

CS Systems Qualifying Exam 2020

Important Dates

- **April 30:** Registration ends. Registration instructions are below. When you register, you must declare the three exams you plan to take.
- **May 20:** Exams. Candidates will take exams during the week starting Monday, May 18. For oral exams, students are responsible for scheduling an exam with the examiner. We will schedule the written exams.
- **May 25:** Grading complete. Faculty members email grades for all exams to Subhasish Mitra (**and Cc Beverly Davis and Kathy Robinson**).
- **Tentatively May 29:** Faculty meet to decide on final grades (**Time TBD**). All systems faculty are invited.
- **June 3:** Announce. Decisions emailed to students and advisors. Any student without a Systems Area advisor wanting to take the systems qual needs the endorsement of their advisor.

If there are any concerns in light of the virus situation, please contact us (**Subhasish Mitra** (subh@stanford.edu) **and Jay Subramanian** (jayanthi@stanford.edu)) ASAP.

Exams

- Architecture: Kunle Olukotun
- Compilers: Monica Lam
- Databases: Peter Ballis
- Graphics: Doug James
- Networking: Sachin Katti
- Operating Systems and Distributed Systems: David Mazieres
- Programming languages: Alex Aiken
- Security: Zakir Durumeric

Registration

Send an email to Subhasish Mitra (subh@stanford.edu) **and Cc Beverly Davis** (beverlyd@stanford.edu) **AND Kathy Robinson** (kathysr@stanford.edu) indicating which of the three exams you wish to take.

Architecture Qualifying Exam

Details and Reading List

Examiner: Kunle Olukotun

This qual will cover any ideas, topics and reading covered in the following courses:

- EE282: Computer Systems Architecture
- EE382A: Advanced Processor Architecture
- CS315A: Parallel Computer Architecture and Programming

You will be expected to be very conversant with the key ideas in computer architecture: Levels of abstraction (e.g. ISA→processor→RTL blocks→gates), pipelining, caching, prediction, virtualization and parallelism. As someone taking the architecture qual, you will be expected to have a fairly sophisticated knowledge of these topics.

Reading: Computer Architecture: A Quantitative Approach, 3rd Edition , Hennessy & Patterson.

Format

30 minute oral exam.

Scheduling

Please arrange with Prof. Kunle Olukotun <kunle@stanford.edu>

Compilers Qualifying Exam

Details and Reading List

Examiner: Monica Lam

Principles, Techniques, & Tools (Second Edition), Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Addison Wesley, 2007.

Format

Oral or written exam, depending on the number of exam takers.

Scheduling

Please contact Prof. Monica Lam <lam@cs.stanford.edu> directly.

Databases Qualifying Exam

Details and Reading List

Examiner: Peter Bailis

This qual will cover any ideas, topics and reading covered in the following courses:

- CS145: Introduction to Databases
- CS245: Database System Principles

You will be expected to be conversant with key ideas in data management, including: data models and query languages; database design; building database applications; file structures, indexing, and hashing methods; query processing and optimization; Transactions, concurrency control and recovery; security and authorization; and database performance. As someone taking the database qual, you will be expected to have a fairly sophisticated knowledge of these topics.

Reading: H. Garcia-Molina, J.D. Ullman, and J. Widom. Database Systems: The Complete Book (Second Edition) Prentice Hall, 2009.

Format

30 minute oral exam.

Scheduling

Please contact Prof. Peter Ballis <pbailis@cs.stanford.edu>

Graphics Qualifying Exam

Details and Reading List

Examiner: Doug James

Knowledge of basic representations of surfaces and solids, scan conversion algorithms, geometric transformations, viewing projections, visible surface determination, and shading models, as covered in CS 148 and 248. Understanding of basic issues in input and display hardware, graphics software, and user interface design. Some knowledge in depth of either curve, surface, and solid modeling and geometric algorithms at the level of CS 348A, or of sampling, filtering, and local and global illumination methods at the level of CS 348B, or of computer animation and physics-based simulation at the level of CS 348C, or of character animation at the level of CS 348E.

Reading list:

Typical references for the material in 248, 348A, 348B and 348C, are the online course notes and references, where available:

- For 148: P. Shirley,, Fundamentals of Computer Graphics, 2nd Edition, A. K. Peters, 2006
- For 248: E. Angel, Interactive Computer Graphics (5th ed.)
- For 348A: G. Farin, Curves and Surfaces for Computer Aided Geometric Design Academic Press, (2nd edition)
- For 348B: M. Pharr and G. Humphreys, Physically Based Rendering. Morgan Kaufman.

Format

30 minute oral exam.

Scheduling

Please contact Prof. Doug James <djames@cs.stanford.edu>

Networking Qualifying Exam

Details and Reading List

Examiner: Sachin Katti

The reading list from CS244: <http://web.stanford.edu/class/cs244/timetable.html>

Format

The exam is an oral examination with Sachin Katti.

Scheduling

Please contact Prof. Sachin Katti <skatti@stanford.edu>

Operating Systems and Distributed Systems Qualifying Exam

Details and Reading List

Examiner: David Mazieres

Details:

Please contact Prof. David Mazieres

Programming Languages Qualifying Exam

Details and Reading List

Examiner: Alex Aiken

Knowledge including and extending beyond the principles and central concepts in programming language, as covered in CS 242. Students taking the Systems Qual in programming languages are expected to have a professional-level conversational competency in the main design and implementation topics associated with programming languages, applied to languages and situations you know and those you may not. Sophistication beyond the preparation provided by CS242, typically gained by practical experience and participation in software systems research, is expected.

Format

30-45 min oral exam.

Scheduling

Please contact Prof. Alex Aiken <aiken@cs.stanford.edu>

Security Qualifying Exam

Details and Reading List

Examiner: Prof. Zakir Durumeric

Format

<http://seclab.stanford.edu/SecurityQual.html>

Scheduling

<http://seclab.stanford.edu/SecurityQual.html>