Evans School of Public Policy and Governance
University of Washington
PB AF 583 – Science, Technology and Public Policy
Fall 2015
Draft Syllabus (12/11/15)

Fall 2015   Greg Traxler
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Office Hours: Thursday 9:30 - 12:00 and by appointment. I am available to meet outside of office hours by appointment most days.

CANVAS

Consult the course website for announcements, class outline updates, access to assigned readings and lecture ppt presentations.

Course Materials

There is no textbook for this course. Required readings with will be posted to the class CANVAS page.

Course description, framework and objectives:

Science and technology are powerful shapers of economies, living standards and societies. It is also a very broad field to cover in one quarter. I use an economic growth framework to discuss selected topics in domestic and international science and technology Policy. The objectives, instruments and consequences of science and technology policies will be discussed. Three of the key themes of the course are the influence of science and technology on productivity, the role of intellectual property, and the division of effort between the public and private sectors in generating science and technology progress.

The course will be taught in a seminar style using a collaborative model of learning. Students have a broad range of backgrounds and expertise, so your input will be used to determine the topics covered in the later part of the quarter.

Specific learning objectives:

1. Understand the relationship between science, technology, innovation and economic growth.
2. Understand how technological progress is measured.
3. Understand the basics of intellectual property rights and its effect on investment incentives and on the distribution of the benefits from technological progress.
4. Build on analytical and communication skills developed in previous courses.

Prerequisites

This is an elective (2nd year) course in the Master of Public Administration program, open to students from other UW graduate programs. To get the most out of this course students should be comfortable with the basic economics and statistics principles that you saw in your undergraduate or Evans core courses (PBAF 516 Microeconomic Policy Analysis and 527-528 Quantitative Analysis I and II). We will use economics as the primary analytical framework for looking at science and technology policies. By the end of the quarter, I hope that you will have an intuitive understanding of the economics of science and technology. Students are expected to be familiar with basic economic concepts such Economic Surplus, the Production Function, Public Goods, and others. We will use these concepts in class, but you are responsible for refreshing or learning the basics on your own. Please see me if you have any questions or would like some guidance.

Student Evaluation

Assignment	Due dates	Weight in final grade
Class participation	All sessions	20%
Annotated Bibliography		
Part 1 – Readings from classes 1-3:	October 15	10%
Part 2 – Readings from classes 4-5:	October 29	10%
Part 2 – Readings from classes 6-8:	December 3	10%
You do not need to annotate the readings assigned by your working group.		
Group Projects		25%
Key readings made available to class:	November 6	
Written summary:	December 3	
Presentations:	November 19 & December 3	
Term Paper	December 10 (last class day)	25%

Late submission policy. Work that is submitted after the due date will be docked 0.1 grade points per day, (for example, a 4.0 would fall to a 3.8 by the 2nd day).

Class participation. Reading and group discussions are key elements of a good graduate course, so it is vital that you each come to each class meeting ready to contribute. The goal is to have respectful, informed discussion in which we all learn from each other. You should notify me by email explaining justified class absences. Each unexcused absence will reduce your participation grade by 10%.

Annotated Bibliography. The reading assignments are central to this class. They form the basis for class discussion and you will be graded on your annotated bibliography. Most class meetings will have 2-4 required readings (approximately 50-100 pages). For this class your annotation for each reading should do two things, each of about one paragraph. You should summarize the reading's content, and then you should provide an interpretative comment containing your thoughts, analysis or opinion. Do you agree with the author? Can you relate the article to other readings from class? How does the author's viewpoint align with your understanding of the topic? The entries should between 100-200 words. Guides for annotated bibliographies are available from Cornell http://guides.library.cornell.edu/c.php?g=32342&p=203789, Purdue University https://owl.english.purdue.edu/owl/resource/614/03/ and South Dakota State https://www.youtube.com/watch?v=3rsNakv8PNY provide guidance. An example annotated bibliography is contained in appendix C of:

Celeste, R. F., A. Griswold, M. L. Straf, National Research Council (US) Committee on Assessing the Value of Research in Advancing, National Goals, National Research Council (US) Division of Behavioral and Social Sciences, and Education, Research Council National, Richard F. Celeste, et al. 2014. *Furthering America's Research Enterprise.* Washington, D.C.: The National Academies Press. http://www.nap.edu/catalog/18804/furthering-americas-research-enterprise.

