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| Johns Hopkins Carey Business School | Infrastructure Development for Sustainable Cities 2 Credits  BU.241.735.XX  [**NOTE:** Each section must have a separate syllabus.]  [Day &Time / ex: Monday, 6pm-9pm]  [Start & End Dates / ex: 3/24/17–5/12/17]  [Semester / ex: Spring 2017]  [Location / ex: Washington, DC] |

## Instructor

[Full Name]

## Contact Information

[Email Address]

[Phone Number, ###- ###-#### (Optional)]

## Office Hours

[Please specify the **day and time** of the 2 hours that will be dedicated to office hours each week. For evening classes, faculty may wish to hold their office hours by phone or email. While faculty are permitted to state “and by appointment,” office hours should not be held exclusively by appointment.]

## Required Text(s) & Learning Materials

Spiro Pollalis, Andre Georgoulias, Stephen Ramos and Daniel Schodek (editors). *Infrastructure Sustainability and Design.* Routledge, Taylor and Francis, New York. 2012.

## Additional suggested references:

Arthur O’Sullivan. Urban Economics. 8th Edition. McGraw Hill. 2012.

Matthew Khan. Fundamentals of Environmental and Urban Economics. Amazon Publishing.

John Sutton. Gridlock: Congested Cities, Contested Policies, Unsustainable Mobility. Routledge. 2016.

Charles Montgomery. Happy City. Random House. 2013.

Edward Glaeser. Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier. Penguin Random House. 2012.

## Course Description

This course provides an understanding of the demand for, and supply of, sustainable infrastructure related to the pace of urbanization across the globe. The challenges for both developing and developed countries is examined from the perspective of potential new strategies, new technologies, new business models, and new financing techniques that could make a difference in addressing a full range of infrastructure needs while addressing sustainability objectives. In terms of sustainability, this will include an understanding of the demand and supply side, cultural factors, the policy framework, and the potential impact of technology and innovation. This course was previously titled Sustainable Cities: Urbanization, Infrastructure, and Strategic Choices.

## Prerequisite(s)

None

## Learning Objectives

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

1. Understand the consequences of urban growth on the demand for infrastructure from a global perspective.
2. Assess the challenges for both developing and developed countries to devise new strategies, new technologies, new business models, and new financing techniques.
3. Equip students to think about some of these challenges, many of which present new business opportunities and partnership arrangements.
4. Learn how the private sector can make a difference in ways that can serve societal needs and contribute to improved living conditions that are essential to sustainability imperatives.

To view the complete list of Carey Business School’s general learning goals and objectives, visit the [Carey website](http://carey.jhu.edu/faculty-research/teaching-learning-at-carey/learning-assessment/).

Attendance   
Attendance and class participation are part of each student’s course grade. Students are expected to attend all scheduled class sessions. Regular attendance and active participation are required for students to successfully complete the course.

## Assignments

The final Project, called The Sustainability Challenge, Additionally, will allow students to choose one of different proposed topics to develop a research paper. Also, students must produce a *Tableau Story* to present the work for class. Examples of previous Tableau stories in the class can be found at:

<https://public.tableau.com/profile/infrdevelopmentsustcities#!/>

One exam will be given. Dates TBA.

| **Assignment** | **Weight** |
| --- | --- |
| Exam one | 30% |
| Project | 50% |
| Cases and Assignments | 20% |
| Total | 100% |

## Grading

The grade of A is reserved for those who demonstrate extraordinarily excellent performance as determined by the instructor. The grade of A- is awarded only for excellent performance. The grades of B+, B, and B- are awarded for good performance. The grades of C+, C, and C- are awarded for adequate but substandard performance. The grades of D+, D, and D- are not awarded at the graduate level (undergraduate only). The grade of F indicates the student’s failure to satisfactorily complete the course work.

Please note that for Core and Foundation courses, a maximum of 25% of students may be awarded an A or A-; the grade point average of the class should not exceed 3.3. For Elective courses, a maximum of 35% of students may be awarded an A or A-; the grade point average of the class should not exceed 3.4. (For classes with 15 students or fewer, the class GPA cap is waived.)

