Fall 2022

KAIST Graduate School of Science & Technology Policy

**STP510A: National Innovation System**

Tuesday 4PM

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**Course Outline**

Why NIS? Once a fad of policy discourses (especially in the 1990s and early 2000s), is it still relevant? Each of the term, National Innovation System, speaks to voluminous research on what innovation is, why it matters, and how nations/regions/sectors/firms/individuals innovate. While the term itself has been appropriated as a tool (or criticized often as a rhetorical slogan) to promote proactive policy agenda at various levels, our understanding of what constitutes innovation, how it takes place, and what impacts/consequences it holds for socioeconomic progress still lags behind the reality, despite a half-century of scholary research with distinctively interdisciplinary work of the last three decades.

This course examines conceptual issues and theoretical challenges in understanding the sources, patterns, trajectories, and impacts of innovation together with actors and contexts of innovation.

**Course Evaluation**

Reading & Discussion (30%): Students will take turns to lead class discussion for each class, although all students are expected to finish the readings. For this class discussion, students will prepare a short summary of the assigned readings and a couple of questions or issues to discuss.

Research Prospectus (40%): Students will submit a tentative research proposal (2,500 words except references/tables/figures) relevant to the course topics by the midterm, which will be submitted again as a final version (4,000 words except references/tables/figures) after refinement in the final week.

Presentation (30%): Students will present their tentative prospectus for feedback right after the midterm week.

**Course Schedule**

**Week 1 (8/30): Introduction**

* Auswald, Philip. 2017. “Conclusion: Identity – A Copernican Moment,” *The Code Economy: A Forty-Thousand-Year-History*. Oxford University Press.
* Fagerberg, Jan, and Bart Verspagen. 2009. Innovation studies – The emerging structure of a new scientific field. *Research Policy* 38: 218-233.

**Week II (9/6): Nature & Sources of Innovation**

* Dosi, G. 1988. The Nature of the Innovative Process. In *Technical Change and Economic Theory* edited by G. Dosi, C. Freeman, G. Silverberg, and L. Soete. Pinter.
* Salter, Ammon, and Olivery Alexy. 2014. The Nature of Innovation. In *The Oxford Handbook of Innovation Management* edited by Mark Dodgson, David M. Gann, and Nelson Philips. Oxford University Press.

**Week III (9/13): National Innovation Systems: History/Concept/Models**

* Lundvall, B-A. 2016. Postcript: Innovation Systems Research: Where It Came From and Where It Might Go. In *The Learning Economy and the Economics of Hope* by Bengt-Åke Lundvall. Anthem Press.
* Edquist, Charles. 2012. Systems of Innovation: Perspectives and Challenges. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson.
* Carlsson, B. 2003. Innovation Systems: A Survey of the Literature from a Schumpeterian Perspective. In *The Companion to Neo-Schumpeterian Economics* edited by A. Pyka. Edward Elgar.
* Freeman, C. 1995. The ‘National Systems of Innovation’ in Historical Perspective. *Cambridge Journal of Economics* 19:5-24.
* Godin, Benoit. 2006. The Linear Model of Innovation: The Historical Construction of an Analytical Framework. *Science, Technology, and Human Values* 31(6): 639-667.
* Lundvall, B-A. 1992. *National Innovation Systems: Towards a Theory of Innovation and Interactive Learning*. Pinter.
* Nelson, Richard R. ed. 1993. *National Innovation Systems: A Comparative Analysis*. Ch 1: Technical Innovation and National Systems. Oxford University Press.
* Sharif, Naubahar. 2006. Emergence and Development of the National Innovation Systems Concept. *Research Policy* 35: 745-766.

**Week IV (9/20): Regional Innovation Systems**

* Cooke, Philip, Mikel Gomez Uranga, and Goio Etxebarria. 1997. Regional innovation systems: Institutional and organizational dimensions. *Research Policy* 26: 475-491.
* Hassinki, Robert. 2009. Locked in decline? On the role of regional lock-ins in old industrial areas. In *Handbook of Evolutionary Economic Geography*, edited by B. Boschma and R. Martin. Edward Elgar.
* Cooke, P. 1998. Introduction: Origins of the Concept. In *Regional Innovation Systems* edited by H. Braczyk, P. Cooke, and M. Heidenreich. University of College London Press.
* Asheim, Rjorn, and Meric G. Gertler. 2012. The Geography of Innovation: Regional Innovation Systems. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson. Oxford University Press.
* Feldman, M. P. 2000. Location and Innovation: The New Economic Geography of Innovation, Spillovers, and Agglomeration. In *The Oxford Handbook of Economic Geography* edited by G. L. Calrk, M. P. Feldman, and M. S. Gerler. Oxford University Press.
* Saxenian, AnnaLee. 1994. *Regional Advantage: Culture and Competition in Silicon Valley*. Harvard University Press.
* Special lecture on regionnal innovation & smart specialization by Dr. Maria Ranga, European Commission-Joint Research Center.

