The Sam Nunn School of International Affairs

Georgia Institute of Technology

INTA 3044/8803 – Global Politics of Technology

FALL 2017

Tuesday/Thursdays, 1:30pm – 2:45pm
Instructional Center Room 115

Instructor: Dr. Diane Alleva Cáceres

Office Hours: By Appointment. Room 143, Habersham Building.

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OVERVIEW

In this course, we will examine the economic and political dynamics that influence how regulations governing technology are created and adopted around the world. We also explore why some countries are better than others at innovating.

Goals

By the end of this course, students will be able to:

- Identify, compare and evaluate different sets of institutions (finance, research & development, skills, other) governing different types of technologies across countries;
- Apply theoretical frameworks towards understanding innovation and its impact on economic change;
- Trace a technology over time alongside regulations/institutions designed to govern it;
- Prepare a policy or corporate strategy memo.

This course will investigate the economic and political dynamics of technological innovation and the role that institutions play in its diffusion globally. We ask: How do we define institutions, particularly science and technology ones? What do we mean by technology? Why do some countries adopt similar regulations and standards governing technologies while others do not?

What are the different paths that technological innovation and diffusion take and how do they impact productivity and competitiveness? Who governs these processes? Ultimately these questions help us understand the role of the state, markets and society in shaping technological and economic change. While the subject is vast, the scope of the course helps keep it manageable. It draws from the scholarly and popular literature as well as industry examples such as digital technology, agribusiness, energy, life sciences and advanced manufacturing. The course also compares US technology innovation strategies with those of Europe, China and developing countries, among others.

The course is open to advanced undergraduates and graduate students. Prior work in political science or economics is strongly recommended**.**

I have tried to keep your weekly readings to a manageable level, though as you can imagine it is not easy given the breadth and depth of the subject. Much has been written over the last couple of decades. The course delves more deeply into economic, political, and technological elements. However, you are given considerable flexibility to choose research topics of particular interest to you.

Please keep apprised of current issues regarding the economic and political dynamics of technological innovation by reading a good daily or weekly publication such as The Wall Street Journal, The Financial Times, The New York Times, and/or The Economist. I will also be posting current event articles on T-Square from time to time. These will help link some of the more conceptual themes in the course with real world events.

COURSE REQUIREMENTS

Papers, Exams, Projects and Grades:

Research Paper: *40%.* The course requires a 15-20 page, double-spaced research paper. The study should examine a research question of your choosing related to any one of the syllabus' four modules or their subtopics.

Policy/Strategy Memo: *25%.* Write a 3-5 page, double-spaced policy or corporate strategy memo based on a major global technology issue. Examples may be climate change, nuclear energy, digital security, health, among many others. Students may choose their format (instructor will provide samples). The goal is to gain experience in clearly writing a memo that persuades policy/strategy-makers to choose what you argue to be the most efficient and effective policy/strategy. Details to be discussed at the beginning of the course.

Class Participation: *35%.* Class participation is critical to the success of this course. I expect each student to attend all classes and read all assignments prior to the start of each class. In addition, your active engagement in discussions, group projects, and two presentations are required: 1. A power-point presentation/critical analysis of two readings for that class, and 2. A five-minute report on the latest technology/regulatory news. The report should define the technology/regulation, address why you think it is important and anticipate how it might impact society. One major in-class group project requires students to choose a technology (sample list provided), trace and compare its evolution in two countries alongside regulatory regimes and other institutions from creation to adoption or displacement. Your group will then present your finding to the class. Groups will be formed during the class prior to the first day of the project. These elements comprise your participation grade. All views are welcome as we all learn from each other's insights.

Student Honor Code/Academic Honesty: Adherence to the Student Honor Code is expected. The Academic Honor Code is explained in detail in the GIT General Catalogue or at http://www.deanofstudents.gatech.edu/Honor/. Any instance of suspected academic dishonesty (e.g., plagiarism; cheating on an examination) will be referred to the Office of the Dean of Students for disciplinary action.

Electronic Media: Please turn off your cell phone before class. Laptops are permitted ONLY for research and reference during class.

