This is a Core IMPACTS course that is part of the Social Sciences area.

Core IMPACTS refers to the core curriculum, which provides students with essential knowledge in foundational academic areas. This course will help students master course content, and support students' broad academic and career goals.

This course should direct students toward a broad Orienting Question:
· How do I understand human experiences and connections?

Completion of this course should enable students to meet the following Learning Outcome:
· Students will effectively analyze the complexity of human behavior, and how historical, economic, political, social, or geographic relationships develop, persist, or change.

Course content, activities, and exercises in this course should help students develop the following Career-Ready Competencies:
· Intercultural Competence
· Perspective-Taking
· Persuasion

INTA 2040
Science, Technology, and International Affairs

Fall 2024

Van Leer E361 — Monday & Wednesday
2:00 – 3:15 PM

Instructor: Sanghyun Han (shhan@gatech.edu)
Office: Habersham G14
Office Hour: MW 3:30 – 4:30 PM or by appointment

Course Description

The recent advancements in semiconductor technology, particularly at the nanometer scale, have revolutionized our ability to process vast amounts of data and information within seconds. While such innovations in science and technology represent significant progress, their novelty may diminish over time compared to their initial development period. For example, the railroad in the 1800s, initially considered an "emerging" technology due to its profound impact on the economy, politics, and

society, is no longer considered emerging compared to more recent advancements like nanotechnology. However, it still offers valuable lessons on understanding the relationship between science and technology (S&T) and International Relations (IR), the focus of this course.

This course adopts an interdisciplinary approach by integrating various S&T developments with IR. It challenges conventional understandings by placing S&T at the core of IR, which seeks theoretical explanations for international phenomena amidst the complexities of different actors, units, and effects within the realm of Political Science. Specifically, the course delves into the fundamental interplay between S&T and IR, examining how S&T influences IR and vice versa. Through this exploration, students gain insights into the dynamic relationship between these two domains and their implications for global affairs.

Through a comprehensive exploration of these two interconnected components and active learning, students will gain insights into the intricate dynamics of IR and understand the essential role each element plays in shaping global policies and interactions.

Learning Objectives

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

- Identify the relationship and connection between S&T and IR.
- Illustrate the emergence and divergence of S&T and IR using an interdisciplinary approach.
- Apply key IR concepts and theories to analyze social and political phenomena relevant to S&T.
- Demonstrate critical thinking, analytical research, and public presentation skills.

Course Materials

Most readings for this course are available online through the Georgia Tech Library or are open access. You can find all course materials on CANVAS. Students are not required to purchase any materials for this course. Reading must be completed before each class. Students are responsible for all assigned readings, even if the material is not explicitly discussed in class.

Assessment Plan

Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Attendance & Participation (10%)

This is a seminar and discussion-based course that encourages and expects students to actively participate and engage with each lecture by attending in person, reading all required readings or materials, and being familiarized with them. Students who repeatedly arrive late to the lecture will have their participation grade lowered. When discussed, we are less concerned with "right" or "wrong" answers than we are with thoughtful contributions that follow the discussion and either add to the debate or move it in a new direction.

Weekly Discussion Post (10%)

Students are required to submit their thoughts or questions for **one lecture per week on CANVAS** (and everyone should read it prior to the class). If only one lecture occurs during a week, students should submit their post for that lecture. Each post must be at least 100 words in length.

- Readings for Monday class: by noon (12pm) on Monday.
- Readings for Wednesday class: by noon (12pm) on Wednesday.

S&T Presentation (20%)

This group presentation will explore one of the selected technologies by applying various IR theories. It will begin with an overview of the historical context of the chosen technology, outlining its expected development trajectory. The focus will then shift to how current developments and anticipated applications of the technology impact international relations. Additionally, the presentation will identify which theoretical frameworks are most useful in explaining the technology's role and influence in global politics, providing well-reasoned justifications for these choices.

