Department of Political Science
UNIVERSITY OF TORONTO

The Political Economy of Technology: From the Auto-Industrial to the Information Age

POL 409S/2307S
Winter, 2012-2013

Wednesday, 2:00 – 4:00 pm
University College, Room 148
Office Hours: Wednesday, 4:00 – 5:30 pm

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This course surveys a broad range of issues concerning the relationship between technological change and social and political development from a theoretical, historical and comparative perspective. The principal objectives are to explore the growing centrality of science and technology in political affairs generally, and its current significance for public policy in particular; to examine the conceptual tools that political economy brings to bear on an analysis of the nature of technological change; and to assess the implications of the development of social and political institutions at the national and international level for the process of technological innovation in the current period and the policy implications of that relationship.

The course will be based on a seminar format. Assignments for the course will consist of seminar participation and a major paper. The exact format for the conduct of the seminars will be discussed and agreed upon at the first class. Essays should be chosen from the topics outlined for each term. Variations upon these themes will be considered at the instructor's prerogative. Undergraduate essays are to be 4,000 words long and graduate essays 6,000 words long. Undergraduates must submit a five page outline and annotated bibliography before reading week. Each will count for 10% of the final grade. Essays are due the final week of the term. The paper will count for 70% of the final grade (60 % for undergraduates). Seminar participation and presentations will be worth 30%.

Required readings for each week are marked with an (*). Students are encouraged to read as many of the required readings for each week as possible.

Required Texts: POL 409S/2307S Course Readings available online.

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TOPICS: First Term

1. Introduction to the course and discussion of outlines
2. What is Technology?
3. Long Waves and Technological Change
4. Rise and Fall of the Fourth Kondratiev Wave
5. Science and Technology in the Postwar Era
6. The IT Revolution – A New Techno-Economic Paradigm?
7. The 'New' E-conomy – Economic Impact of the IT Revolution
8. The IT Paradigm and the Financing of Innovation
9. Technology and Globalization
10. Global Production Networks and IT
11. Innovation Policy for the IT Paradigm
12. The IT Paradigm and the Future of Economic Growth

Readings by Topic

Readings marked by an asterisk (*) are required readings on each topic.

1. Introduction to the course and discussion of outlines

2. What is Technology?

*W. Brian Arthur, *The Nature of Technology: What It is and How It Evolves*, ch. 2, 9

*Robert L. Heilbroner, "Do Machines Make History?" *Technology and Culture* 8 (July 1967)

*Joel Mokyr, "Evolution and the Dynamics of Technological Change," in *The Lever of Riches*, pp. 273-99.

*Bill Buxton, "The Long Nose of Innovation," *Business Week*, Jan. 2, 2008.

J. David Bolter, *Turing's Man: Western Culture in the Computer Age*, ch. 2

Jean-Jacques Salomon, "What is Technology? The Issue of its Origins and Definitions," *History and Technology* 1 (1984)

Nathan Rosenberg, "The Historiography of Technical Progress," in *Inside the Black Box*

Lewis Mumford, *Technics and Civilization*

Donald Mackenzie, "Marx and the Machine," *Technology and Culture* 25 (July 1984)

3. Innovation and Long Waves

*Giovanni Dosi, "Technological Paradigms and Technological Trajectories," in *Long Waves in the World Economy*, ed. C. Freeman, pp. 78-101.

or

*Giovanni Dosi and Richard R. Nelson, "Technical Change and Industrial Dynamics as Evolutionary Processes," in B.H. Hall and N. Rosenberg, eds, *Handbook of the Economics of Innovation*, Vol. II, pp. 51-127.

*C. Freeman and F. Louca, "Introduction: Technological Change and Long Waves in Economic Development," in *As Time Goes By: From the Industrial Revolutions to the Information Revolution*, pp. 139-151.

*Carlota Perez, "Technological revolutions and techno-economic paradigms," *Cambridge Journal of Economics* 34 (2010): 185-202.

or

*Carlota Perez, *Technological Revolutions and Financial Capital*, pp. 3-32.

*William R. Thompson, "Long waves, technological innovation, and relative decline," *International Organization* 1990: 44:2 (Spring): 201-33. Optional for MGA students

C. Freeman and C. Perez, "Structural Crises of Adjustment: Business Cycles and Investment Behaviour," in Dosi, ed., *Technical Change and Economic Theory*, pp. 38-66.

Thomas P. Hughes, "The Dynamics of Technological Change," in *Technology and Enterprise in Historical Perspective*, ed. G. Dosi, R. Giannetti and P.A. Toninelli, pp. 97-117.

Chris Freeman, "The Economics of Technological Change," *Cambridge Journal of Economics* 1994: 463-514.

Andrew Tylecote, *The Long Wave in the World Economy*, ch. 1, pp. 7-27.

