

## Ph.D. Preliminary Examination

### Department of Computer Science

### Kent State University

#### 1. Goals and Definitions

The *Ph.D. Preliminary Examination* is in place to assess a student's understanding of the basic *prerequisite concepts* for entrance into the Doctoral program in Computer Science. It is also in place to assure that all incoming Ph.D. students have the ability to effectively reason with and integrate the underlying knowledge and concepts in the broad field of Computer Science. This ability is necessary to continue the student's studies in the degree program.

The goals of the Ph.D. Preliminary Exam:

- Assess a student's general ability to enter the Doctoral program
- Give the student a positive learning experience that benefits their academic career (i.e., helps prepare them for study in the Doctoral program)
- Cover only required prerequisite breadth knowledge for the degree program
- The exam is NOT be tied to specific courses
- Support all Computer Science faculty/student research initiatives equally
- Be consistent, uniform, and fair for all students

Other constraints:

- The exam must be completed by the student within 20 months after entering the Ph.D. program
- The exam is completely separate from M.A. exit requirements

#### 2. Exam Topics

Below is a set of topics, (and will be referred to as the *Exam Topics*) that are generally considered prerequisite (preliminary) knowledge for incoming students applying for entrance to the Ph.D. degree program in Computer Science. Any doctoral student conducting research in Computer Science must have a basic knowledge of the following six areas. These areas are aligned with the first six areas of the 2001 *ACM/IEEE Computer Science Body of Knowledge* namely, Discrete Structures (DS), Programming Fundamentals (PF), Algorithms and Complexity (AL), Programming Languages (PL), Architecture and Organization (AR), and Operating Systems (OS). These six areas represent the basic foundations of the fourteen areas in the CS Body of Knowledge. The 2001 ACM/IEEE Computer Science Body of Knowledge can be found at:

[www.computer.org/education/cc2001/steelman/cc2001/](http://www.computer.org/education/cc2001/steelman/cc2001/)

A complete and detailed list of the topics covered will be published with ample time (i.e., the six months prior to exam) for students to prepare for the exam. A suggested reading list will also be provided and it will be manageable and focused for the student's benefit. The reading list will reference a text book(s) and associated chapters that reflect the topics covered on the exam. In certain cases a small number of classic papers may be part of the reading list. Textbooks must be those widely used in Computer Science curriculums and viewed as standard texts.

Below is the list of general exam topics. See the *Preliminary Examination Reading List* for a complete and detailed list of topics and suggested reading list. The reading list is the official description of the exam topics.

- Discrete Structures
- Design and Analysis of Algorithms
- Foundations of Programming Languages
- Data Structures and Fundamentals of Programming
- Computer Operating Systems
- Computer Architecture and Organization

#### 3. Exam Format & Policies

The student **must** successfully complete the Preliminary Examination within 20 months after entering the Ph.D. program. The format will be a *written examination*. The exam topics will be arranged into the following groupings. These grouping will be referred to as the three *Preliminary Exams*:

- **Exam 1**

Discrete Structures  
Design and Analysis of Algorithms

- **Exam 2**  
Foundations of Programming Languages  
Data Structures and Fundamentals of Programming
- **Exam 3**  
Computer Operating Systems  
Computer Architecture and Organization

The three exams will be administered one week before classes start in both the Fall (late August) and Spring (mid January) semesters. All three exams will be (typically) given during a one week period (MWF). The student may take one or more of the exams during this period.

Each of the three exams is passed individually. Each of the exams will be 3-4 hours and contain eight (8) questions, with four (4) questions from each topic. Out of these eight (8) questions the student must solve five (5) successfully. Additionally, at least two (2) questions must be solved from each area. A minimum average score 75% in each of the two topics is required for a passing grade.

A student will only have two (2) opportunities to pass each part the Preliminary Examinations. However, if the student fails the first attempt the second attempt must be done within the 20 month period. Extensions to this deadline can only be granted by the Graduate Studies Committee.

The student must register to take the exam at least two months prior to the examination date. The student should inform the Graduate Secretary and Graduate Coordinator by emailing to [gradinfo@cs.kent.edu](mailto:gradinfo@cs.kent.edu).

#### 4. Management of Exam

A Preliminary Examination Committee (PEC) will be formed each year comprised of tenure track Graduate Faculty. These committee duties will rotate regularly among the Graduate Faculty. Because the exams are to be given the week before the term starts and the committee assignments are not approved until after the term starts, the committee's duties will run from the Spring to the following Fall (as opposed to a Fall Spring schedule). The newly appointed committee will take up the coming Spring exam and the Fall exam will be the previous year committee's duty. PEC should be composed of at least four Graduate Faculty members and membership should rotate regularly among the Faculty.

PEC will be in charge of:

- Administration of the exam
- Consistency and quality of the exam
- Publication of examination dates
- Publication of the Preliminary Examination Reading List in a timely manner (at least one full term before the exam date)
- Publication of additional study materials (previous exams, etc.)
- Creation of exam questions – PEC can (should) solicit questions/answers from entire faculty
- Grading of the exam
- Exam must be graded in a timely fashion, that is, four (4) weeks after the exam is administered. This is to ensure that exam results can be used by the GSC for GA (re)appointments.
- Changes to reading list will be recommended by PEC and given to GSC for approval
- Changes to exam format will be recommended by PEC and given to GSC for approval

Each question must be graded by at least two PEC members. If there is a large difference in the assigned grade, a third grader will be necessary. A Preliminary Examination Form/Spreadsheet will be used to record the student's grades on each exam and dates they attempted the exam.

The exam will be developed in whole by the committee to ensure consistency. No one member can be completely in charge of developing questions and grading any one part of the exam.

PEC will give examination results and recommendations to GSC for final approval. The Graduate Coordinator, PEC, and the Graduate Secretary will maintain the Preliminary Examination Form/Spreadsheet for students.

It is the official responsibility of the Graduate Coordinator to inform a student of examination results. No other member of GSC or PEC may inform a student(s) of examination results or discuss the results with a student(s) prior to official notification by the Graduate Coordinator.