

DARTMOUTH COLLEGE  
COMPUTER SCIENCE DEPARTMENT  
Winter, 2008

**Ideas, Ideals, and Computer Science (Computer Science 7)**

**Information**

**Faculty:** Carey Heckman  
7 Choate Road  
(603) 643-8139  
Carey.Heckman@dartmouth.edu  
Office Hours: 3-4:30 PM Thursdays and Fridays, or by appointment  
Please blitz me in advance if you plan to come to office hours so that I am certain to be there. You may also make appointments for other times that are mutually convenient.

**Overview**

Based on the view that the foundation of computer science is not computer science but the problems computer science seeks to solve, this seminar explores the ideas, values, and visions of a better life that underpin various areas of computer science. Algorithms, programming languages, computation, database and information systems, distributed systems, networks, and open source software development and distribution will be among the areas studied.

Our primary objective will be a better understanding of what is meant by “computer science” and what computer science can teach us about truth, beauty, our universe, and ourselves. Our intellectual journey will also provide constant opportunities to hone critical thinking, analytic, and writing skills.

No technical knowledge will be required or assumed. An interest in the connection between the human condition and computer science is essential, however. The seminar also requires regular class participation, a one page reaction paper twice each week, three formal papers totaling about 20 pages, and an oral presentation.

**Class Meetings**

Baker Library 213

Mondays, Wednesdays, and Fridays at 1:45-2:50 PM  
x-hour, Thursdays at 1:00-1:50 PM

## ***Expectations***

To receive credit for this course, you must: (1) attend classes prepared for energetic and informed participation; (2) complete and submit the required reaction papers and three draft and final essays; and (3) schedule and attend an individual conference with me to discuss each final version of an essay.

Reading assignments are due on the dates listed in the syllabus.

You are expected to attend every scheduled class. If you must miss a class, please let me know *in advance*, as soon as you can, and tell me the reason. You are allowed two absences. If you have more than two absences, your final grade will be lowered. In extraordinary circumstances, these terms may be negotiated. Arriving more than 15 minutes or more late or leaving 15 minutes or more early is an absence. Whenever you miss class, you remain responsible for what was covered and therefore must arrange to get notes from another student.

A reaction paper is a one-page reflection on some or all of the assigned reading for the day. You should either explain why you found special merit or had special criticism with the reading you selection. Reaction papers will often be used as a springboard for that day's class discussion.

You must submit your reaction papers and draft and final essays electronically using Blackboard. Your first two essays should be 1400-1900 words, about 5-7 pages double-spaced; the third essay should be 2400-2900 words, about 8-10 pages in length. Your drafts will not be finished products, of course, and will not be graded, but they must be submitted on time and demonstrate a good faith effort.

Essays are due as noted on the syllabus. You should also plan on attending a private conference with me after each final paper. The schedule has no room to spare, so no extensions are possible. Don't ask. I reserve the right to refuse to read and grade any essays received after the stated due date.

## ***Reading Materials***

Various articles and excerpts

Brian Cantwell Smith, *On the Origin of Objects* (MIT Press: 1998)

Eric. S. Raymond, *The Cathedral and the Bazaar* (O'Reilly Media, Inc.: 2001)

## ***Your Part***

- Reading the assigned readings and writing reaction papers, as preparation for class discussion.
- Attending class and participating actively in discussions
- Writing three papers, two shorter ones and one longer one
- Completing on time any other writing or research exercises

## *Grading*

I will assign grades in this course according to the following proportions:

Attendance and participation (including reaction papers)	30%
Essays (including rewrites)	70%

Except in cases approved by the dean, I will not award a grade of “Incomplete” in this course.

## *Composition Center*

For additional help with all your writing assignments, please talk to me or, if you prefer, visit the Composition Center.

## *Honor Principle*

The Dartmouth Honor principle applies to the work in this course. It is expected that the material you hand in is your own work. You are allowed to discuss the issues with others in the class and with me. If you receive more than trivial assistance or ideas from someone, you should so note on the material you turn in. All sources must be properly acknowledged, according to standard convention (see *Sources: Their Use and Acknowledgement*).

