INTA 8000: Science, Technology, & International Affairs I

Fall 2024

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3 credits
Monday 6:30 – 9:15 PM
Habersham G17

Office hours: *TBD*
& by appointment
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Overview

The course will explore and enable better understanding of the interactive roles; the effects of science and technology; and the economic, institutional, policy, and social contexts in which science and technology may be implemented.

Rarely does science or technology (S&T) itself drive policy. The potential geopolitical, economic, or other national-level consequences of the application of science to human endeavors is where technology intersects with policy predominantly. Science & technology can be causal, intervening, or determinant factors. The ability to recognize, communicate, and identify nodes for intervention, change, or influence are strategic requirements for effective use of S&T domestically and internationally. The ways in which governments act as proponents and sustainers, as well as consumers of S&T, vary significantly. These issues reflect important questions about the relationship between science, technology, policy, and geopolitics.

Technological changes are anticipated to occur over the ensuing decades in a globalized world characterized by complex security, societal, and other challenges like climate change. While emerging technologies promise scientific breakthroughs, they also generate skepticism and controversies. How will these S&T developments impact stability, and what are the potential threats? How will such emerging technologies affect the overall international discourse?

This course introduces theories and methodologies for science and technology policy analysis and for analysis of geopolitics. Students will learn how science and technology policy is made, with specific attention to the roles of government agencies, expert advisory committees, and other epistemic groups. This analytic toolkit will be drawn from literature in a range of disciplines, including political science, public policy, economics, sociology, and history.

This course will provide:

- Background on the science & technology policy formation, with an emphasis on US systems and policies
- A multidisciplinary toolkit for thinking about science & technology policy and security, including an understanding of social science methods, theories, and approaches to science & technology policy in context of international affairs

Learning Objectives

1) Students will be able to demonstrate knowledge of principal contemporary global challenges in the fields of international affairs and science and technology.
2) Students will develop research skills in order to produce a research or policy paper on specific technological and scientific issues in international affairs.

Class Requirements

1) International agency/office/agreement relevant to S&T (15%)
2) International scientific or technology controversy (15%)
3) Project (70%)
    a. Proposal
    b. Status report
    c. Semester document
    d. Semester presentation

The grading rubric will be discussed during the first week of class.

Course Mantra

Semper Gumby, aka always flexible.

Attendance and Participation

You are expected to make reasonable efforts to attend all classes. I recognize that both anticipated and unanticipated events may overlap with the regularly scheduled class time.

If you're sick, please stay home.

Arriving Late and Departing Early

While I recognize that both anticipated and unanticipated events may overlap with the regularly scheduled class, if you have an ongoing conflict that occurs at the same time as this class, perhaps you should reconsider. Repeated tardiness reflects poorly on you and can disrupt the entire class. If you ask to depart my class early for another event, you are communicating what is your priority. I reserve the right to make attendance a portion of the grade and penalize for lateness if it is a reoccurring problem.

Electronic Devices

They are allowed. My right to rescind is reserved. It has been found that use of electronic devices can hinder learning and impact your grade, see e.g., "Checking phones in lectures can cost students half a grade in exams" and primary data included therein, https://phys.org/news/2018-07-students-grade-exams.html. The other problem is rudeness or the unintended perception of rudeness, which is especially bad when/if we have guest speakers. Unfortunately, this has been a problem in the past on multiple occasions, so it now gets a section in the syllabus.

Academic Integrity

For all assignments, materials, and exams, you are expected to maintain the highest academic integrity.

While academic integrity takes many forms, one of the most common violations is plagiarism. Per the Georgia Tech Honor Code, plagiarism is an act of academic misconduct. The Georgia Tech Honor Code specifies: "'Plagiarism' is the act of appropriating the literary composition of another, or parts of passages of his or her writings, or language or ideas of the same, and passing them off as the product of one's own mind. It involves the deliberate use of any outside source without proper acknowledgment."

Plagiarism ranges from the blatant, such as purchasing a term paper or copying on an exam, to the subtle, e.g., failing to credit another author with the flow of ideas in an argument. Simply changing a few words from the writings of other authors does not alter the fact that you are essentially quoting from them and appropriating their ideas. Paraphrasing of this sort, where you use the words of another almost verbatim without acknowledging your source, is the most common form of plagiarism among students and in general. When you state another author's viewpoint, theory, or hypothesis – especially when it is original or not generally accepted – you must also include a reference to the originator. In general citations are unnecessary when the information is considered common knowledge or a matter of widespread agreement or controversy.

For more information on the Georgia Tech Honor Code, please see http://www.honor.gatech.edu.

In short: just don't cheat.
This is one instance when asking forgiveness
*rather than permission is *not* a good strategy.*

Accommodations for Students with Disabilities

Per Georgia Tech policy: if you have a significant disability, special arrangements will be made to accommodate documented needs. Please contact the professor after class or at your earliest convenience.