The grading rubric is included at the end of the syllabus.

Group Project. *November 19* will be devoted to topics identified by students. For this assignment, students will work in groups of four or five to research a science and technology topic of their choosing. Each group will have 45 minutes to present their main findings to the class and to lead a class discussion – the presentation should be no more than 25 minutes. Groups should provide one or two key readings (no more than 30 pages) in their topic area by **November 6.** Each group will also hand in a written summary of their project topic. I am available to meet with groups to discuss their topic at any time. The evaluation rubric is contained at the end of this syllabus. The November 19 class meeting will run to 6:00 pm. Those who need to leave before then, please do so discretely.

Spring 2015 Working Group Topics:
- State and Local Transportation Policy: Managing Innovation
- Energy Efficiency
- Gender and Racial Gaps in STEM Higher Education & Careers
- Renewable Energy Policy in the U.S. and the Future Outlook For Wind-Generated Power

Term Paper. An individual term paper will also be required. I will be the audience for the term paper. Choose a topic that interests you and write your paper in a way that I will learn something. Pay attention to formatting and the reference list. For the reference list you can use one of the citation management programs available through the UW

library website, or follow a standard guide such as this one from the American Journal of Agricultural Economics. http://www.oxfordjournals.org/our_journals/ajae/for_authors/guide.pdf

The evaluation rubric is contained at the end of this syllabus.

How do you decide on a good topic for the Group Project or individual Term Paper projects? I allow a great deal of flexibility for students to choose a topic that appeals to them. The audience for the Group project is the class (professor and students). Choose a topic that interests your group and put together a presentation and discussion so that we learn something interesting and worthwhile about your topic. The presentation is very short, so you will just be able to introduce the topic, present some context, introduce some interesting questions and summarize. The audience will have read your suggested reading, so will have a modest background on the topic. The goal of your minute session will be to stimulate discussion among your student peers.

The audience for the term paper is someone who is interested in science and technology policy issues, but who is not an expert on your specific topic – someone like me! Choose a topic that interests you and write your paper in a way that I will learn something (there is a lot that I don't know about the broad S&T policy field). Identify a manageable science and technology policy question and assemble the background evidence to give me a feel for the importance of the problem. Why do you think this is an interesting or important topic? What does the literature say about the issue? What is the current state of understanding of the issue? What are the potential policy issues and proposed solutions? What do you think are the remaining areas of greatest uncertainty about the problem? Be sure to insert your views into the closing of the paper. Without this, it is hard for me to tell what you have learned from writing the paper.

Course Outline
Dates are tentative and will change – Consult CANVAS for updates or contact me with questions

PART I:

October 1: Introduction, opening questions and framing of the class

Background Reading and Sources:

NSF (National Science Foundation). *Science and Engineering Indicators 2014*. Arlington: National Science Foundation, 2014. http://www.nsf.gov/statistics/seind14/index.cfm/overview

Battelle Technology Partnership Practice. 2010. *Battelle/BIO state bioscience initiatives 2010.* Columbus, OH: Battelle Memorial Institute. http://www.washingtonlifescience.com/econ_dev_reports/Battelle_State_Bioscience_Initiatives_2010.pdf

October 8: Science and Technology Overview

Required Readings for discussion

Bush, Vannevar, Atkinson, Richard C., National Science Foundation (U.S.), 1980. *Science--the endless frontier: A report to the president on a program for postwar scientific research*. [Washington, D.C.]: National Science Foundation. Read the main report (p. 1-40) and Skim Appendix 3 (pp. 70-117). https://archive.org/details/scienceendlessfr00unit