## *Disabilities*

I encourage students with disabilities, including “invisible” disabilities like chronic diseases, learning disabilities, and psychiatric disabilities, to discuss with me after class or during office hours appropriate accommodations that might be helpful to them. Also, stop by the Academic Skills Center to register for support services.

DARTMOUTH COLLEGE  
COMPUTER SCIENCE DEPARTMENT  
Winter, 2008

**Ideas, Ideals, and Computer Science (CS 7)  
Syllabus**

<i>Date</i>		<i>Topic</i>	<i>Reading</i>	<i>Papers</i>
Jan 7:	M	<b>1. Introductions, Expectations, Assignments, Books</b>		
9:	W	<b>2. What Is Philosophy?</b>	AUDI (2001), COLBURN (1999) 20-48	
11:	F	<b>3. What Is Computer Science?</b>	KNUTH (1974), NEWELL & SIMON (1976) DENNING (1989) HARMANIS & LIN (1992) BROOKS (1996) SHAPIRO (2001)	
12:	Sa	<b>NO CLASS</b>		
14:	M	<b>4. What Is Science? What Is Engineering?</b>	BOWEN (2006) 69-101 PAPINEAU (1996) 290-294, 298-308, 319-320, skim rest KEMENY (1959) LOUI (1995) PETROSKI (2003)	
16:	W	<b>5. What Is a Computer?: Part I (History)</b>	ENGSMEGER (2004) ECK (2000)	<b><i>Draft Essay #1 Due by Noon</i></b>

<i>Date</i>		<i>Topic</i>	<i>Reading</i>	<i>Papers</i>
17: X-Hour	Th	<b>Your Computer Is Not a Typewriter</b>	TURING (1936) read nontechnical portions, especially §§ 1-6 and part 1 of § 9; skim §§ 7-8	
18:	F	<b>6. What Is an Algorithm?: Part I (Computation)</b>	HERMAN (1983)	
21:	M	NO CLASS		
23:	W	<b>7. What Is an Algorithm? Part II</b>	SOARE (1996) §§ 1-3, 4.5-5 (skim rest)	<i>Essay #1 Due by Noon</i>
25:	F	<b>8. What Is a Computer?: Part II</b>	SEARLE (1990) HAYES (1997)	
28:	M	<b>9. What Is a Procedure?</b>	CLELAND (1993) CLELAND (2001) CLELAND (2002)	
30:	W	<b>10. What Is Hypercomputation?</b>	COPELAND (2002) KUGEL (2002)	<b>Draft Essay #2 Due by Noon</b>
31: X-Hour	Th	<b>11. What Is a Computer Program?: Part I (Implementation)</b>	CHALMERS (1993) RAPAPORT (1999)	
Feb 1:	F	<b>12. What Is a Computer Program?: Part II (Computer Programs as Theories)</b>	WEIZENBAUM (1976) CHS. 5,6 SIMON (1996) Ch. 1	

<i>Date</i>		<i>Topic</i>	<i>Reading</i>	<i>Papers</i>
Feb. 4:	M	<b>13. What Is Software?</b>	MOOR (1978) SUBER (1988)	
6:	W	<b>Research</b>		<i>Essay #2 Due by Noon</i>
7: X-Hour	Th	<b>14. BASIC and Human- Computer Interfaces</b>	KEMENY & KURTZ (1985) 1-53, 89- 106 DOURISH (1999)	
8:	F	<b>NO CLASS</b>		
11:	M	<b>15. Hackers</b>	LEVY (1984) 17-49	
13:	W	<b>16. Open Source/ Free Software</b>	PAVLICEK (2000) 47- 97 RAYMOND (2001) 21- 63	
14: X-Hour	Th	<b>17. Open Source/ Free Software</b>	LEVY (1984) 415-430 STALLMAN (1998) STALLMAN (1985) STALLMAN (1994)	
15:	F	<b>NO CLASS</b>		
18:	M	<b>18. Introduction to On the Origin of Objects</b>	SMITH (1998) 3-23	
20:	W	<b>19. Computation</b>	SMITH (1998) 27-76	<i>Draft Essay #3 Due by Noon</i>
21: X-Hour	Th	<b>20. Irreduction, Realism</b>	SMITH (1998) 77-115	

