Why do some cities and regions thrive while others struggle? How can regional policymakers support sustainable, equitable economic growth, enabled by local private enterprise, technology development, and industry? This applied course will focus on the roles of research and innovation in driving regional economic growth. Learning from the successes of tech-driven “superstar” cities and the challenges of smaller cities, this course will prepare students to develop realistic, region-specific development goals and strategies, whether coming from the private, public, or nonprofit sector perspective. Our discussions will also familiarize students with the critical and rapidly evolving technology market, and the proper role of government in managing that market and protecting citizens.

Course objectives:
1. Gain familiarity with entrepreneurship, venture capital, technology, and applied research, and understand how entrepreneurship and technology development support local growth and economic vitality;
2. Understand regional production through a function of talent, capital, and technology;
3. Understand how public policy has acted to support the growth of regional technology economies and design a strategy for supporting regional economic growth through technology transfer and entrepreneurship;
4. Understand the critical issues that technology presents policy makers from a perspective of economic fairness, privacy, and respect for humanity.


Additional materials: Spreadsheet with relevant Municipal Statistical Area (MSA) data; selected readings. Though it isn’t required, I advise you sign up for regular email updates from Pitchbook, the Information Technology and Innovation Foundation, MacroPolo (Paulson Institute), ProMarket (Stigler Center), and if you are a New York Times subscriber, the NY Times’ On Tech newsletter.

Course Description: This course will familiarize students with the process for growing a regional innovation economy, and the full range of challenges that technology presents policy makers. We will cover the importance of applied research, the process of technology transfer, clusters, and the role of government support and public policy. We will explore the growth of the San Francisco regional economy (for obvious reasons), while also referring to institutions within the Chicago regional economy. To guide our discussion through the various policy levers used to strengthen regional economic performance, I will take the approach of narrating the growth of the U.S. and international economies since World War II.
Instructor: Thomas Day
Tom is the director of research for Five Forks consulting and a consultant with Intueor Consulting. Previously he helped build The Bunker (now Bunker Labs) into a national nonprofit organization supporting military veteran entrepreneurs. Tom holds degrees from Penn State University, the Medill School of Journalism at Northwestern University, and the University of Chicago’s Harris School of Public Policy. He has authored opinions for the Washington Post, Deadspin, Governing, ESPN the Magazine, Philadelphia Magazine, and Crain’s Chicago Business, and was a McClatchy Newspapers bureau correspondent in Afghanistan in 2009 and 2010.

ADA student accommodations: Any student who believes they may need assistance should inform the Harris dean of students office by the end of the first week of class. The dean of students office will coordinate any student accommodations with Harris instructors. Students with disabilities who have been approved for the use of academic accommodations by Student Disability Services (SDS) and need a reasonable accommodation(s) to participate fully in this course should follow the procedures established by SDS. Please meet with me to discuss your access needs.

Diversity statement: The University of Chicago is committed to diversity and rigorous inquiry that arises from multiple perspectives. I wholeheartedly support this commitment. If there are adjustments that I make to support a more inclusive learning environment, please let me know.

Late-work policy: All assignments are expected to be submitted by email to me by 9:35 a.m. the day they are due. If you would like an extension, please email me with an explanation and expect that the maximum additional time I can provide will be an additional week.

Academic integrity: Collaborating with your colleagues is encouraged. Drawing upon the insight of others is (obviously) required. Copying the work of your classmates and plagiarism will earn you swift referral to Harris School dean of students. All written work must include proper citations.

Grading: You will be graded on three problem sets and your final project. The breakdown is as follows:

- 30% problem sets
- 70% final project
Week-by-week schedule:

**Week 1:** Why do economies grow? Why do some regions grow faster than others? And what is the ultimate goal of economic growth?

**Lecture summary:** We will examine Robert Solow’s exogenous growth model that predominated after the Industrial Revolution, the updated version of the model authored by Paul Romer, and examine relevant data to understand why growth across regional economies has diverged. We will define success for regional economies, a seemingly simple concept that is often lost in regional economic development, and apply production functions in an empirical setting. We will cover U.S. place-based policies and programs that have attempted, with limited success, to catalyze regional growth. We will explore the dramatic changes that have defined the last three decades in the American and international economy after the introduction of the personal computer, where the manufacturing economy has been replaced by the information economy and productivity has been decoupled from wage growth. With these changes have come regional efforts to respond and keep pace.

