Fall 2022

KAIST Graduate School of Science & Technology Policy

**STP510A: National Innovation System**

Tuesday 4PM

So Young Kim (soyoungkim.syk@gmail.com)

**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**

* 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.
* **Godin, Benoit. 2006. The Linear Model of Innovation: The Historical Construction of an Analytical Framework. *Science, Technology, and Human Values* 31(6): 639-667.**
* **Sharif, Naubahar. 2006. Emergence and Development of the National Innovation Systems Concept. *Research Policy* 35: 745-766.**
* 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.
* Nelson, Richard R. ed. 1993. *National Innovation Systems: A Comparative Analysis*. Ch 1: Technical Innovation and National Systems. Oxford University Press.
* Lundvall, B-A. 1992. *National Innovation Systems: Towards a Theory of Innovation and Interactive Learning*. Pinter.

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

* **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, Maryann P., and Dieter Kogler. 2010. Stylized Facts in the Geography of Innovation. In the *Handbook of the Economics of Innnovation* edited by Bronwyn Hall and Nathan Rosenberg. North Holland.**
* **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.**
* 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.
* 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.
* Cooke, Philip, Mikel Gomez Uranga, and Goio Etxebarria. 1997. Regional innovation systems: Institutional and organizational dimensions. *Research Policy* 26: 475-491.
* Saxenian, AnnaLee. 1994. *Regional Advantage: Culture and Competition in Silicon Valley*. Harvard University Press.

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

* **Lee, Keun, and Franco Malerba. 2017. Catch-up cycles and changes in industrial leadership:Windows of opportunity and responses of firms and countries in the evolution of sectoral systems. Research Policy 46: 338-351.**
* **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.**
* Mowery, David C., and Richard R. Nelson. eds. 1999. *Sources of Industrial Leadership: Studies of Seven Industries*. Cambridge University Press.
* Malerba, F. and L. Orsenigo. 1997. Technological regimes and sectoral patterns of innovative activities. *Industrial and Corporate Change* 6: 83-117.
* Nelson, Richard R. 1994. The Co-evolution of Technology, Industrial Structure, and Supporting Institutions. *Industrial and Corporate Change* 3: 47-63.
* **Pavitt, K. 1984. Sectoral Patterns of Technological Change: Towards a Taxonomy and a Theory. *Research Policy* 13:343-73.**

**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.**
* **Burcharth, Ana L., and John P. Ulhol. 2011. Structural approaches to organizing for radical innovation in established firms. *Entrepreneurship and Innovation* 12(2): 117-125.**
* 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.
* **Laursen, Keld, and Ammon Salter. 2005. Open for Innovation: The Role of Openness in Explaining Innovatoin Performance among U.K. Manufacturing Firms. *Strategic Management Journal* 27: 131-150.**
* Ahuja, G., and R. Katila. 2001. Technological acquisitions and the innovation performance of acquiring firms: a longitudinal study. *Strategic Management Journal* 22: 197-230.
* 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**

* **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.**
* 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.
* **Perkmann, Markus, and Kathryn Walsh. University-industry relationship and open innovation: Towards a research agenda. International Journal of Management Review 9(4): 259-2580.**

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* Etzkowitz, H. 2003. Research groups as ‘quasi-firms’: the invention of the entrepreneurial university. *Research Policy* 32(1): 109-121.
* 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.
* **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.**
* Godin, B., and Y. Gingras. 2000. The Place of Universities in the System of Knowledge Production. *Research Policy* 29: 273-278.
* Etzkowitz, H., and L. Leydesdorff, 2000. *Universities in the Global Economy: A Triple Helix of Academy-Industry-Government Relation*. Croom Helm.
* Mansfield, E. 1991. Academic Research and Industrial Innovatoins. *Research Policy* 20: 1-12.

**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**

* **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.**
* Hall, Bronwyn, Jacques Mairesse, and Pierre Mohhen. 2010. 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. 2010. Patent Statistics As An Innnovation Indiator. In *Handbook of the Economics of Innnovation* edited by Bronwyn Hall and Nathan Rosenberg. North Holland.**
* Godin, Benoit. 2005. *Measurement and Statistics on Science and Technology: 1920 to the Present*. Routledge.
* Jaffe, Adam B., and Manuel Trajtenberg. 2002. *Patents, Citations and Innovations: A Window on the Knowledge Economy*. MIT Press.
* 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.
* Brouwer, E., and A. Kleinknecht. 1997. Measuring the Unmeasurable: A Country’s Expenditure on Product and Service Innovation. *Research Policy* 25: 1235-42.
* Grilliches, Z. 1990. Patent Statistics as Economic Indicators: A Survey*. Journal of Economic Literature* 28: 1661-707.
* 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**

* **Powell, Walter, and Stine Grodal. 2012. Networks of Innovators. In *The Oxford Handbook of Innovation* edited by Jan Fagerberg, David C. Mowery, and Richard R. Nelson. Oxford University Press.**
* **Murray, F. 2002. Innovation as Co-evolution of Scientific and Technological Networks: Exploring Tissue Engineering. *Research Policy* 31: 1389-403.**
* 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.
* Freeman, C. 1991. Networks of Innovators: A Synthesis of Research Issues. *Research Policy* 20: 499-514.
* Special guest lecture by Seolmin Yang (doctoral candidate, KAIST STP)

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

* Howell, S. T. 2017. Financing innovation: Evidence from R&D grants. *American Economic Review* 107: 1136–64.
* **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.**
* 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.
* **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.**
* 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**

* 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.
* **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.**
* **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.**
* Scherer, Frederic M. 1999. *New Perspectives on Economic Growth and Technological Innovation*. Brookings Institution Press.
* Grossman, Gene M., and Elhana Helpman. 1993*. Innovation and Growth*. Ch 1: Growth and Technology. MIT Press.
* Aghion, P., and P. Howitt. 1992. A Model of Growth through Creative Destruction. *Econometrica* 60: 323-51.
* Romer, Paul. 1990. Endogenous Technological Change. *Journal of Political Economy* 98: S71-S102.
* Solomou, Solomos. 1986. Innovatoin Clusters and Kondratieff Long Waves in Economic Growth. *Cambridge Journal of Economics* 10(2): 101-112.
* David, Paul A. 1975. *Technical Choice, Innovation and Economic Growth: Essays on American and British Experience in the Nineteenth Century*. Cambridge University Press.

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

* 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.
* **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.**
* **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!’**
* 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**

* 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.
* **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.**
* Edler, Jakob and Luke Georghiou. 2007. Public procurement and innovation – Resurrecting the demand side. *Research Policy* 36: 949-963.
* **Furman, Jeffrey, Michael Porter, and Scott Stern. 2002. The Determinants of National Innovative Capacity. *Research Policy* 31: 899-933.**

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

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