasized a single concept rather than served as a grouping for related ideas.

Date considered: July-August 2022

Feedback comment:
Changes suggested to Object-Oriented Programming were:

1. Minor changes/additions to existing topics
2. Specific reference to a book on design patterns
3. Comments which supported the changes made by the subcommittee leading up to the alpha release.

How incorporated:
Minor changes to topics within the KU were incorporated.

Topics within the KU were reworked to avoid duplication, as well as excessive and unnecessary specificity.

Why not incorporated:
Comments of design patterns were not relevant and more properly belonged in software engineering.

Date considered: July-August 2022
Feedback comment:
Reviewer 2 provided details comments on functional programming. The comments covered topics that might better be taught at the graduate level, and several that references specific architectures etc.

How incorporated:
Ideas provided by the reviewer were generalized and incorporated if they were suitable for undergraduate programs. Comments that were excessively specific about a topic (content) or related to how a topic was to be taught were either discarded or reworked to focus more on general topics that will stand the test of time and ensure that curriculum guidelines remain relevant for the next decade.

Minor changes to topics within the KU were incorporated.
Topics within the KU were reworked to avoid duplication, as well as excessive and unnecessary specificity.

Why not incorporated:
Comments that were considered by the subcommittee to discuss topics better taught at the graduate level were discarded.

Date considered: July-August 2022

Feedback comment:
Reviewer 2 provided suggested changes to the illustrative learning outcomes of the functional programming KU.

How incorporated:
Many of these suggestions were adopted – sometimes with some minor wordsmithing.

Why not incorporated:
Some suggestions were excessively specific (ABC machine). Typically, such comments were generalized and incorporated as possible, Some learning outcomes were merged into a single outcome.

Date considered: July-August 2022

Feedback comment:
Reviewers 2 and 3 provided suggestions to add or change topic descriptions for the Event-Driven and Reactive Programming KU.

How incorporated:
There was some overlap in the reviewer’s suggestions. These were handled by aligning the comments and rewording them to incorporate the reviewers suggestions. As a result of the comments, some existing topics and new topics identified by reviewers were merged into a more general topic.
Why not incorporated:

Some of the remarks made by reviewer 3 were really just comments in general and had no impact on the document.

**Date considered:** July-August 2022

Feedback comment:

All 3 reviewers made comments on the Basic Type Systems KU. Reviewer 1 offered very specific changes to discuss specific type systems. Reviewer 2 offered suggestions to improve wording, and reviewer 3, offered support for changes the subcommittee had incorporated into the draft.

How incorporated:

Reviewer 2’s rewordings were discussed, and many were accepted and incorporated into the document.

Why not incorporated:

Reviewer 1’s comments were discussed, and the subcommittee decided that they were more appropriate to a graduate course and were not things that should be included into the CS-core.

**Date considered:** July-August 2022

Feedback comment:

Reviewers 1 and 2 made comments on the Program Representation KU. Reviewer 2 essentially rewrote the KU, added 2 CS-Core hours and rewrote the illustrative learning outcomes.

How incorporated:

The subcommittee agreed with Reviewer 2’s recommendations to increase the CS core hours and the level of detail provided. Much of these concepts will be shared concepts with other KA’s which cover program representation at the architecture level etc. There is also some relationship with other KU’s within the KA and the revised Program Representation KU offers better insight into how programs and data are stored and how this supports the programming language. Making this change also allowed dome topics from other KU’s to be deleted since they were now incorporated in the Program Representation KU.

Why not incorporated:

Some comments were not incorporated as the reviewers suggested since they were incorporated into topics that emerged as the reviewers comments were merged into a single coherent topic that was fairly general in nature.

**Date considered:** July-August 2022
Feedback comment:

Reviewers 2 provided remarks on the Language Translation and Execution KU. Reviewer 2 again suggested an increase in CS-core hours and suggested an expansion of the topics covered. Changes to the illustrative learning outcomes were also offered.

How incorporated:

Reviewer 2 comments and recommendation to increase core hours were generally accepted by the subcommittee. They supported the changes to the Program Representation KU and provided useful knowledge to graduates. The subcommittee reworded some of the suggested changes and merged some topics into one in order to keep the content fairly generic so that programs had choices in how the content was delivered.

Why not incorporated:

Some of the suggested changes to the illustrative learning outcomes were rejected as they were too specific to a particular programming language, or more detailed that necessary and would limit the flexibility institutions would have in covering the material.

Date considered: July-August 2022

Feedback comment:

Reviewer 2 offered some rewordings of topics in the Syntax Analysis KU.

How incorporated:

With additional wordsmithing, the majority of the remarks were accepted by the subcommittee.

Why not incorporated:

Date considered: July-August 2022

Feedback comment:

Reviewer 2 offered some rewordings of topics in the Compiler Semantic Analysis KU.

How incorporated:

With additional wordsmithing, the majority of the remarks were incorporated into the topics listed within the KU.

Why not incorporated:

Date considered: July-August 2022
Feedback comment:

Reviewers 2 and 3 offered comments on the Runtime systems KU. Reviewer 3 offered a comment in support of previous changes and suggested a modification relevant to distributed programming. Reviewer 2 suggested adding 3 CS-core hours to the KA for this KU and suggested numerous additional topics and new illustrative learning outcomes.