**Week V (9/27): Sectoral Innovation Systems**

* Pavitt, K. 1984. Sectoral Patterns of Technological Change: Towards a Taxonomy and a Theory. *Research Policy* 13:343-73.
* Malerba, Franco, and Pamela Adams. 2014. Sectoral Systems of Innovation. In *The Oxford Handbook of Innovation Management* edited by Mark Dodgson, David M. Gann, and Nelson Philips. Oxford University Press.
* Malerba, F. and L. Orsenigo L. 1997. Technological regimes and sectoral patterns of innovative activities. *Industrial and Corporate Change* 6: 83-117.

**Week VI (10/4): Firm-Level Innovation**

* Laxonick, William. 2012. The Innovative Firm. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson. Oxford University Press.
* Teece, David J. 2010. Technological Innnovation and the Theory of the Firm: The Role of Enterprise-Level Knolwedge, Complemetarities, and (Dynamic) Capabilities. In the *Handbook of the Economics of Innnovation* edited by Bronwyn Hall and Nathan Rosenberg. North Holland.
* O’Sullivan, M. 2000. The Innovative Enterprise and Corporate Governance. *Cambridge Journal of Economics* 24(4): 393-416.

**Week VII (10/11): Universities in Innovation**

* Etzkowitz, H., and L. Leydesdorff, 2000. The Dynamics of Innovation: From National Systems and “Mode 2” to a Triple Helix of University-Industry-Government Relations. Introduction to the special “Triple Helix” issue of *Research Policy* 29, 109-123.
* Foray, Dominique, and Francesco Lissoni. 2010. University Research and Public-Private Interaction. In *Handbook of the Economics of Innnovation* edited by Bronwyn Hall and Nathan Rosenberg. North Holland.
* Mowery, David. 2002. *Ivory Tower and Industrial Innovation: University-Industry Technology Tranfer Before and After the Bayh-Dole Act in the United States*. Stanford University Press.
* Mowery, David, and Bhaven N. Sampat. 2012. Universities in National Innovation Systems. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson. Oxford University Press.

**Week VIII (10/18): Midterm Week**

Tentative research prospectus by October 23rd (Sunday)

**Week IX (10/25): Research Prospectus Draft Presentation and Discussion**

**Week X (11/1): Measuring Innovation**

* Hall, Bronwyn, Jacques Mairesse, and Pierre Mohhen. Measuring the Returns to R&D. In *Handbook of the Economics of Innnovation* edited by Bronwyn Hall and Nathan Rosenberg. Elsevier.
* Nagaoka, Sadao, Kazuyuki Motohashi, and Akira Goto. Patent Statistics As An Innnovation Indiator. In *Handbook of the Economics of Innnovation* edited by Bronwyn Hall and Nathan Rosenberg. North Holland.
* Brouwer, E., and A. Kleinknecht. 1997. Measuring the Unmeasurable: A Country’s Expenditure on Product and Service Innovation. *Research Policy* 25: 1235-42.
* Godin, Benoit. 2005. *Measurement and Statistics on Science and Technology: 1920 to the Present*. Routledge.
* Grilliches, Z. 1990. Patent Statistics as Economic Indicators: A Survey*. Journal of Economic Literature* 28: 1661-707.
* Hansen, J. A. 2001. Technological Innovation Indicators: A Survey of Historical Development and current Practice. In *Innovation Policy in the Knowledge-Based Economy* edited by M. P. Feldmann and A. Link. Kluwer.
* Smith, Keith. 2012. Measuring Innovation. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson. Oxford University Press.
* Trajtenberg, Manuel. 1990. A Penny for Your Quotes: Patent Citations and the Value of Innovation. *RAND Journal of Economics* 21: 172-187.