THE SYLLABUS IS DYNAMIC & IS LIKELY TO BE UPDATED THROUGHOUT THE SEMESTER.

Course Calendar and Content

Week 1

19 August

- Introductions
- Semester scope
- Subject matter overview and class organization
- Framing the course, current problems, policy, doctrine, and debate; establishing process
- Discussion of project possibilities

Readings

- John Marburger, "Perspective: Science's Uncertain Authority in Policy," *Issues in Science and Technology,* Summer 2010, http://issues.org/26-4/p_marburger/
- *Browse:* White House Office of Science and Technology Policy (OSTP), https://www.whitehouse.gov/ostp/
- John F. Sargent Jr. & Dana A. Shea, *Office of Science and Technology Policy (OSTP): History and Overview,* CRS R43935, 20 March 2020, https://crsreports.congress.gov/product/pdf/R/R43935

Optional/further reading

- John Krige and Kai-Henrik Barth, "Science, Technology, and International Affairs," *Osiris,* 2006, 21, pp 1-21, https://www.journals.uchicago.edu/doi/10.1086/507133
- Emily G. Blevins & Rachael D. Roan, *The White House Office of Science and Technology Policy: Issues and Options for the 118th Congress,* CRS R47635, 26 July 2023, https://crsreports.congress.gov/product/pdf/R/R47635
- Jason A. Gallo, et al., *Science and Technology Issues for the 118th Congress,* CRS R47373, 29 February 2024, https://crsreports.congress.gov/product/pdf/R/R47373
- Herbert Werlin, "Ghana and South Korea: Lessons from World Bank Case Studies," *Public Admin. Dev.,* 1991, pp 245-255. https://doi.org/10.1002/pad.4230110312

Week 2

26 August

- What is policy?
- Technological determinism
  - Or why Pakistan has the bomb and Japan doesn't
- Frameworks for studying science, technology, and policy
  - And why social scientists dislike *[to put it diplomatically]* Jared Diamond's Guns, Germs, and Steel … *& it's not the same reason white supremacists dislike like the book either*
- Offense-Defense Theory
- Solow-Swan Model

Readings

- Ralph Turner, "Technology and Geopolitics," *Military Affairs,* 1943, 7(1), pp 5-15

- Tsuyoshi Hasegawa, "The Atomic Bombs and the Soviet Invasion: What Drove Japan's Decision to Surrender?" *The Asia-Pacific Journal,* 2007, 5(8), https://apjjf.org/tsuyoshi-hasegawa/2501/article
- Ash Carter, "What I Learned from the People Who Built the Atom Bomb: Technologists want their creations to do good for the world. We should make it easier for them to accomplish that," *MIT Technology Review*, January-February 2018, pp 8-9, https://www.technologyreview.com/s/609557/what-i-learned-from-the-people-who-built-the-nuclear-bomb/
- William E. Scheuerman, "Realism and the Critique of Technology," *Cambridge Review of International Affairs,* 2009, 22(4), pp 563-584, https://doi.org/10.1080/09557570903325504
- Peter Turchin, et al., "War, Space, and the Evolution of Old World Complex Societies," *Proceedings of the National Academy of Sciences (PNAS),* 2013, pp 16384–16389, http://www.pnas.org/content/110/41/16384

Optional/further reading

- Kier Lieber, "Grasping the Technological Peace: The Offense-Defense Balance and International Security," *International Security*, 2000, 25(1), pp 71-104, https://muse.jhu.edu/article/447718
- Hans Morgenthau, *Science: Servant or Master?* New York: Meridian Books, 1972
- William Ogburn, *Technology and International Relations.* Chicago: University of Chicago Press, 1949
- Eugene B. Skolnikoff, *The Elusive Transformation: Science, Technology, and the Evolution of International Affairs,* Princeton: Princeton University Press, 1993
- Etel Solingen, "Domestic structure and the international context: Toward models of state-scientists interaction," in *Scientists and the States: Domestic Structures and the International Context*, Etel Solingen (ed), 1994, University of Michigan Press, pp 1-31
- Susan Strange, *The Retreat of the State: The Diffusion of Power in the World Economy.* Cambridge: Cambridge University Press, 1996
- Andrew Feenberg, *Transforming Technology: A Critical Theory Revisited.* New York: Oxford University Press, 2002
- Michael Talalay, Roger Tooze, & Chris Farrands (eds). *Technology, Culture and Competitiveness: Change and the World Political Economy.* London: Routledge, 1997
- Geoffrey L. Herrera, "Technology and International Systems," *Millennium: Journal of International Studies,* 2003, 32(3), pp 559-593

Week 3

2 September

- Labor Day *No class*

Week 4

9 September

- Discussion of project proposals

Project proposals due electronically NLT 9AM directly to MEK.