<i>Date</i>		<i>Topic</i>	<i>Reading</i>	<i>Papers</i>
Feb 22:	F	<b>21. Particularity, Physics I</b>	SMITH (1998) 117- 151	
25:	M	<b>22. Physics II</b>	SMITH (1998) 151- 188	
27:	W	<b>23. Flex &amp; Slop</b>	SMITH (1998) 191- 212	<i>Final Essay #3 Due by Noon</i>
29:	F	<b>24. Conclusion</b>	SMITH (1998) 345- 377	
Mar 3:	M	<b>25. Computer Science (reprise)</b>	SMITH (2002)	
5:	W	<b>Oral Presentations</b>		
7:	F	<b>Oral Presentations (Dinner)</b>		

## READING LIST

- AUDI, ROBERT 2001. *Philosophy: A Brief Guide for Undergraduates*. American Philosophical Association  
<http://www.apa.udel.edu/apa/publications/texts/briefgd.html>.
- BOWEN, JACK 2006. *The Dream Weaver*. New York: Pearson Education.
- BROOKS, FREDERICK P., JR. 1996. "The Computer Scientist as Toolsmith II," *Communications of the ACM* 39(3) (March): 61-68.
- CHALMERS, DAVID J. 1993. A Computational Foundation for the Study of Cognition (unpublished).
- CLELAND, CAROL E. 1993. Is the Church-Turing Thesis True? *Minds and Machines* 3(3) (August): 283-312.
- CLELAND, CAROL E. 2001. Recipes, Algorithms, and Programs. *Minds and Machines* 11: 219-237.
- CLELAND, CAROL E. 2002. On Effective Procedures. *Minds and Machines* (special volume, *Effective Procedures*) 12: 159-179.
- COLBURN, TIMOTHY 1999. *Philosophy and Computer Science*. Armonk: M.E. Sharpe.
- COPELAND, B. JACK 2002. Hypercomputation. *Minds and Machines* 12(4): 461-502.
- DENNING, PETER J., DOUGLAS E. COMER, DAVID GRIES, MICHAEL C. MULDER, ALLEN TUCKER, A. JOE TURNER, AND PAUL R. YOUNG 1989. Computing as a Discipline. *Communications of the ACM* 32(1) (January): 9-23
- DOURSH, PAUL 1999. *Embodied Interaction: Exploring the Foundations of a New Approach to HCI* (unpublished draft).
- ECK, DAVID J. 2000. *The Most Complex Machine*. Natick, Mass.: AK Peters: 137-169.
- EINSMENGER, NATHAN 2004. Bits of History: Review of A.R. Burks's *Who Invented the Computer? The Legal Battle that Changed Computing History*. *American Scientist* 91 (September-October): 467-468.
- HARTMANIS, JURIS & LIN, HERBERT 1992. What Is Computer Science and Engineering? In JURIS HARMANIS & HERBERT LIN (eds.), *Computing the Future: A Broad Agenda for Computer Science and Engineering*. Washington, DC: National Academy Press: ch. 6, pp. 163-216.
- HAYES, PATRICK J. 1997. What is a Computer? An Electronic Discussion. *The Monist* 80(3): 389-404.
- HERMAN, GABOR T. 1983. Algorithms, Theory of. In ANTHONY S. RALSTON (ed.), *Encyclopedia of Computer Science and Engineering, 4th edition*. New York: Van Nostrand Reinhold: 51-53.
- KEMENY, JOHN G. 1959. *A Philosopher Looks at Science*. Princeton: D. van Nostrand.
- KEMENY, JOHN G. & THOMAS E. KURTZ 1985. *Back to BASIC: The History, Corruption, and Future of the Language*. Reading, Mass.: Addison-Wesley.
- KNUTH, DONALD 1974. Computer Science and Its Relation to Mathematics. *American Mathematical Monthly* 81(4) (April): 323-343.