J.J. Van Duijn, *The Long Wave in Economic Life*

Luc Soete, "Technical Innovation and long waves: an inquiry into the nature and wealth of Christopher Freeman's thinking," in *Technology and the Human Prospect*, ed. Roy Macleod

C. Freeman, J. Clark, and L. Soete, *Unemployment and Technical Innovation*, ch. 2-4

Nathan Rosenberg and Claudio R. Frischtak, "Technological Innovation and Long Waves," *Cambridge Journal of Economics* 8 (1984)

George Modelski and William R. Thompson, *Leading Sectors and World Powers*

Joseph Schumpeter, *Capitalism, Socialism and Democracy*, esp. ch. 7

Christopher Freeman, ed., *Long Waves in the World Economy*

4. Rise and Fall of the Fourth Kondratiev

*C. Freeman and F. Louca, *As Time Goes By*, pp. 272-300

*Andrew Glyn et al., "The Rise and Fall of the Golden Age," in *The Golden Age of Capitalism: Reinterpreting the Postwar Experience*, ed. Stephen A. Marglin and Juliet B. Schor

*Eric Hobsbawm, *The Age of Extremes, 1914-1991*, ch. 9

*Robert D. Atkinson, *The Past and Future of America's Economy: Long Waves of Innovation that Power Cycles of Growth*, ch. 3 (esp. pp. 56-87)

C. Freeman, J. Clark, and L. Soete, *Unemployment and Technical Innovation*, ch. 6, 7, 8

Stephen Marglin and Juliet Schor, eds, *The Golden Age of Capitalism*

M. J. Webber and D. L. Rigby, "Competing Theories of Postwar Growth and Change," in *The Golden Age Illusion: Rethinking Postwar Capitalism*, eds M. Webber and D. Rigby

Annemieke J.M. Roobeek, "The Crisis in Fordism and the Rise of a New Technological Paradigm," *Futures*19:2 (April 1987)

Michael J. Piore and Charles F. Sabel, *The Second Industrial Divide*, ch. 2 (pp. 44-48), 3, 6

P. Armstrong, A. Glyn and J. Harrison, *Capitalism Since 1945*

5. Science and Technology in the Postwar Period

*Richard R. Nelson and Gavin Wright, "The Rise and Fall of American Technological Leadership," *Journal of Economic Literature* 30 (December 1992)

or

*Richard R. Nelson, "US Technological Leadership: Where did it come from and where did it go?" *Research Policy* 19 (1990)

*Fred Block, Swimming Against the Current: The Rise of a Hidden Developmental State in the United States," *Politics and Society* 36:2 (June 2008): 169-206

*National Research Council of the National Academies, *Innovation in Information Technology*, ch. 1

*Robert J. Gordon, "The United States," in Benn Steil et al., *Technological Innovation and Economic Performance*

Kent H. Hughes, *Building the Next American Century: The Past and Future of American Economic Competitiveness*

National Research Council, *Funding a Revolution*

David C. Mowery and Nathan Rosenberg, *Technology and the Pursuit of Economic Growth*

Donald E. Stokes, *Pasteur's Quadrant: Basic Science and Technological Innovation*

Henry Ergas, "Does Technology Policy Matter?" in *Technology and Global Industry*, ed. Bruce R. Guile and Harvey Brooks

David Mowery and Nathan Rosenberg, *Paths of Innovation: Technological Innovation in 20th Century America*

Annemieke J.M. Roobeek, *Beyond the Technology Race: An Analysis of Technology Policy in Seven Industrial Countries*, ch. 3

C. Freeman, J. Clark, and L. Soete, *Unemployment and Technical Innovation*, ch. 6, 7, 8

OECD, *Technical Change and Economic Policy*

David. M. Hart, *Forged Consensus: Science, Technology and Economic Policy in the United States, 1921-1953*

Daniel L. Kleinman, *Politics on the Endless Frontier: Postwar Research Policy in the United States*

Harvey Brooks, "National Science Policy and Technological Innovation," in *The Positive Sum Strategy: Harnessing Technology for Economic Growth*, ed. R. Landau and N. Rosenberg

6. The IT Revolution – A New Techno-Economic Paradigm?

*Manuel Castells, *The Rise of the Network Economy*, ch. 1

*C. Freeman and F. Louca, *As Time Goes By*, pp. 301-335

*Carlota Perez, *Technological Revolutions and Financial Capital*, pp. 36-59.

*Alexand J. Field, "The Information Technology Boom," ch. 5 of *A Great Leap Forward: 1930s Depression and U.S. Economic Growth.*

Paul A. David, "Computer and Dynamo: The Modern Productivity Paradox in a Not-Too-Distant Mirror," in OECD, *Technology and Productivity: The Challenge for Economic Policy*

Bo Carlsson, "The Digital Economy: what is new and what is not?" *Structural Change and Economic Dynamics* 15 (2004): 245-64.

