

Course Syllabus

Course Name: **Information Technology and the Labor Market**

Instructor: Instructor: Frank Levy (Room 9-523, phone 3-2089, flevy@mit.edu)

Assistant: Daniela Trammell (Room 9-519, phone 3-7736, danielat@mit.edu)

Teaching Assistant: Jessica Lee Cohen (Room E52-243d, j_cohen@MIT.EDU)

Class Hours: Tuesdays, Thursdays, 9:00 -10:30, Room 1-150

Section Hours: Fridays, Time to be Determined in Class

In this course, we will explore how information technology is reshaping different dimensions of the U.S. labor market: the way work is organized, the mix of occupations, the skills required to perform in an occupation, economy-wide labor productivity, and the distribution of wages.

Much of our analysis begins from the following ideas:

- All human work – designing a circuit, tasting a sauce, hammering a nail – involves processing information.
- Computers are much better at some kinds of information processing than others.
- Once we understand the kinds of information processing computers can and cannot do well, we can identify those areas of work where computers can *substitute* for human labor (eliminating jobs) and those areas of work where computers *complement* human labor (creating new jobs in many cases). We can also identify the human skills that remain valuable in the computerized workplace.

Readings: This class has been selected for e-reserves so that all readings are on the course web site available for viewing or downloading to persons registered for the class.

Course Web Site: <http://stellar.mit.edu/S/course/14/sp05/14.49/index.html>. The web site can also be accessed by going to Stellar and looking under either Urban Studies or Economics courses.

Grading: Grading will be based on periodic problem sets (20% total), a mid-term (20%), a final exam (35%) and a 20 pp. paper (25%). Each paper will be written by a pair of students and will describe how a computer might eliminate or enhance (substitute or complement) a job that is currently performed by humans.

Approximate Course Outline:

February 1: Setting the Stage – Incomes, Occupations and Wages

Readings:

Frank Levy, “Industrial Change.....” and “Occupational Change....” Chapters 4 and 5 respectively in *The New Dollars and Dreams*, Russell Sage Foundation, 1998.

February 3, 8: Two Early Views of Computers’ Impacts

Readings:

Alan B. Krueger, “How Computers have Changed the Wage Structure: Evidence from Microdata, 1984-1989”, *Quarterly Journal of Economics*, February 1993, pp. 33-60. Herbert Simon, “The Corporation: Will it be Managed by Machines?” in M.L. Anshen and G.L. Bach (eds.), *Management and the Corporations*, McGraw Hill, 1960, pp. 17-55.

February 10, 17 (***No Class on February 15 – Make Up Class on February 18***): Does Technology Complement “Skill”?

Readings:

Paul Attewell. “What is Skill?” *Work and Occupations* 17 (1990). pp. 422-448. Anne Beamish, Frank Levy, and Richard J. Murnane. “Information Technology and Skill Requirements: Examples from a Car Dealership”, in Relix Aruner, Norbert Schreir and Georg Spottl, *Die Zukunft computergestuetzter Kfz-Diagnose, Bielefeld, 2002*. David Card and John DiNardo, “Skill Biased Technological Change and Rising Wage Inequality: Some Problems and Puzzles”, *Journal of Labor Economics*, vol. 20, no. 4 (2002), **pages 733-744, bottom of 746-761.**

February 18, 24: (***No Class on February 22 – Monday Course Schedule on that day because of Presidents’ Day***): Cognition I - Perceiving What Task is to be Done.

Readings:

John R. Anderson, “Perception”, Chapter 2, and “Conceptual Knowledge”, pp.151-168 in *Cognitive Psychology and Its Implications*, W.H. Freeman, 1995. Paul C. Quinn: “Category Representation in Young Infants,” in *Current Directions in Psychological Science*, 11 (2), April 2002, pp. 66-70.

March 1: 3 (part): IT and Tasks I: Rules Based Applications including Expert Systems

Readings:

Randall Davis, "Knowledge Based Systems", *Science Magazine*, February 28, 1968, pp. 957-963. John McCarthy, "Some Expert System (sic) Need Common Sense", mimeo, Stanford University, 1984, (also available at <http://www-formal.stanford.edu/jmc/someneed.pdf>). Research Department of the Federal National Mortgage Association (Fannie Mae), "Understanding Desktop Underwriter," memo dated January 14, 2000 (also take a look at the related sales pitch at: http://www.efanniemae.com/singlefamily/technology_tools/other/streamlined_app.jhtml)

(Optional) Kenneth A. Bowen, "Rules-Based Management of Options Trading", *PC-AI*, January/February 2000, pp. 16-20.

March 3 (part) and 8: IT and Tasks II: Pattern Recognition and Computer Learning

Readings:

Richard O. Duda, Peter E. Hart and David G. Stork, *Pattern Classification* (2nd ed), Chapter 1. Paul C. Quinn and M.H. Johnson, "The Emergence of perceptual category representations in young infants: a connectionist analysis: *Journal of Experimental Child Psychology*, 66 (1997), pp. 236-63. Marsden S. Blois, "Clinical Judgment and Computers", *New England Journal of Medicine*, 303 (July 24, 1980), 192-197.