Research Project (60%)

One of the primary objectives of this course is to develop students' skills in communicating and crafting their own research. Each student is required to write an academic research or policy paper as the final outcome and is asked to submit a proposal and progress report before the final submission. This practice aims to foster logical thinking and analytical writing skills as well as communication practices over a relatively long period (an entire semester) on any topic relevant to the course. Detailed rubrics for each item will be posted on CANVAS.

- **Research Proposal (10%)**
  The research proposal serves as a foundation for the final outcome, helping students identify their research focus throughout the semester and analyze the phenomenon of interest.

- **3 Research Progress Reports (15%; 5% for each)**
  The research progress reports help students adhere to the timeline for the final outcome and allow the instructor to gauge their progress. These submissions are automatically graded with comments from the instructor to facilitate the

research outcome. The follow-up sessions or emails can be requested to students based on the instructor's decision. Reports should be submitted as written documents via CANVAS on designated dates.

- **Research Presentation (10%)**
  The presentation aims to introduce students' research projects to their peers and receive feedback. Through this activity, students have the opportunity to practice communicating their research concisely and logically, and to address questions from their peers. Given the various research stages each student faces, the assessment will be based on how well students present their research overview with logical reasoning and how they answer questions from the audience. Presentation slides should be uploaded to Canvas before the class.

- **Research Paper (25%)**
  Each student must decide whether to write a research article or a policy paper. The purpose of a research article is to present a theoretical argument explaining the student's interests, while a policy paper aims to provide actionable and practical implications drawn from the research. Although these types of research are not mutually exclusive and share common elements, the former focuses on providing consistent and sound reasoning for the argument made, while the latter examines practical implications for the real world—i.e., "Why does it happen?" versus "What should we do now?"

Note: *All written submissions will use Times New Roman 12, double space between sentences, 1" margins all around, and include the page number in the center of the footer.*

Extra-credit

Upon consultation with and approval from the instructor, students may earn extra credit by participating in public talks. After attending, please write a reflective summary (maximum 500 words) and submit it via email within a week of the talk. *Extra-credit may not exceed three submissions*.

Grade Change Policy

Legitimate requests for grade changes are welcome and encouraged. You should, however, resist the temptation to file a frivolous request just hoping to "get lucky". Approach a grade change request as if arguing a legal case: you should have strong and convincing arguments and evidence to support your request. Be aware that appeals to the practices of other professors do not constitute a good argument or evidence. Note also that grade changes requests can result in re-grades either up or down (or left unchanged). That is, if the greater scrutiny demanded by a grade change request reveals your assignment to deserve a lower grade than previously awarded, and then the lower grade will be assigned.

Policies & Guidelines

Absences

In-person student attendance is mandatory, but students can explain absences with valid reasons. Please notify the instructor *prior to your absence* to discuss alternatives to make up for any missed work.

Late Assignments

Late assignments will be penalized initially by one letter grade unless the late assignments are notified to and discussed with the instructor. Please submit your assignments with the provided instructions in a timely manner.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit http://www.catalog.gatech.edu/policies/honor-code/ or http://www.catalog.gatech.edu/rules/18/. Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

A Note on Large Language Models (i.e., Chat GPT)

Although this course appreciates your creative thinking and novel writing based on your own learning and understanding, students *may use ChatGPT or other AI software* to assist their work in very limited circumstances. Please consult with the instructor if you decide to use them for any assignments for the purpose of notification. If you use these AI assistant tools in your assignments, you must make appropriate indications that you used such tools and provide a specific name of such tools and the prompt that you used to generate original or polished phrases or sentences. No citation is considered original and authentic production by students, and using AI tools without any citations or indications will be considered a violation of Georgia Tech's Code of Academic Integrity and severe plagiarism.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or http://disabilityservices.gatech.edu/, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Mental Health and Wellness Resources

If you or someone you know needs assistance, you are encouraged to contact the Center for Mental Health Care & Resources at 404.894.2575 (or 404.894.2575) or visit

https://mentalhealth.gatech.edu. Georgia Tech has several resources for a student seeking mental health services (https://mentalhealth.gatech.edu/about/scheduling-appointment) or crisis support (https://mentalhealth.gatech.edu/seeking-help/get-help-now). Students experiencing an immediate life-threatening emergency on campus, call the Georgia Tech Campus Police at 404.894.2500. For more resources on managing stress, anxiety, relationships, sleep, etc., please visit https://mentalhealth.gatech.edu/mental-health-resources/self-help for a list of free online resources compiled by the Center for Mental Health Care and Resources.

Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/22/ for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Course Schedule

Week 1: Introduction

August 19th: Housekeeping

- The White House. 2022. *National Security Strategy*. Washington D.C.: The White House, 32-34.
- Owen Daniels. 2023. "CSET Analyses of China's Technology Policies and Ecosystem: The PRC's Efforts Abroad." *Center for Security and Emerging Technology*, September.

August 21st: Why do we study S&T and IR?

- Eugene Skolnikoff. 1993. "1. The Setting." In *The Elusive Transformation: Science, Technology, and the Evolution of International Politics*. Princeton: Princeton University Press, 3-15.
- Geoffrey Herrera. 2006. "Thinking About Technology and International Politics." In *Technology and International Transformation*. New York: State University of New York Press, 1-12. (Chapter 1)

Week 2: Concepts & Theories (1)

August 26th: Overview

- Daniel Drezner. 2019. "Technological Change and International Relations." *International Relations*, 33(2): 286-303.
- Edward Mansfield and Nita Rudra. 2021. "Embedded Liberalism in the Digital Era." *International Organization*, 75(2): 558-585.

August 28th: IR Theories

- Geoffrey Herrera. 2006. "International Systems Theory, Technology, and Transformation." In *Technology and International Transformation*. New York: State University of New York Press, 13–34.
- Stefan Fritsch. 2011. "Technology and Global Affairs." *International Studies Perspectives*, 12(1): 27–45.

Week 3: Research Lab Session

September 2nd: LABOR DAY

September 4th: How to Write Paper (*Asynchronous Lecture)

[Research Project Proposal Due by 9/5]

- Please watch the posted video on the CANVAS.

Week 4: Concepts & Theories (2)

September 9th: Structural Factor

- Helen V. Milner and Sondre Ulvund Solstad. 2021. "Technological Change and the International System." *World Politics*, 73(3): 545-582.
- Daniel Drezner. 2001. "State structure, technological leadership and the maintenance of hegemony." *Review of International Studies*, 27(1): 3-25.

September 11th: Innovation

- Mark Talyor. 2016. "Creative Insecurity—Olson's Nemesis." In *The Politics of Innovation*. New York: Oxford University Press, 215-242. (Chapter 8)

Week 5: Concepts & Theories (3)

September 16th: Technology Leadership

Guest Lecture by Dr. Jeffrey Ding (George Washington University)

- Jeffrey Ding. 2024. "The Rise and Fall of Technological Leadership: General-Purpose Technology Diffusion and Economic Power Transitions." *International Studies Quarterly*, 68(2).
- Askar Akaev and Vladimir Pantin. 2014. "Technological Innovations and Future Shifts in International Politics." *International Studies Quarterly*, Volume 58(4): 867–872.

September 18th: Standard

- Walter Mattli & Tim Büthe. 2003. "Setting international standards: technological rationality or primacy of power?." *World Politics*, 56(1): 1-42.
- Nicholas Zúñiga, Saheli Datta Burton, Filippo Blancato, Madeline Carr. 2024. "The geopolitics of technology standards: historical context for US, EU and Chinese approaches." *International Affairs*, 100(4): 1635–1652.

Week 6: IR + S&T

September 23rd: International Security

- Tristan Volpe. 2019. "Dual-Use Distinguishability: How 3D-Printing Shapes the Security Dilemma for Nuclear Programs." *Journal of Strategic Studies*, 42(6): 814–840.
- Erica Lonergan. 2024. "Emerging Technology and the Cult of the Offensive." *Contemporary Security Policy*, 45(3): 459–493.