**Concepts:** Solow and Romer’s growth models, the post-WWI convergence and post-Great Recession divergence of regional economies, U.S. place-based policies, deindustrialization, Growth Per Capita and why we use it as the most critical dependent economic variable, the collapse of the 2019 WeWork IPO.


**For next week:** Open and examine a data set that I will provide, and select a city within the top 40 largest municipal statistical areas to evaluate for this course.

**Week 2:** Where does technology come from? How do federal-university partnerships drive innovation? And what was the real story of how a Northern California orchard became “Silicon Valley”?

**Lecture summary:** Our second week will be focused on the intersection between government and technology. We will draw a map of U.S. research community and understand how research has often been funded by the U.S. military since before World War II. This relationship continues to this day, and we will explore the evolving relationship between the Pentagon and the technology industry. We will delineate basic and applied research, and understand why novel technologies of today trace their roots back to public support for R&D. We will explore the process for bringing a technology into the commercial market beginning with the fundamental discovery that enabled it. For several decades we have lived in a time of very slow growth without a transformative general-

---

1942: The Roosevelt Administration, confronted with a German military that arguably outclasses the Allied Powers in military technology, commissions the U.S. Office of Scientific Research and Development, under the leadership of Vannevar Bush.
purpose technology introduced into the market. We will explore what happened. And we will discuss the concepts of technology push and market pull, and ask ourselves, “Does government create value?” (Answer: yes!).

**Concepts:** Basic and applied research, general purpose technologies, innovation “quad chart,” technology readiness levels, national laboratory system, technology push and pull.

**Reading/Viewing:** “The Entrepreneurial State” by Mariana Mazzucato, chapter 1-2; “The Secret History of Silicon Valley” by Steve Blank (YouTube recording); “Can the Pentagon Lead the Tech Sector Again” by Thomas Day; Congressional Budget Office report on Federally Funded Research and Development Centers (FFRDC).

**Problem Set 1 assigned:** First problem set with ensure complete understanding of the Solow and Romer models and will ask you to explore the research assets of your market.

**Week 3:** How do technologies come out of the laboratory and into the market? How can regions attract the private capital needed to support R&D?

**Lecture summary:** Our third week is about understanding market pull – including urgent problems like COVID-19 that have proven to catalyze rapid technology and market movement to meet demand – and connecting the financial markets to a localized lab-to-product chain. From the support of applied research for defense after World War II came several startups that became the foundation of Silicon Valley. We will explore the formative days of Silicon Valley and trace its path toward the present day. Understanding how Silicon Valley did emerge from a foundation of R&D, we can then deconstruct more recent economic development strategies that have somewhat inverted the playbook, seeking instead to first attract venture capital to support local economic competitiveness. VC appears to have taken on a life of its own in regional economic growth strategies, with some state and local policymakers in regions without much local VC have stepping into the funding void with their own public venture capital funds. We will also explore the role of local real estate and innovation districts like Cambridge’s Kendall Square.

**Concepts:** The connection between urgent national and international problems and funding for research, locally commissioned venture capital funds, capitalization table structure, Qualified Opportunity Zones, real estate development around tech.

**Reading/Viewing:** “The Entrepreneurial State” by Mariana Mazzucato, chapters 3-4; chapter from “Jump-Starting America” by Jonathan Gruber and Simon Johnson; “Why Software is Eating the World” by Marc Andreesen; “The Rise of Innovation Districts” by Julie Wagner and Bruce Katz; Interview with Illinois Treasurer Michael Frerichs; Interview with Julie Wagner, director of the Global Innovation Districts Network.

**Problem Set 1 due**
**Week 4:** How should cities and regions build on their unique assets and advantages? Is it wise to build a regional economy around one core industry or even one company? Or should policymakers look to diversify regional economies?

**Lecture summary:** Harvard Business School's Michael Porter has popularized the "clusters" concept, or the idea that regional economies grow around industries unique to a region's assets. Porter also explores four failed strategies that have undermined previous efforts regional growth: Repealing regulations and lowering taxes to attract industry, building aesthetically pleasing downtowns, going to extreme lengths to attract a headquarters or plant (Amazon HQ2), and following "the next big thing" in technology. We will look at Porter's work and programs guided by cluster-focused economic development. We will also explore growth strategies that drive technology push – R&D tax credits, for example – and strategies drive market pull, such as tax credits for private actors to purchase new technologies. We will discuss how to read corporate tax filings, and how to project the value a corporation holds for investors, and by extension, its home market. We will discuss the proper role of a city in supporting value creation for an employer, be it through public purchases of products or supplying data.