T-Square: T-Square will be used as a general bulletin board for the class and site for materials and added readings. It is your responsibility to access this important information source often.

Special Note: The instructor reserves the right to change session topics, exam dates, assignments throughout the semester. However, students will be given adequate notice of changes.

COURSE READINGS

Readings designated with a "◆" symbol are downloadable from T-Square

PART I:	**Defining and Understanding Institutions and Technology for Economic Growth**

Week 1

August 22 **What are institutions (and those particularly related to S&T?) What do we mean by "Technology"?**

◆North, D.C. (1991). Institutions. The Journal of Economic Perspectives Vol. 5, No. 1 (Winter, 1991), pp. 97-112

◆Hall, P., & Soskice, D. (2001). "Introduction" in Varieties of Capitalism: The Institutional Foundations of Comparative Advantage. Oxford: Oxford University Press.

Taylor, T. (2016). The politics of innovation: why some countries are better than others at science and technology. Oxford University Press. (Introduction; Appendices - "Definitions, Measurements and Data").

Recommended:

OECD (2016), OECD Science, Technology and Innovation Outlook 2016, OECD Publishing, Paris. http://dx.doi.org/10.1787/sti_in_outlook-2016-en (Summary)

https://www.oecd.org/sti/ind/48350231.pdf (technology intensity definition)

Dimaggio, Paul & Powell, Walter. 1995. "Introduction", In Powell and Dimaggio (eds.) The New Institutionalism in Organizational Analysis. Chicago: University of Chicago Press.

◆Hall, Peter, & Taylor Rosemary. "Political Science and the Three New Institutionlisms", Political Studies. Vol. 44 Pp. 936-057.

August 24 **Historical context: Technology Cases**

◆Fallows, James (2013), The 50 Greatest Breakthroughs Since the Wheel, The Atlantic, (Nov. 2013).

◆F.M. Scherer (1965), Invention and Innovation in the Watt-Boulton Steam-Engine Venture,

Technology and Culture, Vol. 6, No. 2 (Spring, 1965), pp. 165-187.

◆David, Paul, 1985. Clio and the Economics of QWERTY, American Economic Review, American Economic Association, vol. 75(2), pages 332-37, May.

Week 2

August 29 CLASS LOCATION CHANGE: Instructional Center 113

Dr. Alasdair Young

Technological change and employment

Technological change can have all sorts of economic effects with political implications. It is necessary for productivity growth, which is key to raising living standards. It can, however, have disruptive effects. It may increase demand for some resources (particular types of land or labor) while reducing that of others (e.g., other types of labor). A key contemporary issue is the extent to which middle-class wage stagnation has been driven by trade or technological change.

Reading

◆Beckert, S. (2015), *Empire of Cotton: A Global History*, Vintage, 63-73 and 102-110 (**t**).

OECD (2011), "An Overview of Growing Income Inequalities in OECD Countries: Main Findings," Organization for Economic Policy and Development. Available at: https://www.oecd.org/els/soc/49499779.pdf (**l**).

◆Sandbu, M. (2016), "Free Lunch: Manufacturing Didn't Leave; It Left Workers Behind," *Financial Times*, 16 March (**t**).

◆*Economist* (2017), "Gary Becker's Concept of Human Capital," 3 August.

August 31 The Politics of Innovation: Some Theoretical Frameworks

Taylor, T. (2016). The politics of innovation: why some countries are better than others at science and technology. Oxford University Press. (Chapters 1 and 4)

◆Breznitz, D. 2007. *Innovation and the State: Political Choice and Strategies for Growth in Israel, Taiwan, and Ireland.* New Haven: Yale University Press. Chapter 1 and Conclusion.

Recommended:

◆Rhodes, R. A. (2006). Policy network analysis. The Oxford handbook of public policy, 425-447. Print Publication Date: Jun 2008

Week 3

September 5 **Cases: China, US, Sweden - Innovation Strategies**

◆Serger, S. S., & Breidne, M. (2007). China's fifteen-year plan for science and technology: an assessment. Asia Policy, 4(1), 135-164.
◆Obama, B. (Ed.). (2011). Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs. Executive Summary and Introduction.
◆Swedish Ministry of Enterprise, Energy and Communications. The Swedish Innovation Strategy. Executive Summary and Introduction.

