

BREADTH REQUIREMENT AREAS FOR 2008-2009 COMPREHENSIVE EXAMINATIONS READING LIST

**Any updates will be e-mailed to:
cs_comps_2008@lists.Stanford.EDU**

This reading list addresses each area of the written comprehensive examinations and includes the course alternatives.

- There will be **13** one-hour exams. Students must pass 8 out of the 13 comps in order to fulfill the Ph.D. Program's comprehensive exam requirement. For more details, please refer to "Comprehensive Exams (Comps) Structure" posted outside of Gates 196 or the Comps Central website at:
<http://www-cs-students.stanford.edu/phd/comps.php>
- All examinations assume a certain mathematical sophistication and programming abilities. Proofs of correctness for simple programs may be required. Students are expected to be able to write programs in Pascal and Lisp, and they should be familiar with at least one assembly language.
- Laptops are only allowed in the open book exams unless otherwise indicated below.
- To advance to Ph.D candidacy prior to the end of your 6th quarter in residency, you must pass 6 of the 8 chosen areas.
- Each comp can be fulfilled either by passing the exam or by earning a **grade A- or higher** in the approved alternate course.

ANALYSIS OF ALGORITHMS AND CONCRETE MATHEMATICS

Test: 1 hour, closed book / NO laptop

Course Alternative: CS161 – Discrete Structures and Algorithms

Readings:

Alfred Aho, John Hopcroft, and Jeffrey Ullman: Data Structures and Algorithms

R. Graham, D. Knuth, O. Patashnik: Concrete Mathematics. Sections 1.1-1.2, 2.1-2.5, 3.1, 3.4, 4.1-4.7, 5.1-5.2, 6.3, 6.6, 7.1-7.2, 8.1-8.2, 9-page 441.

Cormen, Leiserson, Rivest and Stein. Introduction to Algorithms. 2nd edition, Chapters 1-16, 22-25.

Plotkin recommends reviewing past courses and assignments on the web.

ARTIFICIAL INTELLIGENCE

Test: 1 hour, open book / NO laptop, PDAs, iPhones, etc.
Basic calculator without communications functions okay.

Course Alternative: CS121 – Introduction to Artificial Intelligence

Readings:

Michael Genesereth, Nils Nilsson: Logical Foundations of Artificial Intelligence. Chapters 1-5, 11 (except for references to circumscription), 12.

Russell & Norvig: Artificial Intelligence: A Modern Approach, Prentice Hall, 2003 edition.

AUTOMATA AND FORMAL LANGUAGES

Test: 1 hour, closed book / NO laptop

Course Alternative: CS154 – Introduction to Automata and Complexity Theory

Readings:

J.E. Hopcroft, Motwani and J.D. Ullman: Introduction to Automata theory, Languages and Computation, Addison-Wesley, 2001. **Basically chapters 1-11 of the new edition are needed, except for the purposes of the exam sections 5.3, 11.4 & 11.5 can be skipped, as they are not in the 1979 edition.**

COMPILERS

Test: 1 hour, closed book / NO laptop or PDAs

Course Alternative: CS143 – Compilers

Readings: Note: *There is very significant but not complete overlap between the two books.*

Alfred Aho, R. Sethi, and Jeffrey Ullman: Compilers. All except sections 5.6-5.10, 7.2-7.9, 9.10-9.12, 10.3-end. (Or 2nd edition of this book -- read the equivalent material listed for the 1st ed.)

*Andrew Appel. Modern Compiler Implementation in Java. 2nd Edition. Chapters 1-14, 17 & 20.

*** This book is “advisory” only. Students will not be tested on the new material in 2004. However, the new material will be included on the test in 2005.**

COMPUTER ARCHITECTURE

Test: 1 hour, open book / calculators ok

Course Alternative: EE108B – Digital Systems II

Readings:

D. Patterson & J. Hennessy: Computer Organization & Design: The Hardware/Software Interface, 2nd/3rd edition. Morgan-Kaufmann, 1997. ISBN: 1-55860-428-6. (note: the first edition is not sufficient)

DATABASES

Test: 1 hour, open book / NO laptop, PDAs, or calculators

Course Alternative: CS145 – Introduction to Databases

Readings: (Choose one of the following 2 listed below.)

Jeffrey Ullman and Jennifer Widom: A First Course in Database, Systems, 2nd edition, Prentice-Hall, 2001 OR Hector Garcia-Molina,, Jeffrey Ullman, and Jennifer Widom: Database Systems: The Complete Book, 1st edition, Prentice-Hall, 2001.,
Chapters 1, 2, 3, 4 (except 4.1-4.4), 5 (except 5.3-5.4), 6, 7, 8, (except 8.1-8.5)

Jeffrey Ullman and Jennifer Widom: A First Course in Database, Systems, 3rd edition, Prentice-Hall, 2008 OR Hector Garcia-Molina,, Jeffrey Ullman, and Jennifer Widom: Database Systems: The Complete Book, Prentice-Hall, 2nd edition 2008.,
Chapters 1, 2, 3 (except 3.7), 4 (except 4.7-4.10), 6, 7, 8 (except, 8.4), 10 (except 10.2-10.7), 11 (except 11.4)

Human-Computer Interaction

Test: 1 hour, closed book / no laptop, PDAs, or calculators

Course Alternative: CS 147 – Introduction to Human-Computer Interaction Design

Readings (this list is meant to be a copy of the current CS 147 reading list):

Design Breakdowns

Donald Norman, Chapter 1, The Psychopathology of Everyday Things, in The Design of Everyday Things,. pp. 1-33.