**Concepts:** Clusters and the importance of aligning a region’s research institutions, local incentives to lure corporate relocations, Chicago’s 13 percent approach (against cluster formation), R&D tax credits, Form 10-K.

**Reading/Viewing:** "Making Sense of Incentives" by Timothy Bartik; "Clusters and the New Economics of Competition" by Michael Porter (Harvard Business Review, 1998); "Reshaping Regional Economic Development: Clusters and Regional Strategy" by Michael Porter (YouTube recording); **Optional:** “Turn Detroit into Drone Valley” by Marc Andreesen; “Clusters in Innovation Initiative: Wichita” produced by the Council on Competitiveness at Harvard.

**Problem Set 2 assigned:** Second problem set will examine the economic assets of each city, and where they align with industry.

---

**1957:** The “traitorous eight”, a group of eight engineers employed at Shockley Semiconductor Laboratory in Mountain View, California, leave to form Fairchild Semiconductors, setting in motion the rapid development of the entire semiconductor industry that would assert decades of American leadership in computational technologies.
Week 5: How can cities and regions keep and attract educated and skilled workers? (How have cities repelled skilled workers?) Just how far should policymakers go to attract these works? What is the role of social networks – acting entirely in the private sector – in supporting regional growth?

Lecture summary: In Week 1 we defined a production function that includes technology. This week we will define the relationship between talent and production. Has the relationship between talent (skills) and regional growth increased in recent years? How about wages net of housing and regional growth? We will explore the vital role of housing supply in supporting labor productivity growth. We will explore the race 2017-2018 competition for Amazon’s second headquarters and discuss why cities would be so willing to freely hand out economic incentives to Amazon. This week will be critical in understanding how agglomerating talent into cities drives growth, why a handful of American cities are fast leaving the rest behind, and why this divergence is reaching crisis levels. We will also explore how COVID-19 altered, or didn’t alter, economic agglomeration trends. Our analysis will include an examination of informal networks that have played a central role in growing regional economies. We will seek to understand the importance of addressing the socially progressive views of most high-skill workers, and addressing the lifestyle demands of high-skill workers. We will also explore broadband policy and the challenges facing rural communities as talent increasingly flocks to urban areas, and discuss how this might change as the world emerges from COVID-19.

Concepts: Regional culture, Boston v. San Francisco, the “PayPal mafia,” the movement of people into cities, housing prices and government-driven restrictions on housing supply, immigration and mobile labor, noncompete agreements, the race for Amazon’s HQ2, positive association between production and employment of grads in traded sectors, broadband policy, net neutrality, immigration and regional growth.


1968: In the “mother of all demos,” Douglas Engelbert presents his computer hardware and software system at a conference in San Francisco, marking the beginning of the personal computer revolution that would, over decades, dramatically increase the value of STEM education.
**Week 6:** How do R&D, innovation, and the patent process affect regional growth? What policies can increase these markers of technological change and increase productivity?

**Lecture summary:** We will explore the patenting process, patent law, and the correlation between patenting and regional growth. We will also untangle who is funding R&D at what stage and understand why it is so critical that government support high-risk, high-reward research projects. We will discuss the sweeping changes in R&D in the United States during the 1970s, and how new models for technology commercialization have emerged. Startups commercializing technologies in the high sciences require much more early-stage capital than startups building mobile applications. To help solve this challenge the U.S. federal government has created the Small Business Innovation Research (SBIR) program, which we will explore. With obvious significance to current events, we will also understand the process of clinical trials and validating therapeutics and vaccines.

**Concepts:** Patent law, “patent trolls,” Human Genome Project, technology transfer, Bayh-Dole Act, SBIR, clinical trials.


**Problem Set 2 due**

**Problem Set 3 assigned:** Third problem set will require students take the provided data set and begin not only understanding correlations between explanatory variables – including patents, venture financing, and workforce education – and growth, but begin understanding how to increase regional growth.