- The S&T Environments *(start/as time allows)*

Readings

- *Browse* - Vannevar Bush, "Science: The Endless Frontier," 1945 (may be found on-line in multiple places, e.g., in html at the NSF web site, https://www.nsf.gov/od/lpa/nsf50/vbush1945.htm or pdf scan of the original document, https://ia600408.us.archive.org/18/items/scienceendlessfr00unit/scienceendlessfr00unit.pdf)
- Laurie Harris, et al., *Federal Research and Development (R&D) Funding: FY2024,* CRS R47564, 19 March 2023, https://crsreports.congress.gov/product/pdf/R/R47564
- *(Start reading)* National Academies of Sciences, Engineering, and Medicine, *Experimental Approaches to Improving Research Funding Programs: Proceedings of a Workshop*, Washington, DC: The National Academies Press, 2024, https://nap.nationalacademies.org/catalog/27244/experimental-approaches-to-improving-research-funding-programs-proceedings-of-a

Week 5

16 September

- Group/individual work on semester-long projects

Readings

- *(Continue reading)* National Academies of Sciences, Engineering, and Medicine, *Experimental Approaches to Improving Research Funding Programs: Proceedings of a Workshop*, Washington, DC: The National Academies Press, 2024, https://nap.nationalacademies.org/catalog/27244/experimental-approaches-to-improving-research-funding-programs-proceedings-of-a
- Caroline S Wagner, "Science and Foreign Policy," *Sci Public Pol,* 2002, 29(6), pp 409-417, https://doi.org/10.3152/147154302781780741
- Alexis Roig, *Science and Technology Diplomacy,* December 2020, https://www.gob.mx/cms/uploads/attachment/file/577427/NA-Diplomacia_cienti_fica-ingl-final.pdf
- Clement Moyo & Andrew Phiri, "Knowledge creation and economic growth: the importance of basic research," *Cogent Social Sciences*, 2024, 10(1), https://doi.org/10.1080/23311886.2024.2309714

Week 6

23 September

- Discussion of international S&T treaty, agreement, organization, or agency

Week 7

30 September

- US S&T Environments *(finish)*
- Policy creation, implementation, and execution

Readings

- Paul Cairney & Tanya Heikkila, "A Comparison of Theories of the Policy Process," in *Theories of the Policy Process,* 3rd edition, Paul Sabatier & Chris Weible (eds), 2014, Westview Press, pp 363-390
- Samantha, L Mosier, "Policies as species: Viewing and classifying policy from an evolutionary biology perspective," *Politics and the Life Sciences*. 2019, 38(2), pp 117-131, doi:10.1017/pls.2019.10
- Robert D. Atkinson, *Understanding the U.S. National Innovation System,* 2020, Information Technology and Innovation Foundation (ITIF), https://itif.org/publications/2020/11/02/understanding-us-national-innovation-system-2020/

Optional/further reading

- Matthew C. Nowlin, "Theories of the Policy Process: State of the Research and Emerging Trends," *Policy Studies Journal*, 2011, 39, pp 41-60, https://onlinelibrary.wiley.com/doi/full/10.1111/j.1541-0072.2010.00389_4.x

Week 8

7 October

- Group/individual work on semester-long projects

Week 9

14 October

- Fall Break

Week 10

21 October

- Project updates
- Budgets

Readings

- *Policy Basics: Introduction to the Federal Budget Process,* Center on Budget and Policy Priorities (CBPP), 2022, https://www.cbpp.org/research/policy-basics-introduction-to-the-federal-budget-process
- Marcy E. Gallo, *Defense Primer: RDT&E,* CRS IF10553, 27 February 2024, https://crsreports.congress.gov/product/pdf/IF/IF10553
- *Browse:* DoD Budget Request, https://comptroller.defense.gov/Budget-Materials/Budget2025/ &
  DoD, Research Development, Test & Evaluation Programs (R-1), https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2025/FY2025_r1.pdf
  [Optional: the MS Excel file https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2025/r1.xlsx]
- Paul Scharre and Ainikki Riikonen, *Defense Technology Strategy,* CNAS, 2020, https://www.cnas.org/publications/reports/defense-technology-strategy & *Browse: https://www.cnas.org/u-s-national-technology-strategy*
- Eugene Gholz & Harvey Sapolsky, "The defense innovation machine: Why the U.S. will remain on the cutting edge.," *Journal of Strategic Studies*, 2021, 44(6), pp 854-872, https://doi.org/10.1080/01402390.2021.1917392
- Carter Bloch & Mads P. Sørensen, "The size of research funding: Trends and implications," *Science and Public Policy,* 2015, 42(1), pp 30-43, https://doi.org/10.1093/scipol/scu019