(Optional) Elise Chidley, "Assessing New Mamography Technologies", originally published in *Radiology Today*, reprinted in *R2IT News* (http://www.r2tech.com/nwl/v2i1_win02/nwl000.html).

March 10: Computer Vision (Guest Lecture – Professor Todd Zickler, Harvard University)

Readings:

W. E. L. Grimson and J. L. Mundy, "Applications of Computer Vision", *Communications of the ACM* (Special Issue on "Commerical and Industrial AI"), 37(3):45--51, 1994.

(Optional) William T. Freeman et. al., "Computer Vision for Interactive Graphics", *IEEE Computer Graphics and Applications*, volume 18, number 3 (May-June 1998), pp. 42-53.

Two-Person Paper Proposal Due on March 10: Submit electronically to flevy@mit.edu.

March 15: Computer Speech Recognition (Guest Lecture - Dr. T.J. Hazen, CSAIL, MIT)

Reading:

V.W. Zue and J.R. Glass, "Conversational Interfaces: Advances and Challenges", *Proceedings of the IEEE*, August 2000, pp 1166-1180

March 18: (*No Class – Make-Up Class on Friday April 1*)

March 21-25: Vacation

March 29: Implementing Computers and the Reorganization of Work

Readings:

David Autor, Frank Levy and Richard J. Murnane: "Upstairs, Downstairs,: Computers and Skills on Two Floors of a Large Bank" *Industrial and Labor Relations Review*. April 2002. Allen L. Goren et. al, "Automated Natural Spoken Dialog", *IEEE Computer* (get proper journal title), April 2002.

March 31: Radiology Imaging (Guest Lecture: Dr. Polina Golland, CSAIL, MIT) (subject to change)

Readings: To Be Filled in

April 1: Implementing Computers and the Reorganization of Work, ctd.

Readings: Ann Bartel, Casey Ichniowski and Kathryn Shaw, "The Strategic Investment in Information Technologies and New Human Resource Practices and Their Effects on Productivity: An "Insider" Econometric Analysis" mimeo, Columbia University, October 21, 2004.

April 5: Midterm Exam

April 7, 12, 14: Cognition II - What People Get Paid For: Expert Thinking and Complex Communication.

Readings:

"How Experts Differ from Novices", Chapter 2 in *How People Learn: Brain, Mind, Experience and School*, National Academy Press, (2000). Joseph LeDoux, "A Few Degrees of Separation" in *The Emotional Brain: The Mysterious Underpinnings of Emotional Life*, (1996). Nick Murray, "Planning for the Five Great Goals of Life", Chapter 8 in *The Excellent Investment Advisor*, self-published, 1996.

Optional: "The Tree of Talking", Chapter 5 in Tor Norrestradners, *The User Illusion: Cutting Consciousness Down to Size*. Kathleen Valley, Leigh Thompson, Robert Gibbons and Max H. Bazerman "How Communication Improves Efficiency in Bargaining Games" *Games and Economic Behavior* 38 (2002): 127-55.

April 19: *No Class - Patriot's Day Holiday*

April 21, 26: IT and Markets

Readings:

Austin Goolsbee and Judith Chevalier, "Measuring Prices and Price Competition On Line: Amazon and Barnes and Noble", NBER Working Paper 9085, July 2002. Haim Mendelson, "Dell Direct" Teaching Case EC-17, Stanford University Business School Center for Electronic Business and Commerce, November 2000. Glenn Ellison and Sara Fisher Ellison, "Search, Obfuscation, and Price Elasticities on the Internet", MIT Working Paper, January 2001. Constance Hays, "What Wal-Mart Knows about Customer Habits", *New York Times*, November 14, 2004.

April 28: IT and Outsourcing

Readings:

Survey on Outsourcing, *The Economist*, November 11, 2004. Martin Neil Baily and Robert Z. Lawrence, "What Happened to the Great US Job Machine? The Role of Trade and Electronic Offshoring", *Brookings Papers in Economic Activity* (forthcoming) Section 4.

May 3, 5 (part): How Can Computers Substitute for/Complement Classroom Teachers? (Guest Lecture on May 3: Dr. Jill Burstein, Educational Testing Service).

Readings:

Jill Burstein et. al., "*Criterion*: Online Essay Evaluation: An Application for Automated Evaluation of Student Essays". Jeremy Roschelle et. al. "Changing How and What Children Learn in School with Computer Based Technologies", *Children and Computer Technology*, vol. 10, no. 2, (Fall/Winter 2000), pp. 76-101. Frank Levy and Richard J. Murnane, "Computers and the Teaching of Skills" Chapter 7 in *The New Division of Labor* (2004)

May 5 (part) and 10: IT and Productivity

Readings:

Kevin J. Stiroh: "Information Technology and the U.S. Productivity Revival: What Do the Industry Data Say?," *American Economic Review*, December 2002. "Executive Summary and Synthesis of Findings from McKinsey and Company" *How IT Enables Productivity Growth*, October 2002.

May 12: Wrap-Up.