OECD (2016), Measuring Science, Technology and Innovation. OECD Directorate for Science, Technology and Innovation. OECD Publications. Paris 2016. http://www.oecd.org/science/sci-tech/ (use to compare STI status among countries)

Recommended:

Prewitt, Kenneth, Thomas A. Schwandt, and Miron L. Straf, Editors (2012). Using Science as Evidence in Public Policy. Committee on the Use of Social Science Knowledge in Public Policy. Division of Behavioral and Social Sciences and Education. National Research Council of the National Academies. National Academies Press. Washington, D.C. 2012.

September 7 **Guest Speaker**

PART 2 Explaining the Process of Technological Innovation, Diffusion and Economic Change

Week 4

September 12 **Economic Perspectives**

◆J.A. Schumpeter (1911) The Theory of Economic Development, Ch. 2,4,6
◆Gene Grossman and Elhanan Helpman. 1994. “Endogenous Innovation in the Theory of Growth”.

◆Leydesdorff, L. (2000). The triple helix: an evolutionary model of innovations. Research Policy, 29(2), 243-255.
◆Metcalfe, J. S. (2006). Innovation, competition, and enterprise: foundations for economic evolution in learning economies. Innovation, science, and institutional change: a research handbook, 105-121.

Recommended:

◆Romer, M. Paul. 1994. "The Origins of Endogenous Growth," JEP. Vol. 8. (1):3-22.
◆Solow, Robert. 1994. "Perspective on Growth Theory," JEP. Vol. 8 (1):45-54.
◆Nelson, R. and S. Winter (1982), An Evolutionary Theory of Economic Change, Cambridge (MA): Harvard University Press, Parts I and II (pp. 1-136).
◆OECD, O. (1997). Proposed guidelines for collecting and interpreting technological innovation data: Oslo Manual. OCDE Publicantions Service, París.

September 14 Innovation Systems: Institutions, Networks and Organizations

◆Binz, C., & Truffer, B. (2017). Global Innovation Systems—A conceptual framework for innovation dynamics in transnational contexts. Research Policy.
◆Lundvall, B. Å. (2007). National innovation systems—analytical concept and development tool. Industry and innovation, 14(1), 95-119.
◆Cooke, P. (2001). Regional innovation systems, clusters, and the knowledge economy. Industrial and corporate change, 10(4), 945-974.
◆Malerba, F. (2002), 'Sectoral systems of innovation and production,' Research Policy, 31(2), 247–264.

Recommended:

Breschi, S. (2005). Clusters, networks, and innovation: Research results and new directions,[w:] S. Breschi, F. Malerba. in Clusters, Networks & Innovation.
◆Cowan, R. (2005). Network models of innovation and knowledge diffusion. In Clusters, networks and innovation, 29-53.
◆Carlsson, B. (2006). Internationalization of innovation systems: A survey of the literature. Research Policy, 35(1), 56-67.
◆Nelson, R. R., & Nelson, K. (2002). Technology, institutions, and innovation systems. Research policy, 31(2), 265-272.

◆Xiwei, Z., & Xiangdong, Y. (2007). Science and technology policy reform and its impact on China's national innovation system. Technology in Society, 29(3), 317-325.

Niosi, J. (2011). Building innovation systems: an introduction to the special section. Industrial and corporate change, 20(6), 1637-1643. https://academic-oup-com.prx.library.gatech.edu/icc/article-lookup/doi/10.1093/icc/dtr064

Week 5

September 19 Diffusing Technologies and Institutions

◆Stoneman, P., & Diederen, P. (1994). Technology diffusion and public policy. The Economic Journal, 104(425), 918-930.
◆Jacobsson, S., & Johnson, A. (2000). The diffusion of renewable energy technology: an analytical framework and key issues for research. Energy policy, 28(9), 625-640.
◆Casper, S. (2006). 21 Exporting the Silicon Valley to Europe: How Useful is Comparative Institutional Theory? Innovation, Science, and Institutional Change: A Research Handbook: A Research Handbook, 483.
◆Wolfe, D. A., & Gertler, M. S. (2002). Innovation and social learning: an introduction. In Innovation and Social Learning (pp. 1-24). Palgrave Macmillan UK.