September 25th: International Cooperation

[Research Progress Report 1 Due by 9/25]

- Jane Vaynman, and Tristan Volpe. 2023. "Dual Use Deception: How Technology Shapes Cooperation in International Relations." *International Organization*, 77(3): 599-612.
- Bernhard Reinsberg. 2021. "Fully-automated liberalism? Blockchain technology and international cooperation in an anarchic world." *International Theory*, 13(2), 287–313.

Week 7: Artificial Intelligence

September 30th: Societal Impact

Guest Lecture by Dr. Carlos Felipe Balcazar (Yale University)

- David Autor. 2015. "Why Are There Still So Many Jobs? The History and Future of Workplace Automation." *Journal of Economic Perspective*, 29(3): 3-30.
- Aina Gallego and Thomas Kurer. 2022. "Automation, Digitalization, and Artificial Intelligence in the Workplace: Implications for Political Behavior." *Annual Review of Political Science*, 25: 463–484.

October 2nd: AI Introduction

- Benjamin Jensen, Christopher Whyte, and Scott Cuomo. 2020. "Algorithms at war: the promise, peril, and limits of artificial intelligence." *International Studies Review*, 22(3): 526-550.
- Avi Goldfarb and Jon Lindsay. "Prediction and judgment: Why artificial intelligence increases the importance of humans in war." *International Security*, 46(3): 7-50.

Week 8: Artificial Intelligence

October 7th: Data

Guest Lecture by Mr. Michael Mansour (SK)

- Ben Buchanan and Andrew Imbrie. 2022. "Data." In *The New Fire*. Cambridge: The MIT Press, 13-31. (Chapter 1)
- Aynne Kokas. 2023. "The Data Trafficking Dilemma." In *Trafficking Data: How China Is Winning the Battle for Digital Sovereignty*. New York: Oxford University Press, 1-21. (Chapter 1)

October 9th: Policy Implications (CTL Class Observation)

Guest Lecture by Mr. Zachary Arnold (CSET)

- Zachary Arnold, Ilya Rahkovsky, and Tina Huang. 2020. "Tracking AI Investment." *Center for Security and Emering Technology*.
- Zachary Arnold. 2021. "U.S. Investment in China's Capital Markets and Military-Industrial Complex." *Testimony before the U.S.-China Economic and Security Review Commission*, March 19.
- Also see, https://eto.tech (Emerging Technology Observatory)

Week 9: Energy

October 14th: FALL BREAK

October 16th: Energy

Guest Lecture by Mr. Sagatom Saha (Macro Advisory)

- Sagatom Saha. 2022. "Climate Progress Can Be "Made in the USA." *Foreign Affairs*, November 15.
- Varun Sivaram and Sagatom Saha. 2018. "The Geopolitical Implications of a

Clean Energy Future from the Perspective of the United States." In *The Geopolitics of Renewables*. Springer: Cham, 125-162.

Week 10: Printing Press & Railroad

October 21st: Printing Press

- Peter Burke. 2000. "Selling Knowledge: The Market and the Press." In *A Social History of Knowledge: From Gutenberg to Diderot*. Cambridge: Polity Press, 149-176. (Chapter 7).

October 23rd: Railroad

[Research Progress Report 2 Due by 10/23]

- Jon Schmid & Jonathan Huang. 2017. "State Adoption of Transformative Technology: Early Railroad Adoption in China and Japan." *International Studies Quarterly*, 61(3): 570-583.
- Alexandra Cermeño, Kerstin Enflo, and Johannes Lindvall. 2022. "Railroads and Reform: How Trains Strengthened the Nation State." *British Journal of Political Science*, 52. 715-735.

