

Department of Urban Studies and Planning 11.128/11.248
Department of Economics 14.49

Spring 2002

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

Instructor: Instructor: Frank Levy (Room 9-5531, phone 3-2089, flevy@mit.edu)

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In this course, we will explore how information technology is reshaping the U.S. labor market: it's mix of occupations, the skills required to perform an occupation, the way work is organized, labor productivity, and wage levels and wage inequality.

We begin from the perspective the brain is a wonderful information-processing instrument, but when a computer and the brain perform a task in roughly the same way the computer can do it more cheaply. This fact leads to a pair of crosscutting market forces:

(1) Information technology is opening up many new opportunities through its complementarity with some human skills.

(2) Information technology is replacing human labor in certain tasks by substituting for other human skills.

We will explore the current limits on computers' ability to substitute for human skills, the human skills that computers complement, and the net effect of these forces on the labor market.

Class Schedule, texts, etc: The class meets Tuesdays and Thursdays 9:00 - 10:30. In addition, Hoyt will conduct a weekly recitation section at a time to be determined in class. All readings for the course will contained in a set of three readers on sale at MIT CopyTech (11-004). The first reader is available now.

Grading: Grading will be based on bi-weekly problem sets, a mid-term, and a final exam. Doing the problem sets required reading and understanding about three working papers/chapters/articles per week.

Approximate Course Outline:

February 5, 7, 12: An Overview of the Economy

Dennis Snower: "Causes of Changing Earnings Inequality", Federal Reserve Bank of Kansas City Symposium on Income Inequality and Policy Options, 1998. Claudia Goldin and

Lawrence F. Katz: "The Origins of Technology-Skill Complementarity", *Quarterly Journal of Economics*, August 1998, pp 693-732. "Changes in the Structure and Content of Work", Chapter 4 in *The Changing Nature of Work: Implications for Occupational Analysis*, National Academy Press, 1996.

February 14, 21: What Do We Mean By Skill?

Paul Attewell. "What is Skill?" *Work and Occupations* 17 (1990):422-448. Theodore W. Schultz, "The Value of the Ability to Deal with Disequilibria." *Journal of Economic Literature* 13 (1975):827-846. Anne Beamish, Frank Levy, and Richard J. Murnane. "Computerization and Skills: Examples from a Car Dealership" (selected pages). working paper (1999) Department of Urban Studies and Planning, MIT .

February 26, 28: Some Basic Ideas in Cognition

(MIT rules based citation) "The Bandwidth of Consciousness", Chapter 6 in Tor Norrestradners, *The User Illusion: Cutting Consciousness Down to Size.*, "The Growth of Schema Theory", Chapter 6 in Roy D'Andrade, *The Development of Cognitive Anthropology*.

March 5,7: IT and Tasks: Rules Based Applications

Herbert Simon, "The Corporation: Will it be Managed by Machines?" in M.L. Anshen and G.L. Bach (eds), *Management and the Corporations*, pp. 17-55. Houman Talebzadeh, Sanda Mandutianu and Christian F. Winner: "Countrywide Loan-Underwriting Expert System", *Artificial Intelligence Magazine*, Spring 1995, pp. 51-64. Martin Binkin, "Technology and Skills: Lessons from the Military", Chapter 5 in Richard M. Cyert and David C. Mowery eds. *The Impact of Technological Change on Employment and Economic Growth*. (Optional: Terry Horgan and John Tienson, "Rules and Representations" in *The MIT Encyclopedia of Cognitive Science*, available online at <http://cognet.mit.edu/MITECS/Entry/horgan.html>)

March 12, 14: IT and Tasks: Neural Nets and Pattern Recognition

Kanti Bansal, Sanjeev Vandhavkar and Dr. Amar Gupta: "Neural Networks Based Data Mining Applications for Medical Inventory Problems", *Journal of Agile Manufacturing* (full citation to come), David Autor, Frank Levy and Richard J. Murnane: "Upstairs, Downstairs,: Computers and Skills on Two Floors of a Large Bank" forthcoming, *Industrial and Labor Relations Review*. Marsden S. Blois, "Clinical Judgment and Computers", *New England Journal of Medicine*, 303 (July 24, 1980), pp. 192-197. (Optional: Michael I. Jordan, "Neural Networks" in *MIT Encyclopedia*, *op cit.* available on line at: <http://cognet.mit.edu/MITECS/Entry/jordan2.html>)

March 19: 21: IT and the Reorganization of Work

Erik Brynjolfsson and Lorin M. Hitt: "Beyond Computation: Information Technology, Organizational Transformation and Business Performance", *Journal of Economic Perspectives*, vol 14 (4), (2000), pp. 23-48. Wanda J. Orlikowski, "Evolving with Notes: Organizational Change around Groupware Technology", Chapter 2 in *Groupware and Teamwork*, Claudio U. Ciborra ed. David Thesmer and Mathias Thoenig, "Creative Destruction and Firm Organizational Choice: A New Look into the Growth-Inequality Relationship", *Quarterly Journal of Economics*, vol 115 (4) (2000), pp. 1209- 38.

March 26-28, MIT Vacation Week

April 2 and 4: Information v. Meaning, a Prelude to Markets

"The Tree of Talking", Chapter 5 in Norrestrand, op cit. David Sally, "A General Theory of Sympathy, Mind-Reading, and Social Interaction, with an Application to the Prisoners' Dilemma." *Social Science Information* 39(4) (2000): 567-634. Richard L. Daft, Robert H. Lengel, and Linda K. Trevino, "Message Equivocality, Media Selection, and Manager Performance: Implications for Information Systems," *MIS Quarterly* September 1987, 355-366.

April 9: Midterm

April 11, 16, 18: IT and Markets

Michael D. Smith, Joseph Bailey and Erik Brynjolfsson, "Understanding Digital Markets: Review and Assment", Chapter XX in *Understanding the Digital Economy*, Erik Brynjolfsson and Brian Kahin eds, 2000. Richard Wise and David Morrison, "Beyond the Exchange: The Future of B2B", *Harvard Business Review*, November-December 2000, pp. 45-53. David Autor, "Wiring the Labor Market", *Journal of Economic Perspectives*, 15 (1) (Winter 2001), pp. 25-40.

April 23, 25: IT and Productivity

Brynjolfsson and Hitt, op. cit., Stephen Olnier and Daniel E. Sichel, "The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?", *Journal of Economic Perspectives*, 14 (4) (Fall 2000, pp. 3-22. Robert J. Gordon, "Does the "New Economy" Measure up to the Great Inventions of the Past?" op. cit, pp. 48-74. Sections to be announced from McKinsey and Company, *Productivity in the United States* (October 2001, available on line at: www.mckinsey.com/knowledge/mgi/reports)

April 30, May 1: Putting Pieces Together

Alan Kreuger: "How Computers Have Changed the Wage Structure: Evidence from Micro Data", *Quarterly Journal of Economics*, 107 (1), (1993), pp. 35-78. John DiNardo and Jorn-Steffen Pischke, "The Returns to Computer Use Revisited: Have Pencils Changed the Wage Structure Too?", *Quarterly Journal of Economics*, 112 (1) (1997), pp. 201-304. David Autor, Frank Levy and Richard J. Murnane, "The Skill Content of Recent Technical Change: An Empirical Investigation", National Bureau of Economic Research Working Paper 8337, June 2001.

This ends the formal syllabus. We will use the remaining to handle overruns and additional topics we agree deserve attention.