## **Tentative Course Calendar**

Instructors reserve the right to alter course content and/or adjust the pace to accommodate class progress. Students are responsible for keeping up with all adjustments to the course calendar.

The course is organized in a series of topics that proceed from the macro to the micro – from a global scale to the level of particular technologies. The course will rely on readings and research papers. Class discussion may result in an expanded list of topics to reflect a more insightful view of some of the key issues. Students are required to come to class well prepared for discussion. Additional readings may be added for each session as new topics arise in class discussions.

**Course Sections**

1. **Urbanization – Challenges and Opportunities:** Urbanization in developing countries is the defining feature of the 21st century. Global urban expansion poses a fundamental challenge and opportunities for cities, nations, and the international community. Consequences of urbanization include traffic congestion, environmental degradation including air and water pollution, resource scarcity, increase in poverty and crime, and the creation of slums. However, it is only through cities that the challenges of poverty reduction, economic growth, environmental sustainability, and climate change may be addressed. These are challenges that have relevance right down to the building level.
   * Main reading materials:
     + Case LIVING PLANIT from Harvard Business Publishing case course pack (<http://cb.hbsp.harvard.edu/cbmp/access/55980141>)
     + [Inside Songdo, The City Designed From Scratch To Be Sustainable](https://www.fastcoexist.com/3064402/inside-songdo-the-city-designed-from-scratch-to-be-sustainable). Fastcoexist. 2016.
   * Additional readings:
     + McKinsey Global Institute. Urban World: **Mapping the economic power of cities**. McKinsey & Company. 2011.
     + World Bank. 2009. World Development Report 2009: Reshaping Economic Geography. pp. 48-72, 126-145, 198-230.
     + [The growing distance between people and jobs in metropolitan America](https://www.brookings.edu/wp-content/uploads/2016/07/Srvy_JobsProximity.pdf). Kneebone E. and Holmes N. Brookings. 2015.
     + [Sustainable Development and Planetary Boundaries](http://www.post2015hlp.org/wp-content/uploads/2013/06/Rockstroem-Sachs-Oehman-Schmidt-Traub_Sustainable-Development-and-Planetary-Boundaries.pdf). Johan Rockstrom et al. (22 pages).
2. **Sustainability – What Does It Mean and Why It Is Difficult to Attain?:** Sustainability must be understood in its broader context with respect to the consequences of demographic trends, lifestyle choices, consumption patterns, resources constraints, and infrastructure. Central to the sustainability debate is the ability to achieve convergence on what sustainability means, the metrics by which we can measure performance, and the targets that we hope to achieve, and when. A clearer understanding of sustainability should prompt better solutions to what we build, where we build, and how we build in the future. Once a concept is agreed upon, it is necessary to understand whether sustainability requires regulation or whether the market can deliver efficient solutions. Understanding the role of public and private costs and benefits, and the issues of coordination of the different agents involved, is key to understand how to address sustainability issues and why cities have been unsuccessful in tackling many of the sustainability problems.
   * Main reading Materials:
     + Spiro Pollalis, Andre Georgoulias, Stephen Ramos and Daniel Schodek (editors). **Infrastructure Sustainability and Design.** Edited by. Routledge, Taylor and Francis, New York. 2012. Part 1: Dimensions of Sustainability: pp. 9-70.
   * Additional readings:
     + [The Porter Hypothesis at 20: Can Environmental Regulation Enhance Innovation and Competitiveness](http://www.isc.hbs.edu/Documents/pdf/PorterHypothesis_at20_Montreal.pdf). Ambec S., Cohen M., Elgie S., and Lanoie P. 2010.
