

Department of Information Studies, University of California, Los Angeles

IS 270: Introduction to Information Technology

Winter 2007

Course homepage:

<http://courses.gseis.ucla.edu/course/view.php?id=125>

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Objectives & Approach

This course is designed to teach the fundamental concepts of information technology in ways relevant to professional practice in the library, archival, and informatics fields. It is not primarily about programming- or application-specific skills, and the course will not involve any laboratory work. It is also not primarily about the inner workings of the computer considered in isolation. Rather, the course will focus on teaching students computing concepts of enduring value (such as architecture, modularity, and protocol) that can be used in the analysis of networked applications.

Such concepts will be continually accessed by students in their professional life, as they create strategic technology plans, evaluate and acquire applications for their institution, contribute to information policy discussions, participate with software engineers in design discussions, seek to identify and understand social, political and commercial opportunities created by networked information technologies and attempt to communicate this understanding to others.

By applying these concepts to your particular area of professional expertise, you will refine your understanding of how information technology participates in social and institutional change and, conversely, how social and institutional dynamics shape technology. In short, you will be better equipped to anticipate the curve ahead in the professional areas that matter to you.

Method

Because of the rapid pace of evolution of information technologies, it is important to identify ways in which you can keep your skills fresh. This course will help you to identify, access and use resources (e.g., trade press, research journals and conferences, field experiences, etc.) for keeping up-to-date with the

field of information technology, through writing a “business intelligence report” of about 20 pages. The report will be directed at managers seeking to make an informed decision regarding the evaluation and/or acquisition of a given technology (one that you that is relevant to your particular area of expertise) for their organization. The report will follow a fixed structure, covering the technology from several angles explored in the class, including architecture, design, standardization, market, and future evolution.

Examples of potential topics include digital rights management, online education technologies, electronic repositories for scholarly publishing, course management software, storage of authentic electronic records, PDF/A, or electronic delivery of government services. Students should confirm their chosen topic with the instructor or the course reader in order to verify that it has the required breadth and depth.

Each week, you will be asked to apply the concepts covered in class to your chosen topic, in the form of a one to two pages write-up. In this way, by the end of the semester, you will have already gathered much of the material relevant to your report.

Course Requirements

The course presupposes that students have completed or are currently taking “IS260 Information Structures” and are interested in learning how to improve their understanding of information technologies as those will impact their professional practice.

You should come to class ready to participate in discussions of the readings assigned for that week.

You should learn how to type diacritical characters using text-processing software (see <http://en.wikipedia.org/wiki/Diacritic>).

You should abide by the spirit of the “E-Tool Bill of Rights”.

Final paper will be worth 60%; Write-ups will be worth 5% each; 10% will go to class participation.

Description and due dates of write-ups:

<http://courses.gseis.ucla.edu/file.php/125/write-ups.pdf>

Term paper requirements:

<http://courses.gseis.ucla.edu/file.php/125/final-paper.pdf>

Suggestions for potential topics:

<http://courses.gseis.ucla.edu/file.php/125/topics.pdf>

Plagiarism: "To be really good at plagiarism, you need precisely the reading and writing skills that ought to render it unnecessary." — *Jonathan Mlalesic*

Required and Suggested Readings

Required

David G. Messerschmitt, [Networked Applications: A Guide to the New Computing Infrastructure](#), Morgan Kaufman, 1999. This textbook was written with LIS and Management audiences, and is being used at LIS schools at Michigan and Berkeley among others. It is out-of-print, but should be easily available through online booksellers or used bookstores,

All other readings are available on the course website (most can only be accessed from a UCLA connected computer, or using a proxy server mechanism). In addition, two copies of each reading will be available in the course reserve in the MIT lab.

Suggested

Two books which attempt to explain the inner working of a computer in a non-technical way (also on reserve in the MIT lab). I particularly recommend the first one.

Daniel Hillis, [Patterns on the Stone](#), Perseus, 1999.