**Week XI (11/8): Networks of Innovation**

* \*Freeman, C. 1991. Networks of Innovators: A Synthesis of Research Issues. *Research Policy* 20: 499-514.
* \*Powell, Walter, and Stine Grodal. Networks of Innovators. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson. Oxford University Press.
* Ahuja, G. 2000. Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study. *Administrative Science Quarterly* 45:425-55.
* Dyer, J. H., and K. Nobeoka. 2000. Creating and Maintaing a High-Performance Knowledge-Sharing Network: The Toyota Case. *Strategic Management Journal* 21:345-67.
* Hansen, M. T. 1999. The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across Organization Subunits. *Administrative Science Quarterly* 44:82-111.
* Murray, F. 2002. Innovation as Co-evolution of Scientific and Technological Networks: Exploring Tissue Engineering. *Research Policy* 31: 1389-403.

**Week XII (11/15):** **Financing Innovation**

* O’Sullivan, Mary. 2012. Finance and Innovation. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson. Oxford University Press.
* Perez, Carlota. 2002. *Technological Revolutions and Financing Capital: The Dynamics of Bubbles and Golden Ages*. Part II: Technological Revolution and the Changing Behavior of Financial Capital. Edward Elgar.
* Hall, Bronwyn H. 2009. The Financing of Innovation. In *The Handbook of Technology and Innovation Management* edited by Scott Shane. Wiley.
* Hall, B. H. and Lerner, J., 2009. The Financing of R&D and Innovation. In *The Handbook of the Economics of Innovation* edited by B. H. Hall & N. Rosenberg. Elsevier.,
* Howell, S. T. 2017. Financing innovation: Evidence from R&D grants. *American Economic Review* 107: 1136–64.
* Kortum, S., & Lerner, J. 2000. Assessing the impact of venture capital on innovation. *Rand Journal of Economics* 31: 674–692.

**Week XIII (11/22): Innovation and Economic Performance**

* Faberberg, Jan, Martin Srholec, and Bart Verspagen. 2010. Innovation and Economic Development. In *Handbook of the Economics of Innnovation* edited by Bronwyn Hall and Nathan Rosenberg. North Holland.
* Pianta, Mario. 2012. Innovation and Employment. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson. Oxford University Press.
* Aghion, P., and P. Howitt. 1992. A Model of Growth through Creative Destruction. *Econometrica* 60: 323-51.
* Grossman, Gene M., and Elhana Helpman. 1993. Innovation and Growth. Ch 1: Growth and Technology. MIT Press.
* Romer, Paul. 1990. Endogenous Technological Change. *Journal of Political Economy* 98: S71-S102.
* Verspagen, Bart. 2012. Innovation and Economic Growth. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson. Oxford University Press.

**Week XIV (11/29): Politics of Innovation I**

* Mazzucato, Mariana. 2013. *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*. Anthem Press. Ch 3: Risk-Taking State: From ‘De-risking’ to ‘Bring It On!’
* Taylor, Mark Zachary. 2016. *The Politics of Innovation: Why Some Countries Are Better than Others at Science and Technology*. Oxford University Press. Ch 3. Cardwell’s Law in Action: How Do Nations Innovate? Policies and Institutions. Ch 7: Technological Losers and Political Resistance to Innovation.
* Dew, Nicholas, Kathryn Aten, and Geraldo Ferrer. 2017. How many admirals does it take to change a light bulb? Organizational innovation, energy efficiency, and the United States Navy’s battle over LED lighting. *Energy Research & Social Science* 27: 57-67.
* O’Riain, Sean. 2004. *The Politics of High-Tech Growth: Developmental Network States in the Global Economy*. Cambridge University Press.

**Week XV (12/6): Politics of Innovation II**

* Edler, Jakob and Luke Georghiou. 2007. Public procurement and innovation – Resurrecting the demand side. *Research Policy* 36: 949-963.
* Fuchs, Erica. 2010. Rethinking the Role of the State in Technology Development: DARPA and the Case for Embedded Network Governance. *Research Policy* 39: 1133-1157.
* Furman, Jeffrey, Michael Porter, and Scott Stern. 2002. The Determinants of National Innovative Capacity. *Research Policy* 31: 899-933.
* Malik, Tariq H. 2017. Varieties of capitalism, innovation performance and the transformation of science into exported products: A panel analysis. *Technological Forecasting & Social Change* 118: 324-333.

**Week XVI (12/13): Final Week**

Submission of the final research prospectus by December 16th (Friday)