Design Process

David Kelley and Brad Hartfield, “The Designer's Stance” (with profile on IDEO), in Winograd, Bringing Design to Software, Chapter 8, pp. 151-170.

Fundamentals

Hutchins et al., “Direct Manipulation Interfaces,” in Draper and Norman, User-Centered System Design, pp. 87-124.

Metaphors and Conceptual Models

Alan Cooper, "The Myth of Metaphor",
http://www.cooper.com/articles/art_myth_of_metaphor.htm

David Liddle, "Design of the Conceptual Model" (with profile on STAR), in Winograd, Bringing Design to Software, Chapter 2, pp. 17-36.

Working in Teams

Doyle and Straus, "What Goes Wrong at Meetings", in How to Make Meetings Work, Chapter 2, pp. 19-37.

Doyle and Straus, "Summary of the Interaction Method", in How to Make Meetings Work, Chapter 5, pp. 83-87.

Usability

Don Norman, "Design as Practiced", in Winograd, Bringing Design to Software, Chapter 12, pp. 233-251.

Dix et al., "Design Rules", in Human-Computer Interaction, Chapter 7, pp. 258-288.

Visual Design

Mullet and Sano, "Elegance and Simplicity", in Designing Visual Interfaces, Chapter 2, pp. 17-49.

Mullet and Sano, "Organization and Visual Structure", in Designing Visual Interfaces, Chapter 4, pp. 89-130.

Cognitive Principles

Yvonne Waern, "Cognitive Aspects of Computer Supported Tasks", in Basics of Cognition, Chapter 2, pp. 10-30.

Iterative Prototyping

Van Duyne, Landay, and Hong, "Involving Customers with Iterative Design", in The Design of Sites, Chapter 4, pp. 61-85.

Marc Rettig, Prototyping for Tiny Fingers, Communications of the ACM, April 1994, 37:4, pp. 21-27.

Physical Devices and Tangible Interaction

Ken Hinckley, "Input Technologies and Techniques", in Jacko and Sears, The Human-Computer Interaction Handbook, Chapter 7, pp. 151-168.

Paul Dourish, "Getting in Touch", in Where the Action Is, Chapter 2, pp. 25-53.

The History and Future of Interaction

Jakob Nielsen, "Generations of User Interfaces", in Usability Engineering, Chapter 3, pp. 49-69.

Web Design

Steve Krug, "How We Really Use the Web", in Don't Make Me Think, Chapter 2, pp. 20-29.

Natural Interaction and Agents

Nicholas Negroponte, "Agents: From Direct Manipulation to Delegation", in Jeffrey Bradshaw, Software Agents, pp. 57-66.

Don Norman, "How Might People Interact with Agents", in Jeffrey Bradshaw, Software Agents, pp. 49-55.

Emotional Design

Nass, C. & Moon, Y., "Machines and Mindlessness: Social Responses to Computers." Journal of Social Issues, 56(1), pp. 81-103.

Don Norman, "Three Levels of Design", in Emotional Design, Chapter 3, pp. 63-98.

Don Norman, "Emotional Machines", in Emotional Design, Chapter 6, pp. 161-194.

GRAPHICS

Test: 1 hour, closed book / NO laptop; calculators or PDA's are OK

Course Alternative: CS148 – Introductory Computer Graphics

Readings:

Hearn, Donald and Baker, Pauline. Computer Graphics with OpenGL (3rd edition). New Jersey: Prentice Hall, 2003
(older editions will work just as well)

LOGIC

Test: 1 hour, closed book & notes / NO laptop

Course Alternative: CS157 – Logic and Automated Reasoning **OR** PHIL 251 – First-Order Logic

Readings:

Log on to cs157.stanford.edu. Go to Notes.

NETWORKS

Test: 1 hour, closed book / NO laptop

Course Alternative: CS244a – Introduction to Computer Networks

Readings:

Computer Networking: A Top-down approach, 4th Edition, by Kurose and Ross
<http://www.aw-bc.com/catalog/academic/product/0,1144,0321497708-TOC,00.html>
chapter 1-6.

(Note: the Davie, B. and Peterson, L. Computer Networks: A Systems Approach. 1999, Chapter 1-7, excluding section 6.5. Chapter 9, excluding section 9.3. is also indicative of the material, together with cs244a materials).

End-to-end arguments in system design, Saltzer, Reed and Clark
<http://web.mit.edu/Saltzer/www/publications/endoend/endoend.pdf>

NUMERICAL ANALYSIS

Test: 1 hour, closed book / NO laptop

Course Alternative: CS137 – Fundamentals of Numerical Computation

or

CS205- Mathematical Methods for Robotics, Vision, and Graphics

Readings:

K. Atkinson: [An Introduction to Numerical Analysis.](#)

Burden & Faires: [Numerical Analysis.](#)

Heath: [Scientific Computing: An Introductory Survey.](#)

Kincaid & Cheney: [Numerical Analysis.](#)

PROGRAMMING LANGUAGES

Test: 1 hour, closed book

Course Alternative: CS242 – Programming Languages

Readings:

John Mitchell, Concepts in Programming Languages.

Approximate alternative:

Ravi Sethi: Programming Languages: Concepts and Constructs, Addison-Wesley, 1996. Chapters 1-12, 14.

SOFTWARE SYSTEMS

Test: 1 hour, open book / NO laptop or PDA

Course Alternative: CS140 – Operating Systems and Systems Programming

Readings:

Abraham Silberschatz, James Peterson and Peter Galvin: Operating System Concepts, 3rd Edition.
(REQUIRED READING)

M. Ben-Ari: Principles of Concurrent Programming. (OPTIONAL READING)