Charles Petzold, [Code: The Hidden Language of Computer Hardware and Software](#), Microsoft Press, 2000.

Course schedule

Week 1 (January 9/10): Course Overview & Information Technology Literacy

What exactly are "computing skills" made of? What does it mean to be "computer literate" or "fluent"? Is it sufficient and/or necessary to be able to program computers? In this class, we will discuss the kinds of information technology knowledge performances that are relevant and appropriate to the field of LIS, as well as the kind of pedagogical approaches this entails.

Read

D. Scott Brandt, "[Information Technology Literacy: Task Knowledge and Mental Models](#)", *Library Trends* 50(1):73-86

Additional Readings & Browsing

Sanna Talja, "[The Social and Discursive Construction of Computing Skills](#)", *Journal of the American Society for Information Science and Technology* 56(1):13-22.

David Bawden, "[Information and Digital Literacies: A Review of Concepts](#)," *Journal of Documentation*, 57(2): 218-259.

American Association of University Women, [*Tech-Savvy: Educating Girls in the New Computer Age*](#), Washington DC., 2000.

National Research Council, [*Being Fluent with Information Technology*](#), Washington DC, 1999.

ALA / ACRL's "[Information Literacy Competency Standards for Higher Education](#)"

SAA's [guidelines](#) on professional education and information technology

Week 2 (January 16/17): Computer-Supported Cooperative Work and Play

While information technologies were initially restricted to the automation of business and scientific processes, they have now come to profoundly structure the way we work, learn, socialize, buy, sell, and play. This lecture will set the stage for a theme central to this course – that this evolution is no longer primarily technological, but rather, has become profoundly embedded within economic, regulatory, and cultural processes, as well as the tangled technological legacy of previous information ages.

Read

Messserchmitt, Chapter 1 and 2

Martin Campbell-Kelly, "[Punched-Card Machinery](#)", chapter four of [*Computing Before Computers*](#) (William Aspray, ed.), Iowa State University Press, 1990.

Survey: [Telecoms Convergence](#), *The Economist*, October 12, 2006.

O'Sullivan, G. (2002). "[The South African Truth and Reconciliation Commission: Database Representation](#)", chapter 4 (including appendixes) in [*Making the Case: Investigating Large Scale Human Rights Violations Using Information Systems and Data Analysis*](#), Patrick Ball, Herbert F. Spirer, and Louise Spirer (eds.) American Association for the Advancement of Science, 2000.

Week 3 (January 23/24): Architecture

Far from the intangibility suggested by the term "cyberspace", networked information technologies are crafted from the combination of three material resources: processing power, storage, and communication channels. This lecture will illustrate common types of arrangements of these resources for the purpose of information processing (e.g., Von Neumann machine, memory hierarchy, thin clients), and how those arrangements are structured by cost, footprint, and technological evolution.

Read

Messserchmitt, Chapter 3.1, 3.2, 3.3.

Richard E. Smith, "A Historical Overview of Computer Architecture", *Annals of the History of Computing*, October-December 1988 (Vol. 10, No. 4) pp. 277-303.

"High-Speed Data Races Home, Sci. Am." 281:4, p94, 6p;

"The Internet via Cable, Sci. Am.," 281:4, p100, 2p.

"DSL: Broadband by Phone, Sci. Am.," 281:4, p102, 2p.

"The Broadest Broadband, Sci. Am.," 281:4, p104, 2p.

"Satellites: The Strategic High Ground," Sci. Am., 281:4, p106, 2p.

"LMDS: Broadband Wireless Access," Sci. Am., 281:4, p108, 2p.

"The Light at the End of the Pipe," Sci. Am., 281:4, p110, 6p.

Anne C. Lear, "[Managing E-Commerce Reliability, eBay Style](#)", IT Pro, March/April 2000.

Additional Readings

Paul E. Ceruzzi, "[The Advent of Commercial Computing, 1945-1956](#)", chapter 2 of *A History of Modern Computing*, 2nd ed., MIT Press 2003.