- KUGEL, PETER 2002. Computing Machines Can't Be Intelligent (... and Turing Said So). *Minds and Machines* 12(4): 563-579.
- LEVY, STEVEN 1984. *Hackers: Heroes of the Computer Revolution*. New York: Dell.
- LOUI, MICHAEL C. 1995. *Computer Science is a New Engineering Discipline*. *ACM Computing Surveys* 27(1) (March): 31-32.
- MOOR, JAMES H. 1978. Three Myths of Computer Science. *British Journal for the Philosophy of Science* 29(3) (September): 213-222.
- NEWELL, ALLEN & SIMON, HERBERT A. 1976. Computer Science as Empirical Inquiry; Symbols and Search. *Communications of the ACM* 19(3) (March): 113-126.
- PAPINEAU, DAVID 1996. Philosophy of Science. In NICHOLAS BUNNIN & E.P. TSUI-JAMES (eds.), *The Blackwell Companion to Philosophy*. Oxford: Blackwell: 290-324.
- PAVLICEK, RUSSELL 2000. *Embracing Insanity: Open Source Software Development*. Indianapolis: Sams/Macmillan.
- PETROSKI, HENRY 2003. Early Education. *American Scientist* 91 (May-June): 206-209.
- RAPAPORT, WILLIAM J. 1999. Implementation Is Semantic Interpretation. *The Monist* 82(1): 109-130.
- RAYMOND, ERIC. S. 2001. *The Cathedral and the Bazaar*. Beijing: O'Reilly Media, Inc.
- SEARLE, JOHN R. 1990. Is the Brain a Digital Computer? *Proceedings and Addresses of the American Philosophical Association* 64: 21-37.
- SHAPIRO, STUART C. 2001. *Computer Science: The Study of Procedures* (unpublished).
- SIMON, HERBERT A. 1996. *The Sciences of the Artificial, Third Edition*. Cambridge, Mass.: MIT Press.
- SMITH, BRIAN CANTWELL 1998. *On the Origin of Objects*, Cambridge, Mass.: MIT Press.
- SMITH, BRIAN CANTWELL 2002. Foundations of Computing. In MATTHIAS SCHEUTZ (ed.), *Computationalism: New Directions*. Cambridge, Mass.: MIT Press) 23-58.
- SOARE, ROBERT J. 1996. Computability and Recursion. *Bulletin of Symbolic Logic* 2(3) (September), 284-321.
- STALLMAN, RICHARD 1985. The GNU Manifesto.  
<http://www.gnu.org/gnu/manifesto.html>
- STALLMAN, RICHARD 1994. Why Software Should Not Have Owners.  
<http://www.gnu.org/philosophy/why-free.html>
- STALLMAN, RICHARD 1998. The GNU Operating System and the Free Software Movement. In CHRIS DIBONA, SAM OCKMAN & MARK STONE (eds.), *Open Sources: Voices from the Open Source Revolution*. Sebastopol, Calif.: O'Reilly: 53-70.
- SUBER, PETER 1988. What Is Software? *Journal of Speculative Philosophy* 2(2): 89-119.
- TURING, ALAN M. 1936. On Computable Numbers, with an Application to the Entscheidungsproblem. In DAVIS, MARGIN (ed.) (1965), *The Undecidable: Basic Papers on Undecidable Propositions, Unsolvability Problems and Computable Functions*. New York: Raven Press:115:153.

WEIZENBAUM, JOSEPH 1976. *Computer Power and Human Reason: From Judgment to Calculation*. New York: W.H. Freeman.