Celeste, Richard F., Ann Griswold, Miron L. Straf, National Research Council (US) Committee on Assessing the Value of Research in Advancing,National Goals, National Research Council (US) Division of Behavioral and Social Sciences,and Education, Research Council National, Richard F. Celeste, et al. 2014. *Furthering America's Research Enterprise.* Washington, D.C.: The National Academies Press. Read Chapters 1-3 (pp. 1-50). http://www.nap.edu/catalog/18804/furthering-americas-research-enterprise

October 15: Science and Technology in Agriculture – the case of genetically modified organisms

Required Readings:

Barrows, Geoffrey, Steven Sexton, and David Zilberman. 2014. Agricultural biotechnology: The promise and prospects of genetically modified crops. *Journal of Economic Perspectives* 28 (1): 99-120.

Harmon, Amy. 2014. A lonely quest for facts on genetically modified crops. *The New York Times*, January 5, 2014, 2014, sec Section A; Column 0; National Desk; Pg. 1.

One additional reading related to agricultural S&T or biotechnology in agriculture. You may choose a reading on your own, or use one available on the CANVAS Files webpage.

October 22: Science, Technology and Economic Growth

Required Readings:

Chapter 3, pp. 47-70. Easterly, William, 2001. *The elusive quest for growth: Economists' adventures and misadventures in the tropics*. Cambridge, Mass.: MIT Press.

Chapters 2&3, pp. 9-34. Helpman, Elhanan. 2004. *The mystery of economic growth*. Cambridge, Mass.: Belknap Press of Harvard University Press.

Also read one of the following:

Stephan, Paula E. Chapter 5 - the economics of science. In *Handbook of the economics of innovation.* Vol. Volume 1, 217-273North-Holland.

Tassey G., 2013. Beyond the business cycle: The need for a technology-based growth strategy. *Science and Public Policy* 40 (3): 293-315.

October 29: UN Sustainable Development Goals and connectivity – the business, technology, and policies.

Guest Speaker – Paul Mitchell, Senior Director, Technology Policy, Microsoft

Required Readings:

United Nations Conference on Trade And Development (2015). Implementing WSIS Outcomes: A Ten-Year Review. Geneva. http://unctad.org/en/PublicationsLibrary/dtlstict2015d3_en.pdf (Links to an external site.) Read: Executive Summary, Chapters 1,2,3 and 9.

Documents from 2nd Preparatory Meeting for the General Assembly's overall review of the implementation of the outcomes of the World Summit on the Information Society: Agenda and zero draft report.

Additional Background Readings (annotation not required)

NetHope (2015). Sustainable Development Goals ICT Playbook: From Innovation to Impact.

Abelson, Harold, Ross Anderson, Steven M. Bellovin, Josh Benaloh, Matt Blaze, Whiteld Die, John Gilmore, Matthew Green, Susan Landau, Peter G. Neumann, Ronald L. Rivest, Jerey I. Schiller, Bruce Schneier, Michael Specter, Daniel J. Weitzner (2015). Keys Under Doormats: Mandating insecurity by requiring government access to all data and communications. Mimeograph.

United Nations Conference On Trade And Development (2005). Tunis Agenda For The Information Society.

Taylor, Emily (2015). ICANN: Bridging the Trust Gap. Centre for International Governance Innovation and Chatham House.

November 5: Issues of Diversity in Science and Technology.

Panel Discussion

Eve A. Riskin, Professor of Electrical Engineering, Associate Dean of Diversity and Access, University of Washington

Required Readings:

Blickenstaff, Jacob Clark. 2005. Women and science careers: Leaky pipeline or gender filter? *Gender & Education* 17 (4).

Plaut, V. 2014. 3 Myths Plus a Few Best Practices for Achieving Diversity. *Scientific American*. Volume 311, Issue 4.