Recommended:

◆Furman, J. L., Porter, M. E., & Stern, S. (2002). The determinants of national innovative capacity. Research policy, 31(6), 899-933.

September 21 IN-CLASS GROUP PROJECT - Tracing and Comparing Technology Diffusion, Adoption or Displacement among Countries

We will be forming subgroups and each group will select a technology to trace based on the resources listed below OR a technology of your own choosing.

See James Fallow's article - "The 50 Greatest Breakthroughs Since the Wheel" in *The Atlantic Magazine* on T-Square for an historical ranking of major technological breakthroughs.

More recent technological advances:

Privacy & Security: Cyber Security technologies
Health: Stem cells or robotics
Finance: Blockchain
Advanced manufacturing/other: Artificial Intelligence
Energy & Environment: Clean technologies; alternative energy (wind, solar, wave etc.)
Food/Food processing: Genetically modified organisms (GMOs); robots; delivery apps etc.

Week 6

September 26 **IN-CLASS GROUP PROJECT**

September 28 **IN-CLASS GROUP PROJECT PRESENTATIONS**

Week 7

October 10 **NO CLASS – FALL BREAK**

PART 3 The Role of Regulatory and Technology Standards

What are regulatory and technology standards? How are they created, diffused globally and what are their effects?

October 12 **Understanding Standards**

Murphree, Michael. Standards Presentation.
https://prezi.com/hkqn5gsertc7/standards/?utm_campaign=share&utm_medium=copy

◆Stigler, G.J. "The Theory of Economic Regulation," Bell Journal of Economic and Management Science 2(1) 1971 (Now the Rand Journal of Economics).

Week 8

October 17 **Cases**

◆Kim, D. H., Lee, H., & Kwak, J. (2017). Standards as a driving force that influences emerging technological trajectories in the converging world of the Internet and things: An investigation of the M2M/IoT patent network. Research Policy.

Clover, Charles (2015). China: Monopoly Position. *Financial Times.* January 25, 2015. https://www.ft.com/content/22704a96-9ff2-11e4-9a74-00144feab7de#myft:saved-articles:page

Butler, Nick (2017). It is time for Europe to face its nuclear challenge. *Financial Times.* MAY 1, 2017. https://www.ft.com/content/2b79ac79-aef0-3252-b712-7c5cddeef171

October 19 Standards as Market Creators?

◆Vogel, S. K. (1996). Freer Markets More Rules: Regulatory Reform in Advanced Industrial Countries. Ithaca: Cornell University Press. Chapter 1-3.

Week 9

October 24 Cases

◆Robert Burgelman, David Hoyt, Margaret LeBrecque, Amanda Silverman. *Cellular Telecommunications: An Industry Driven by Intellectual Property and Technical Standards* 2009|Case No.SM177.

Wasik, Zosia. (2017). Polish fintech companies face Brexit dilemma. Special Report Central and Eastern Europe: Technology and Innovation*. Financial Times.* June 5, 2017. https://www.ft.com/content/dfd5364a-3998-11e7-821a-6027b8a20f23#myft:saved-articles:page

October 26 Creating and Diffusing Standards Globally

◆Bekkers, R., Iversen, E., & Blind, K. (2011). *Emerging ways to address the reemerging conflict between patenting and technological standardization*. Industrial and Corporate Change, 21(4), 901-931.
◆Funk, J. L., & Methe, D. T. (2001). Market-and committee-based mechanisms in the creation and diffusion of global industry standards: the case of mobile communication. Research Policy, 30(4), 589-610.

◆Guler, I., Guillén, M. F., & Macpherson, J. M. (2002). Global competition, institutions, and the diffusion of organizational practices: The international spread of ISO 9000 quality certificates. Administrative science quarterly, 47(2), 207-232.
◆"The digital divide over consumer data widens: Regulatory divergence in America, Europe and Asia spells trouble." *Financial Times.* July 26, 2017.