Due

Write up #1

Week 4 (January 30/31): Programming, modularity, layering

How are real-world problems and their contexts conceptualized, modeled, and encoded in a form suitable for computer processing? What kinds of tools have programmers and mathematicians developed in order to perform such representations? How do programmers break down the enormous complexity of software systems and coordinate the operation of the different parts of such systems?

Read

Messserchmitt, Chapter 4.1, 4.2, 6.

Daniel Hillis, Chapter 5, "Algorithms and Heuristics" and 3, "Programming."

Bakhtiar Mikhak *et al.*, "[To Mindstorms and Beyond: Evolution of a Construction Kit for Magical Machines](#)" in *Robots for Kids: Exploring New Technologies for Learning Experiences*. (Edited by Allison Druin, published by Morgan Kaufman and Academic Press, San Francisco, March, 2000).

Additional readings

Donald E. Knuth, "Algorithms", *Scientific American* 236(4):68-30 (April 1977).

Due

Write up #2

Week 5 (February 6/7): Design

As information technologies are introduced in ever more complex contexts, in the service of ever more elaborate social interactions (from dating to collaborative science), traditional methods of systems analysis and design have shown serious limitations. This lecture will highlight the challenges faced by software engineers as they attempt to identify, articulate, predict and respond to users' needs, behaviors and interaction with information technologies, as well as their fit within organizations.

Read

Messserchmitt, Chapter 3.4

W. Wayt Gibbs, "Software's Chronic Crisis," [Scientific American](#), September 1994, pp. 86-95.

Brian M. Landry, Jeffrey S. Pierce and Charles L. Isbell Jr, "[Supporting routine decision-making with a next-generation alarm clock](#)", *Personal and Ubiquitous Computing* (2004) 8: 154-160.

Joan S. Ash *et al.*, "[Some Unintended Consequences of Information Technology in Health Care: The Nature of Patient Care Information System-related Errors](#)", *Journal of the American Medical Informatics Association*, **11**(2):104-112 (March/April 2004).

Survey: [Make It Simple](#), *The Economist*, October 28, 2004.

Week 6 (February 13/14): Standards

While information technologies are constantly evolving, they must also remain compatible to some degree with previous generations of hardware and software. An important role of standards is to coordinate this compatibility across time and space. The spread of the Internet has been accompanied by the emergence of several new standardization institutions (e.g., W3C and IETF), as well as new procedures for reaching consensus over complex socio-technical issues (e.g., the semantic web). This lecture will provide a map of this new standardization environment, and emphasize the important role of standards as strategic tools for structuring markets.

Read

Messserchmitt, Chapter 4.3

Urs von Burg, *The Triumph of the Ethernet*, Stanford University Press, 2001 (Introduction and Chapter 4).

Laura Tull, "[Library Systems and Unicode: A Review of the Current State of Development](#)", *Information Technology and Libraries* **21**(4):181-185 (December 2002).

Browse

Unicode Consortium, [The Unicode Standard](#), Version 4.0. Addison-Wesley 2003 ([Introduction](#) and [General structure](#))

ANSI/NISO Z39.85 - 2001 [Dublin Core Metadata Element Set](#) . 16 pp. ISBN: 1-880124-53-X . ANSI Approval Date: 09/10/01.

Due

Write up #3: Design

Week 7 (February 20/21): Markets

Markets for information technologies and products behave markedly differently than that for physical goods. For example, while it is very costly to produce the first copy of OS X for the Macintosh (high fixed costs), it is virtually free to produce every other copy (zero marginal costs). In this lecture, we will examine the behavior of information technology markets, the various methods producers use in order to extract value from intangible products, and what institutions must consider when acquiring off-the-shelf or custom-designed software.

Read

Messerchmitt, Chapter 5.1 - 5.4.

Hal Varian, "Economics of Information Technology" (you can skip section 7, and any material that is overly mathematical or that refers to economic concepts you are unfamiliar with — e.g., Nash equilibrium, or Pareto efficiency).