C. Freeman and L. Soete, *Work for all or Mass Unemployment: Computerized Technical Change in the 21st Century*

George Gilder, *Microcosm*

George Gilder, *Telecosm*

Daniel E. Sichel, *The Computer Revolution: An Economic Perspective*

Tom Forester, *High-Tech Society: The Story of the Information Technology Revolution*

Charles R. Morris, *The Coming Global Boom*

Peter Schwartz and Peter Leyden, *The Long Boom: A Vision for the Coming Age of Prosperity*

7. The 'New' E-conomy – Economic Impact of the IT Revolution

*Manuel Castells, *The Internet Galaxy*, ch. 3

*Roger Alcaly, *The New Economy*, ch. 1, 2 (pp. 52-60)

*Gregory Tassey, "Strategic Shifts in the IT Economy, " ch. 7 of *The Technology Imperative*

*David Mowery and Timothy Simcoe, "The Internet," in Benn Steil, et al., *Technological Innovation and Economic Performance*

Peter F. Cowhey and Jonathan D. Aronson, *Transforming Global Information and Communication Markets.*

Erik Brynjolfsson and Adam Saunders, *Wired for Innovation: How Information Technology is Reshaping the Economy?*

Manuel Castells, *Communication Power*

Martin Fransman, *Telecoms in the Internet Age: From Boom to Bust to ...*

John Naughton, *A Brief History of the Future: The origins of the Internet*

Dan Schiller, *Digital Capitalism: Networking the Global Market System*

National Research Council, *The Internet's Coming of Age*

OECD, *The New Economy: Beyond the Hype*

OECD, *A New Economy: The Changing Role of Innovation and Information Technology in Growth*

8. The IT Paradigm and the Financing of Innovation

*Carlota Perez, "Finance and technical change: a long-term view," in Horst Hanusch and Andreas Pyka, *Elgar Companion to Neo-Schumpterian Economics*

*William Janeway, *Doing Capitalism in the Innovation Economy*, ch. 7, 8

*Andrew Tylecote, "The Role of Finance and Corporate Governance in National Systems of Innovation," *Organization Studies* 28:10 (Oct. 2007): 1461-1481.

*Josh Lerner, *The Architecture of Innovation*, ch. 4,5

*William Lazonick, "The New Economy Business Model and the Crisis of U.S. Capitalism," *Capitalism and Society* 4:2 (2009)

Roger Alcaly, *The New Economy*, ch. 5-7

Andrew Tylecote and Francesca Visintin, *Corporate Governance, Finance and the Technological Advantage of Nations*

Paul Gompers and Josh Lerner, 2001, *The Money of Invention: How Venture Capital Creates New Wealth.*

Amar Bhide, *The Venturesome Economy*

Ferguson, Charles H. *High St@kes, No Prisoners*

Kenney, Martin and Richard Florida, 2000. "Venture Capital in Silicon Valley: Fueling New Firm Formation," in Martin Kenney, ed., *Understanding Silicon Valley*, pp. 98-123.

von Burg, Urs and Martin Kenney, 1999. "Venture capital and the birth of the local area networking industry," *Research Policy* 29: 9, pp. 1135-1155.

Kenney, Martin, 2000. "Note on Venture Capital," prepared for *International Encyclopedia of the Social and Behavioural Sciences*, ed. N.J. Smelser and P.B Baltes.

9. Technology and Globalization

*Manuel Castells, *The Rise of the Network Society*, ch. 2 (pp. 92-147)

*Gregory Tassey, "The Globalization of Technology," ch. 1 of *The Technology Imperative*

*D. Archibugi and J. Michie, "The globalisation of technology: a new taxonomy," in Archibugi and Michie, eds, *Technology, Globalisation and Economic Performance*

*National Research Council, *Rising to the Challenge: U.S. Innovation Policy for the Global Economy*, ch. 1, pp. 23-41.

John Cantwell and Grazia Santangelo, "The new geography of corporate research in Information and Communications Technology (ICT)," *Journal of Evolutionary Economics* 12 (2002): 163-97.