POLICY/STRATEGY MEMO DUE OCT. 26th at beginning of class

Week 10

October 31 **Guest Speaker**

PART 4: Globalization, Technology and Governance

November 2 **Who Governs? Technological Innovation and Industrial Policy**

◆Ansell, C. 2000. The Networked Polity: Regional Development in Western Europe. *Governance*, 13(3): 303-333.
Breznitz, D. 2007. *Innovation and the State: Political Choice and Strategies for Growth in Israel, Taiwan, and Ireland.* New Haven: Yale University Press. A country case chapter of your choice.
◆Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. Review of international political economy, 12(1), 78-104.

Recommended:

Narula, R. (2014). Globalization and technology: Interdependence, innovation systems and industrial policy. John Wiley & Sons. Introduction.

Week 11

November 7 **Levels of Governance**

◆Hooghe, Liesbet and Gary Marks. "Unraveling the Central State, but How? Types of Multi-Level Governance." The American Political Science Review, Vol. 97, No. 2 (May, 2003), pp. 233-243.
◆Schreurs, M. A. (2008). From the bottom up: local and subnational climate change politics. *The Journal of Environment & Development*, *17*(4), 343-355.

OECD. Cross-border governance arrangements for STI, http://dx.doi.org/10.1787/sti_in_outlook-2016-18-en . Read the document on-line.
◆Kuhlmann, S., & Shapira, P. (2006). How is innovation influenced by science and technology policy governance? Transatlantic comparisons. In Innovation, science, and institutional change. A research handbook. Oxford University Press, Oxford, 232-255.

November 9 **Potential Site Visit - Local Firm Active in Innovation Globally. Visit contingent upon firm's schedule.**

RESEARCH PAPER DUE NOV. 9th at beginning of class

Week 12

November 14 **FDI, Trade and Spillovers**

◆Stiglitz, J. E., & Greenwald, B. C. (2014). Creating a learning society: A new approach to growth, development, and social progress. Columbia University Press. Chapter 12.
◆OECD, "Foreign Direct Investment for Development. Maximizing Benefits, Minimising Costs" 2002.
◆INDIA & GLOBALISATION - FINANCIAL TIMES SPECIAL REPORT. Thursday January 27 2011 and Thursday January 26 2012.

November 16 **Cases**

◆The End of an Era in International Financial Regulation? A Postcrisis Research Agenda. Eric Helleiner and Stefano Pagliari (Review of Books). International Organization 65, Winter 2011, pp+ 169–200.
◆Buckberg, Elaine, "Whose Rules of the Game? Defining the Globalization Divide." International Finance. 4:1, 2001: pp. 145-159.
◆ Mueller, M. L. (2010). Networks and States: The Global Politics of Internet Governance.

Week 13

November 21 **Guest Speaker** - Guy Tessler, President, CONNEXX America-Israel Business Connector

November 23 **NO CLASS – THANKSGIVING BREAK**

Week 14

November 28 **Special Issue: Privacy & Security**

◆Kshetri, N. (2013). Privacy and security issues in cloud computing: The role of institutions and institutional evolution. Telecommunications Policy, 37(4), 372-386.
◆Weber, R. H. (2010). Internet of Things–New security and privacy challenges. Computer law & security review, 26(1), 23-30.
◆Reidenberg, J. R. (1996). Governing networks and rule-making in cyberspace. Emory LJ, 45, 911.

November 30 **Special Issue: Ethics in Science & Technology**

◆The Ethics of Invention Technology and the Human Future. Selin, C. Science, 2016 Aug 19, Vol.353(6301), pp.756-756 (Book Review – Sheila Jasanoff)
◆M. Ladikas et al. (eds.) (2015), Science and Technology Governance and Ethics: A Global Perspective from Europe, India and China: Introduction and Chapter 1.

Waters, Richard. (2017). Frankenstein fears hang over AI: Artificially intelligent systems must not replicate human bias. Financial Times. February 16, 2017. https://www.ft.com/content/8e228692-f251-11e6-8758-6876151821a6#myft:saved-articles:page

Week 15

December 5 **LAST DAY OF CLASS – POT LUCK!**

Course Review