Valantine, Hannah A., and Francis S. Collins. 2015. National institutes of health addresses the science of diversity. *Proceedings of the National Academy of Sciences*. 112 (40) (October 06): 12240-2.

Additional Background Readings (annotation not required)

Kranton, Rachel E., George A. Akerlof, and George A. Akerlof. 2010. *Identity economics how our identities shape our work, wages, and well-being*, ed. Rachel E. Kranton. Princeton: Princeton: Princeton University Press.

National Science Foundation, National Center for Science and Engineering Statistics. 2015. Women, Minorities, and Persons with Disabilities in Science and Engineering: 2015. Special Report NSF 15-311. Arlington, VA. Available at http://www.nsf.gov/statistics/wmpd/

National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. 2011. Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads. The National Academies Press, Washington, D.C.

November 12: Intellectual Property - Guest lecturer, Robert JM Lee, Dorsey & Whitney LLP

Required Readings: See CANVAS page. No Annotation required for this class.

November 19: Working Group Discussions 1 & 2

2:30 – 3:45 Working Group 1: *Private Property and Public Goods: A Discussion of Intellectual Property*

3:45 – 4:00 Break

4:00 - 5:15 Working Group Discussion 2: *The Future Is Genetically Modified*

Required Readings:

Spok, Armin. 2010. The "Pharming" challenge. In Governing risk in GM agriculture., eds. Michael Baram, Mathilde Bourrier, 169-200. Cambridge: Cambridge University Press.

Stoye, Emma. GM tomato is a factory for healthy nutrients. *Chemistry World*(30 October 2015).

December 3: Working Group Discussion 3 & Guest Speaker

2:30 – 3:45 Working Group Discussion 3: *Difficulties in Commercialization of Defense Technology*

3:45 – 4:00 Break

4:00 - 5:15 Guest Speaker – Jesse Kindra - Director, Intellectual Property Management, CoMotion, University of Washington

Required Readings:

Working Group: (**Read and annotate)**

Molas-Gallart, Jordi. 1997. _Which way to go? Defence technology and the diversity of 'dual-use' technology transfer. Research Policy 26 (3) (10): 367-85._

Guest Speaker (**Read but DO NOT need to annotate):**

Review CoMotion website http://comotion.uw.edu/news/introducing-uw-comotion

Stanford University Office of Technology Licensing. (2007). "In the Public Interest: Nine Points to Consider in Licensing University Technology". White paper. https://otl.stanford.edu/documents/whitepaper-10.pdf

University of Washington. Patent, Invention, and Copyright Policy Presidential Executive Order No. 36. http://www.washington.edu/admin/rules/policies/PO/EO36.html

December 10: Regional Policies

Required Readings: (**Read but DO NOT need to annotate):**

Wessner, Charles W., National Research Council (U.S.), National Academy of Sciences,, National Academy of Engineering, Institute of Medicine (U.S.). 2013. _Best practices in state and regional innovation initiatives: Competing in the 21st century_. Read chapters 1 & 2 and Case studies from the annexes - Stanford and Silicon Valley; North Carolina's Research Triangle Park.

Working Groups

1. _Private Property and Public Goods: A Discussion of Intellectual Property_

Problem Statement: Weighing the cost-benefits of intellectual property and presenting both sides of the argument

Working Group Members:

1. Catherine Foster
2. Kate Sykes
3. Lynsey Tafreshi
4. Michael Hart
5. Anissa Tanweer

2. _The Future Is Genetically Modified_

Problem statement: Weighing the benefits and challenges of applying genetic engineering technology

Group members:

1. Rachel Beck
2. Sam Marshall
3. Chris Keenan
4. Yasmeen Hussain

3. _Difficulties in Commercialization of Defense Technology_

Problem Statement: The lack of collaboration between defense and non-defense research teams, restrictive national security rules and the lack of comprehensive regulations limit the commercialization of defense technologies.