Michael Borrus and John Zysman, "Globalization with Borders: The Rise of Wintelism as the Future of Global Competition," *Industry and Innovation*: (December 1997)

Linda Garcia, "The Globalization of Telecommunications and Information," in William J. Drake, ed., *The New Information Infrastructure: Strategies for US Policy*

OECD, "Technology and Globalisation," ch. 10 in *Technology and the Economy: The Key Relationships*

J. Niosi, ed., "The Internationalization of R&D," special issue of *Research Policy* (1999)

F. Myer-Krahmer, ed., *Globalisation of R&D and Technology Markets*

OECD, *Internationalisation of Industrial R&D: Patterns and Trends*

Council on Competitiveness, *Going Global: The New Shape of American Innovation*

S. Ostry and R.R. Nelson, *Techno-Nationalism and Techno-Globalism*

P. Doremus et al., *The Myth of the Global Corporation*

T.H. Lee and P.P. Reid, eds, *National Interests in an Age of Global Technology*

10. The IT Paradigm and Global Production Networks

*Manuel Castells, *The Rise of the Network Society*, ch. 3

*Timothy J. Sturgeon, "How Do We Define Value Chains and Production Networks," MIT IPC Globalization Working Paper 00-010

*Eric Thun, "The Globalization of Production," in John Ravenhill, ed., *Global Political Economy*, 2nd ed.

*Jason Dedrick, Kenneth Kramer and Greg Linden, "Who Profits from Innovation in Global Value Chains? A Study of the iPod and Notebook PCs," Industry Studies Association Working Paper WP-2008-15

or

*Greg Linden, Jason Dedrick and Kenneth L. Kraemer, "Innovation and Job Creation in a Global Economy: The Case of Apple's iPod," *Journal of International Commerce & Economics*

Dan Breznitz and Michael Murphree, "China's Run of the Red Queen – Government, Innovation, Globalization and Economic Growth," PDF

Martin Kenney and Richard Florida, eds, *Locating Global Advantage: Industry Dynamics in the International Economy*

Peter Dicken, *Global Shift: Mapping the Changing Contours of the World Economy*, 6th ed., ch. 3

Jeffrey T. Macher, David C. Mowery and Timothy S. Simcoe, "e-Business and the Disintegration of the Semiconductor Industry Value Chain," *Industry and Innovation* 9:3 (Dec. 2002): 155-81.

11. Innovation Policy for the IT Paradigm

*Gregory Tassey, "Globalization of technology-based growth: the policy imperative," *Journal of Technology Transfer* 33 (2008):560–578

*John Zysman, "Creating Value in a Digital Era: How Do Wealthy Nations Stay Wealthy?" in John Zysman and Abraham Newman, eds, *How Revolutionary was the Digital Revolution?*

*National Research Council of the National Academies, *Innovation Policies for the 21st Century*, "Introduction," pp. 3-37

*OECD, "Key Findings" of the *OECD Innovation Strategy* online.

Claire Nauwelaers, *Policy Mixes for R&D in Europe* online.

National Research Council, *Rising to the Challenge: U.S. Innovation Policy for the Global Economy*

National Research Council, *Assessing the Impacts of Changes in the Information Technology R&D System*

D. Archibugi, J. Howells and J. Michie, eds, *Innovation Policy in a Global Economy*

Martin Kenney and James Curry, "E-Commerce: Implications for Firm Strategy and Industry Configuration," *Industry and Innovation* (Dec. 1999)

S.S. Cohen, J.B. DeLong, S. Weber and J. Zysman, "Tools: The Drivers of E-Commerce," in *Tracking a Transformation: E-Commerce and the Terms of Competition in Industries*

Paul Cusumano and David Yoffie, *Competing on Internet Time*

William W. Keller and Richard J. Samuels, eds, *Crisis and Innovation in Asian Technology*

Marie Anchordoguy, *Reprogramming Japan: The High Tech Crisis under Communitarian Capitalism*

Dan Breznitz, *Innovation and the State: Political Choices and Strategies for Growth in Israel, Taiwan and Ireland*

12. The IT Paradigm and the Future of Economic Growth

*W. Brian Arthur, "The Second Economy," *McKinsey Quarterly* (October 2011).

*Robert Gordon, "Is U.S. Economic Growth Over? Faltering Innovation Confronts The Six Headwinds," CEPR Policy Insight No. 63, September. 2012. Online

*Kevin Kelly, "The Post-Productive Economy," http://www.kk.org/thetechnium/archives/2013/01/the_post-produc.php.

*Carlota Perez, "The double buble at the turn of the century: technological roots and structural implications," *Cambridge Journal of Economics* 33 (2009): 779-805

*Robert Boyer, "The long-term historical outlook after the Internet bubble," ch. 7 of *The Future of Economic Growth: As New Becomes Old*

Erik Brynjolfsson and Andrew McAfee, *Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*

Tyler Cowen, *The Great Stagnation: How America Ate All the Low-Hanging Fruit of Modern History, Got Sick, and Will(Eventually) Feel Better*

Kevin Kelly, *What Technology Wants*

William Lazonick, *Sustainable Prosperity in the New Economy?*

Michael J. Mandel, *The Internet Depression: The Boom, the Bust and Beyond*