<http://www.sims.berkeley.edu/~hal/Papers/mattioli/mattioli.pdf>

Vaughan, Jason, "[A library's integrated online library system: assessment and new hardware implementation](#)", *Information Technology and Libraries* **23**(2):50-7 (June 2004).

Due

Write up #4: Standards

Week 8 (February 27/28): Regulation

The increasingly central role of information networks in social life has made it necessary to rethink and reform many of the fundamental regulatory systems of Western societies, including those dealing with copyright, universal access to

telecommunication services, privacy, and antitrust. In this lecture, we will review some of those reforms and how they have affected values dear to the library, archival and computing professions, such as intellectual freedom, collective memory, and the digital divide.

Read

Messerchmitt, Chapter 5.5 & 11.

Longstaff, P. H., "Networked Industries: Patterns in Development, Operation, and Regulation." http://pirp.harvard.edu/pubs_pdf/longsta\longsta-p00-2.pdf (read pages 1-31).

Tim Wu, "Network Neutrality, Broadband Discrimination," *Journal of Telecommunications and High Technology Law*, Vol. 2, p. 141, 2003.

Jeffrey James, "[Technological blending in the age of the Internet: A developing country perspective](#)," *Telecommunications Policy*, Volume 29, Issue 4, May 2005, Pages 285-296.

Due

Write up #5: Markets

Week 9 (March 6/7): Trust & Authenticity

Work and play both require that participants behave according to rules – whether formally articulated within contract law or implicitly embedded within cultural codes (e.g., deference to elders). Enforcing such rules has proven highly difficult in the context of computer-mediated communications. Purely technical solutions, such as cryptography, have largely failed to fulfill their promise. This lecture will examine new cultural and legal norms for electronic trust and authenticity and the debates surrounding their emergence.

Read

Messerchmitt, Chapter 8.

Ross Anderson, [Why cryptosystems fail](#). *Communications of the ACM* 37, 11 (Nov. 1994), 32-40.

Rebecca Mercuri, "[A Better Ballot Box?](#)" *IEEE Spectrum*, Volume 39, Number 10, October 2002.

Ian Jermyn, Alain Mayer, Fabian Monrose, Michael K. Reiter, and Aviel D. Rubin. "[The Design and Analysis of Graphical Passwords](#)", in *Proceedings of the 8th USENIX Security Symposium*, August, Washington DC, 1999.

Additional Readings:

Bruce Schneier, [*Secrets and Lies: Digital Security in a Networked World*](#), Wiley, 2000.

Ross J. Anderson, [*Security Engineering: A Guide to Building Dependable Distributed Systems*](#), Wiley 2001.

Due

Write up #6: Regulation

Week 10 (March 13/14): The Grid: Computing as a public resource.

Successive waves of computerization have proposed various configurations of processing power, communication networks, and data storage – from the age of the centralized mainframe, of the personal computer, to peer-to-peer networks. One proposed future configuration is that of a “computing grid”, an infrastructure providing processing power on-demand. This lecture will examine the profound changes to our notion of computing that the development of such an infrastructure entails.

Read

Ian Foster, “The Grid: Computing without Bounds”, [*Scientific American*](#), April 2003, Vol. 288 Issue 4, p78.

McDowell, J.C., [*Downloading the sky*](#)”, Spectrum, IEEE, Volume: 41 Issue: 8 Aug. 2004, Page(s): 35- 39.

Browse

Anderson, D. P., *et al.* 2002. “[SETI@home: an experiment in public-resource computing](#),” Communications of the ACM **45**(11) (Nov. 2002), 56-61.

Help locate the aliens by sharing your idle processor cycles! [Download](#) and install the SETI client.

Additional Readings:

Ian Foster, Carl Kesselman, [*The Grid 2: Blueprint for a New Computing Infrastructure*](#),

Due: Final paper, Friday March 16, 5pm.