Week 11: Nuclear Revolution & Insights

October 28th: Nuclear Revolution

- Robert Jervis. 1986. "The Nuclear Revolution and the Common Defense." *Political Science Quarterly*, 101(5): 689-703.
- Robert Jervis. 2020. "Author Response: Reflections on 'The Meaning of the Nuclear Revolution,' 30 Years Later." *Texas National Security Review*.

October 30th: Insights from the Experiences

Guest Lecture by The Hon. John Tien (former Deputy Secretary of DHS)

- Department of Homeland Security. 2023. *Foundation Models at the Department of Homeland Security: Use Cases and Considerations*. Science and Technology Directorate: Washington D.C., 14-19.

Week 12: Cyber

November 4th: Cyber Introduction (CTL Class Observation)

- Brandon Valeriano and Ryan C. Maness. 2018. "International relations theory and cyber security." *The Oxford Handbook of International Political Theory*.
- Myriam Dunn Cavelty and Andreas Wenger. 2020. "Cyber security meets security politics: Complex technology, fragmented politics, and networked science." *Contemporary Security Policy*, 41(1): 5-32.

November 6th: Cyberspace

Guest Lecture by Mr. Kirt Smith (CrowdStrike)

- Christian Bueger and Tobias Liebetrau. 2021. "Protecting hidden infrastructure: The security politics of the global submarine data cable network." *Contemporary Security Policy*, 42(3): 391-413.
- Jacquelyn Schneider. 2019. "The Capability/Vulnerability Paradox and Military Revolutions: Implications for Computing, Cyber, and the Onset of War." *Journal of Strategic Studies*, 42(6): 841–863.

Week 13: Cyber

November 11th: Security

- Jon Lindsay and Lucas Kello. 2014. "Correspondence: A Cyber Disagreement" *International Security*, 39(2): 181–192.
- Jason Healey. 2024. "Cyber Effects in Warfare: Categorizing the Where, What, and Why." *Texas National Security Review*, 7(4).

November 13th: Control

- Loqman Salamatian, Frédérick Douzet, Kavé Salamatian and Kévin Limonier. 2021. "The geopolitics behind the routes data travel: a case study of Iran." *Journal of Cybersecurity*, 7(1).
- Daniëlle Flonk. 2021. "Emerging illiberal norms: Russia and China as promoters of internet content control." *International Affairs*, 97(6): 1925-1944.

Week 14: Autonomous System & Space

November 18th: Autonomous System

- Michael Horowitz. 2016. "Public Opinion and the Politics of the Killer Robots Debate." *Research and Politics*, 3(1).
- Mark Milley and Eric Schmidt. 2024, "America Isn't Ready for the Wars of the Future." *Foreign Affairs*, September/October.

November 20th: Space

[Research Progress Report 3 Due by 11/20]

Guest Lecture by Dr. Thomas González Roberts (Georgia Tech)

- Audrey Allison. 2014. *The ITU and Managing Satellite Orbital and Spectrum Resources in the 21st Century* (New York: Springer), 1-15.
- Thomas G. Roberts. Forthcoming. *Who is following the rules in space? Assessing GEO satellite operators' compliance with ITU orbital assignments* (Washington D.C.: Center for Strategic and International Studies), 4-20.

Week 15: Technological Competition

November 25th: Technological Competition

- Andrea Gilli, and Mauro Gilli. 2018. "Why China has not caught up yet: military-technological superiority and the limits of imitation, reverse engineering, and cyber espionage." *International Security*, 43(3): 149-170.

- Eugene Gholz, and Harvey Sapolsky. 2021. "The defense innovation machine: Why the US will remain on the cutting edge." *Journal of Strategic Studies*, 44(6): 854-872.

November 27th: THANKSGIVING BREAK

Week 16: Research Project Presentation

December 2nd

[Presentation Slide Due by Noon (12pm), 12/2]

Research Project Presentation (1)

December 4th

Research Project Presentation (2)

Week 17: Research Project Submission

December 9th

Research Project Submission Due