How incorporated:

Some of the new topics suggested by Reviewer 2 were included in the KU. Those that were included had to be important and appropriate for an undergraduate degree. The subcommittee, however, decided not to increase the number of CS-core hours and left all the topics in this KU as elective of non-core.

Why not incorporated:

The subcommittee reviewed the remarks and decided that much of the suggested changes by Reviewer 2 were not appropriate for an undergraduate student, nor were the changes necessarily something that every CS student needed to know.

Date considered: July-August 2022

Feedback comment:

Reviewer 2 mad some suggestions to topics and learning outcomes for the Program Analyzers KU.

How incorporated:

The changes to the topics were accepted without change.

Why not incorporated:

The changes to the learning outcomes were rejected since they were excessively specific to a narrow topic.

Date considered: July-August 2022

Feedback comment:

Reviewer 2 suggested some changes to the Advanced Programming Constructs KU and reviewer 3 identified a topic that they felt was too specific.

How incorporated:

Reviewer 3’s comments were accepted, and the topic was removed from the KU. Reviewer 2’s comments were also accepted and the recommended alterations were incorporated into existing topics and in topics that were migrated to this KU from other KU’s/
Why not incorporated:

Date considered: July-August 2022

Feedback comment:
Reviewer 2 offered a number of additional topics to add to the Parallel and Distributed Computing KU. Reviewer 3 made a comment on the topics and suggested some additional topics.

How incorporated:
This KU underwent a significant revision by the subcommittee to reorganize it to be clearer and more structured. The reviewers’ comments were included in that major revision. Even though none of the words from the alpha draft, or from the reviewers’ comments are in the current draft of this KU, the intent from all of them is included. The KU is now easier to read, and more organized and looks less like a laundry list of topics, loosely related, which need to be covered.

Why not incorporated:

Date considered: July-August 2022

Feedback comment:
Reviewers 2 and 3 offered comments on the Language Pragmatics KU. Reviewer 2 suggested increasing the CS Core hours by 1 for this topic and suggested content related to language design principles.

How incorporated:
The number of core hours was not changed, but the topics each reviewer suggested was incorporated into the KU. There is some overlap with this KU and some other KU’s and the subcommittee preferred to move some topics to other KU’s that it felt was more appropriate.

Why not incorporated:

Date considered: July-August 2022

Feedback comment:
Reviewer 2 had significant comments on the Logic Programming KU, including increasing the number of CS Core hours by 2.

How incorporated:
Some of the suggestions were included in the revised draft,

**Why not incorporated:**

The majority of the suggested changes were not included since logic programming, although a useful paradigm, does not have a significant share of the job market and the subcommittee was concerned about over emphasizing the area.

**Date considered:** July-August 2022

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**Feedback comment:**

Reviewer 1 had some minor remarks on the Type Systems KU. These were just being more explicit on some of the topics already in the KU.

**How incorporated:**

The Basic Type Systems and the Types Systems KUs were combined into a single KU since the subcommittee could see no benefit in continuing to have them identified separately. Content of the 2 KUs and the comments made by reviewers were all rolled into a single new KU called Type Systems.

**Why not incorporated:**

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**Date considered:** July-August 2022

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**Feedback comment:**

Reviewers 1 and 2 offered comments on the Formal Semantics KU. Reviewer 1 added 2 new topics appropriate to undergraduates, and review 2 offered a number of new topics which were more appropriate to a graduate course.

**How incorporated:**

Reviewer 1’s comments were included into the KU.

**Why not incorporated:**

Reviewer 2’s comments were discarded since the level of expertise and math background necessary to support the topics were unlikely in an undergraduate program. Inclusion of the topics would also have required an expansion of the number of core hours.

**Date considered:** July-August 2022

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**Feedback comment:**
Reviewer 1 offered comments on the Formal Development Methodologies KU suggesting some additional topics for inclusion.

**How incorporated:**
One of the new topics was accepted by the subcommittee.

**Why not incorporated:**
The second new topic was rejected by the subcommittee since it was already covered by a previously identified topic.

Reviewer 1 also suggested that 2 KUs be merged (Formal Semantics and Formal Development Methodologies). The committee agreed to keep them separate since one dealt with describing programming language semantics using a formal methodology and the other deals with formal methods as a language.

**Date considered:** July-August 2022

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**Feedback comment:**
Reviewers 2 and 3 provided comments on the Hardware Interfaces KU. Reviewer 2 suggested a name change for the KU and the inclusion of topics related to logical circuits and a specific programming language. Reviewer 3 offered comments including their thoughts on the relevance of FPGAs.

**How incorporated:**

**Why not incorporated:**
Some of Reviewer 2’s comments were already encapsulated in previously identified topics. Those that were very closely related to the architecture were discarded since the focus is on the programming languages aspect and how the programming language interacts with the hardware.

FPGA’s were left in the KU since they are still currently in use and are likely to be relevant for some time to come.

**Date considered:** July-August 2022

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**Feedback comment:**
Reviewer 2 changed the section on “Math required” to “prerequisites”. The section on discrete math was expanded and many other non-math topics were identified as prerequisites.

**How incorporated:**

**Why not incorporated:**
There was no argument with the topics identified as prerequisite, but the section was specifically with dealing with Math prerequisite knowledge.

**Date considered:** July-August 2022