1. Chase Munroe
2. Mariah Bell-Stuart
3. Christina Carnevale
4. Alexander Schuler
5. Donghui Park

Group and Individual Project Evaluation

For both the individual papers and the group projects, I would like you to identify a science and technology policy topic and ask an interesting question about it. Come up with a problem statement (thesis) about an important policy question, summarize the literature and find relevant data to frame the question, summarize the literature and state your conclusions. If you feel there is sufficient evidence, make a policy suggestion based on your findings.

The scope of your study can be as broad or as narrow as you choose. I want you to show me that you have identified a relevant S&T policy question and that you have learned something by researching the topic. I am not an authority in any of your topic areas, so try to teach me something within the tight time and page constraints that you have been given!

I am impressed by projects that use empirical evidence, draw from many sources, and use critical reasoning to make thoughtful conclusions. Clear writing impresses everyone, so be prepared to go through several drafts. You may draw on a range of literature such as academic, policy briefs, and data summaries. Popular press is often useful to frame the question and to establish the relevance of the topic. There is no firm page limit, shoot for 7-12 pages of text and no more than 5 pages of tables and figures (you can have less). Please use single spacing with an extra line between paragraphs in 11 or 12 point.

The grading criteria are similar for the presentation and the papers. Your working group project grade will be weighted 80% on the class presentation and 20% on the written summary. The working group written executive summary should be 4-5 pages for the problem statement and main conclusions, plus a reference list. Please use single spacing with an extra line between paragraphs in 11 or 12 point.

Individual Paper	Points
Total	**100**
Clarity: writing and organization.	**50**
Is the problem or thesis statement clear? Is sufficient context given for the reader to understand the importance of the issue?	10
Are qualitative or quantitative indicators presented to frame the problem or is there a clear explanation of why they are lacking?	10
Is the narrative well structured, and does it have a logical flow?	30
Points will be deducted for grammar and spelling errors.	
Analysis: substance and reasoning.	**50**
Depth and breadth of analysis: Appropriate use and thoughtful synthesis of published literature. A minimum of 8-10 sources should be integrated into the paper.	30
Summary discussion: Do summary and conclusions flow from the body of the paper? Are follow up questions identified?	20

Working Group Science & Technology Policy Project (100 total points)	Points
Working Group Presentation Total	**80**
Clarity of the presentation: structure and organization.	**40**
Is the problem or thesis statement clear? Is sufficient context given for the audience to understand the importance of the issue?	8
Are qualitative or quantitative indicators presented to frame the problem or is there a clear explanation of why they are lacking?	8
Is the presentation well structured, and does it have a logical flow?	24
Points deducted for grammar and spelling errors.	
Analysis: substance and reasoning.	**40**
Depth and breadth of analysis: Appropriate use and thoughtful synthesis of published literature.	24
Summary discussion: Do summary and conclusions flow from the main presentation? Are follow up questions identified? Are the main points logically summarized? Does the conclusion offer the working group's original thoughts and interpretation of their findings? Are there policy changes that you would recommend?	16
Working Group Written Executive Summary Total	**20**
Problem Statement Is the problem or thesis statement clear? Is sufficient context given for the audience to understand the importance of the issue?	4
Summary & Conclusions Are the main points logically summarized? Does the conclusion offer the working group's original thoughts and interpretation of their findings? Are gaps in the literature identified? Are suggestions for further work and additional related issues identified? What are the main policy changes that you would recommend?	12
References Are at least 10 references cited? Is there a mix of scholarly, policy and popular press references included? Is there a mix of recent and older references? Is a standard bibliographic format used?	4

Annotated Bibliography Grading Rubric	Points
Total	**10**
Reading Summary: Are the main objectives and conclusions of the reading captured?	**4**
Assessment and Reflection Do you find the reading credible and relevant overall? Why or why not? What did you find most interesting or important in the reading? How valuable did you find the reading for learning about S&T policy?	**4**
Writing Your writing should be clear, grammatically correct and easy to understand.	**2**