---

**1980:** President Jimmy Carter signs the Bayh-Dole Act into law, allowing inventors, research institutions, and small businesses to share ownership of an invention that was enabled by federal funds.
Week 7: Who is driving R&D and innovation in the private sector? How does the growth in open-source innovation affect different regions? What policies can best facilitate technology transfers that raise productivity?

Lecture summary: Gone are the days where a large company like General Electric will take on the risk attendant to building out an invention under their own R&D budget. What happened? What is the new model for supporting corporate innovation and privately funded R&D? What is the role of open-source communities that have only recently entered the consciousness of policymakers and business managers alike? We will understand how corporate innovation has changed and allowed for a market where small- and medium-sized businesses are relied upon to commercialize technologies, yet struggle to challenge “big tech.” And we will discuss the role of Wall Street and its impact on regional economies.

Concepts: Stock buybacks, financialization, private equity, corporate innovation, corporate venture capital, the “innovator’s dilemma,” M&A, open-source innovation, the “fourth industrial revolution,” offshoring and reshoring of manufacturing.

Reading: “The Entrepreneurial State” by Mariana Mazzucato, chapters 7-8; chapter from "Innovator’s Dilemma" by Clayton Christensen; selected excerpt from “From Global to Local” by Finbarr Livesey; “Understanding the Decline of U.S. Manufacturing Employment” by Susan Houseman. Optional: “American Capitalism’s Great Crisis and How to Fix It” by Rana Foroohar.

1982: The U.S. Securities and Exchange Commission issues a rule that effectively legalizes stock buybacks, a process that had previously been recognized as market manipulation, allowing corporations to purchase large holdings of its own shares.

2001: China is welcomed into the World Trade Organization and the dot com bubble bursts.

Week 8: How has R&D and technology policy moved to the center of global power competition? Instead of simply competing with China, should the U.S. be replicating its industrial policies? How will increasing antitrust scrutiny of big tech firms affect future innovation and productivity growth?

Lecture summary: The international market for technology is rapidly changing, with capital instantly moving across borders, putting startup entrepreneurs and regional innovation economies at the intersection of global politics. We will understand how the market for technology has changed, and what local policymakers need to know in this new marketplace. We will familiarize ourselves with the Chinese and American innovation models, and how the Chinese government has expanded public support for private enterprise to advance their economy right up to the point where they threaten to bypass the U.S. in critical fields of technology. We will also discuss “big tech” and what the growth of the big five tech firms – Google, Facebook, Amazon, Microsoft, and Apple – has meant for regional economies. And we will explore the recent push to exercise antitrust enforcement in regulating these firms.
**Concepts**: Standards, the “Tech Cold War,” China’s special economic zones, Committee on Foreign Investment in the United States (CFIUS), Made in China 2025, the big five technology companies, American and global regulation of technology corporations.

**Reading/Viewing**: “The Entrepreneurial State” by Mariana Mazzucato, chapter 9; Chapter from “AI Superpowers: China, Silicon Valley, and the New World Order” by Kai-Fu Lee; “In the Age of AI” (Frontline episode); Interview with Matt Stoller, author of “Goliath.”

**Problem Set 3 due**

**Week 9**: How did 2007-2009 financial crisis change regional economies? How has COVID-19 changed regional economies? What new sectors will drive value in the 2020s? And are we at the beginning of several new technology frontiers that could fundamentally change humanity?

**Lecture summary**: We will discuss current trends that define technology market, including the current race to build 5G networks, autonomous vehicles, and the Internet of Things (IOT). Our conversation will explore how policymakers can anticipate the dramatic economic changes these new technology fields will catalyze in the near future, and how to make technology work for, not against, communities. Our course will end with a look toward the future and discuss what I believe to be the most promising drivers of future value: quantum computing, nanotechnology, and genomic sciences.

**Concepts**: 5G, quantum computing, nanotechnology, genomics, CRISPR, Elon Musk v. Jeff Bezos and the race to space, mRNA therapeutics.

**Reading/Viewing**: Interview with Dr. Matthew Tirrell, dean of the Institute for Molecular Engineering at the University of Chicago.

**Final Project due**

---

**2008**: Lehman Brothers, holding more than $600 billion in assets, files for Chapter 11 bankruptcy, throwing the global economy into the chaos and marking the beginning of a post-Great Recession economy where “tech cities” dominate everyone else.