Week 11

28 October

- Discussion of international science or technology controversy

Week 12

4 November

- Innovation & Institutions
- Revolutionary versus evolutionary technology development

Readings

- Daniele Rotolo, Diana Hicks, & Ben R. Martin, "What is an emerging technology?" *Research Policy,* 2015, 44, pp 1827-1843, https://www.sciencedirect.com/science/article/pii/S0048733315001031
- White House, *Critical and Emerging Technologies List,* 2024, https://www.whitehouse.gov/wp-content/uploads/2024/02/Critical-and-Emerging-Technologies-List-2024-Update.pdf
- Regina Dugam & Kaigham J. Gabriel, "'Special Forces' Innovation: How DARPA Attacks Problems," *Harvard Business Review,* October 2013, pp 75-84, https://hbr.org/2013/10/special-forces-innovation-how-darpa-attacks-problems

- J. Rogers Hollingsworth, "High Cognitive Complexity and the Making of Major Scientific Discoveries," in *Knowledge, Communication, and Creativity*, Arnaud Sales and Marcel Fournier (eds), Sage Publications, 2007, pp 129-155
- Lynne G. Zucker & Michael R. Darby, "Star Scientists and Institutional Transformation: Patterns of Invention and Innovation in the Formation of the Biotechnology Industry," *PNAS,* November 1996, pp 12709-12716, http://www.pnas.org/content/93/23/12709.full
- Natalia Lamberova, "The puzzling politics of R&D: Signaling competence through risky projects," *Journal of Comparative Economics,* 2021, 49, pp 801-818, https://www.sciencedirect.com/science/article/pii/S0147596721000020
- Adam J. Harrison, "DOD 2.0: High Tech Is Eating the Pentagon," *Proceedings of the US Naval Institute,* February 2016, https://www.usni.org/magazines/proceedings/2016/february/dod-20-high-tech-eating-pentagon

Week 13

11 November
- S&T Policies Beyond the US
- Globalization

Readings
- National Research Council, *S&T Strategies of Six Countries: Implications for the United States*, Washington, DC: The National Academies Press, 2010, https://doi.org/10.17226/12920
- Institute of Medicine and National Research Council, *Globalization, Biosecurity, and the Future of the Life Sciences*, Washington, DC: The National Academies Press, 2006, https://doi.org/10.17226/11567
- Thomas Zacharewicz, Noemi Pulido Pavón, Luis Antonio Palma Martos, & Benedetto Lepori, "Do funding modes matter? A multilevel analysis of funding allocation mechanisms on university research performance," *Research Evaluation*, 2023 32(3), pp 545-556, https://doi.org/10.1093/reseval/rvad023

Week 14

18 November
- Semester presentations

Week 15

25 November
- Thanksgiving

Week 16

2 December
- Semester presentations
- Semester wrap-up and synthesis of topics covered

The CISTP conference room/library in 307 Habersham is available to members of this seminar for small group meetings, etc. The material in that room may be borrowed on an honor system basis for any purpose that interests you.

Final paper due 2 December, i.e., the last day of class; late papers accepted without penalty until noon, Monday 9 December.

No Final Exam

<u>One More Thought</u>

Collaboration, sharing ideas, etc.

"Talk about your ideas. Help your colleagues work out their problems. Pay attention to what other people are doing, and see if you can learn something, or if you can contribute.

"Other than the mundane goal of getting your degree, you are in school to push back the frontiers of knowledge. You do this by generating and exploring new ideas. There is no way that you will ever be able to explore all of the ideas that you generate, but some of those ideas that you discard might be just what some of your colleagues are looking for.

"Human nature tends to make us want to hoard our own ideas. You have to fight against that. Human nature also tends to make us treat other people's ideas with disrespect. The closer the idea to our own area of research, the more likely some part of our brain will try to find fault with it. Fight against that even harder.

"You will find many people in academia who give in to the dark side. These Stealth Researchers never discuss what they are working on, except in vague and deceptive terms. They are experts at finding fault with the work of their colleagues. The Stealth Researcher writes papers that make very grand claims, but you can never quite figure out what they've accomplished and what they haven't. He is a master at omitting the key detail of the design or process that would enable others to follow his work. The Stealth Researcher is a knowledge diode, a roach motel for information. He has replaced the fundamental goal of discovery and publication with the twin evils of ego and empire.

"Be open about what you are working on. Be honest about what you've done, and even more honest about what you haven't. Don't ever hide an idea for fear that someone will steal it, even if you are talking to a Stealth Researcher. With patience, maybe we can cure them."

Prof Kristofer S.J. Pister
Electrical Engineering and Computer Science, UC Berkeley