     + [The Non-Tragedy of the Commons](http://tierneylab.blogs.nytimes.com/2009/10/15/the-non-tragedy-of-the-commons/?_r=0). John Tierney. The New York Times. 2009.
     + [The Tragedy of the Commons](http://science.sciencemag.org/content/162/3859/1243.full). Garrett Hardin. Science 13 Dec 1968: Vol. 162, Issue 3859, pp. 1243-1248.
     + [Community-run fisheries: avoiding the 'tragedy of the commons'](http://www.perc.org/articles/community-run-fisheries-0). Leal, D. 1996.
     + [Elinor Ostrom's 8 Principles for Managing A Commmons](http://www.onthecommons.org/magazine/elinor-ostroms-8-principles-managing-commmons). Walljasper, J. On the Commons.
     + [The Coase Theorem is widely cited in economics. Ronald Coase hated it.](https://www.washingtonpost.com/news/wonk/wp/2013/09/04/the-coase-theorem-is-widely-cited-in-economics-ronald-coase-hated-it/) Lee, T. The Washington Post. 2013.
     + [The Problem of Social Cost.](http://econ.ucsb.edu/~tedb/Courses/UCSBpf/readings/coase.pdf) Coase, R. Law and Economics. Vol 2. 1960.
     + [The Fannie and Freddie Solution for Pollution](http://dailysignal.com//2010/05/13/the-fannie-and-freddie-solution-for-pollution/). Mason, D. The Daily Signal. The Heritage Foundation. May 13, 2010.
     + [The Coase Theorem](http://encyclo.findlaw.com/0730book.pdf). Medema, S., and Zerbe, R.Encyclopedia of Law and Economics. 1999.
     + [Other Things Equal, The so-called Coase Theorem](http://www.deirdremccloskey.com/docs/pdf/Article_306.pdf). McClosekey, D.
3. **Sustainable Urban Infrastructure – What Does This Encompass?** Urban infrastructure is essential to buildings cities and generally refers the “hard” systems - transportation, telecommunications, energy, water, sanitation, and waste. On the “soft” side are health, education, social services, security and natural areas. To this list must be water and food. The requirements of each must be examined and understood in a socio-political, cultural and economic context. Each must be examined separately, either as networks or nodes, then collectively. In terms of sustainability the challenge is with methods of measurement and performance evaluation, typically applied to complex systems. Compounding the problem is the many stakeholders involved in the lifetime of most infrastructure systems.
   * Main reading Materials:
     + Spiro Pollalis, Andre Georgoulias, Stephen Ramos and Daniel Schodek (editors). **Infrastructure Sustainability and Design.** Edited by Routledge, Taylor and Francis, New York. 2012. Part 2: Sustainable Practice in Infrastructure Systems: pp. 71-168. Part 3: Assessing Urban Infrastructures: pp. 169-244.
     + Energy: cases COAL, NUCLEAR, NATURAL GAS, OIL, OR RENEWABLE: WHICH TYPE OF POWER PLANT SHOULD WE BUILD?, and BRIGHTSOURCE: CHALLENGES AND PROSPECTS FOR A CONCENTRATED SOLAR POWER PLANT from Harvard Business Publishing case course pack (<http://cb.hbsp.harvard.edu/cbmp/access/55980141> )
     + Water: cases WATER SHORTAGE AND PROPERTY INVESTING IN MEXICO CITY, MEXICO CITY WATER SHORTAGE, and CITY WATER TANZANIA (A): WATER PARTNERSHIPS FOR DAR ES SALAAM from Harvard Business Publishing case course pack (<http://cb.hbsp.harvard.edu/cbmp/access/55980141> )
     + Transportation: Rose Smart Growth Investment Fund from Harvard Business Publishing case course pack (<http://cb.hbsp.harvard.edu/cbmp/access/55980141> )
   * Additional readings:
     + [Cities Infrastructure: a report on sustainability](https://home.kpmg.com/content/dam/kpmg/pdf/2012/05/Cities-Infrastructure-a-report-on-sustainability.pdf). KPMG 2012.
     + **Growing resources for growing cities: Density and the cost of municipal public services in Latin America**. Libertun et al. Urban Studies Journal. September 2015.
4. **Climate Change** Climate change is one of the biggest challenges of our time. Average temperatures have risen to record levels. This has affected the frequency and strength of extreme weather events. These changes affect productivity, health, and in some cases even the survival of vulnerable cities. Furthermore, contribution to the causes and vulnerability to the effects is unequally distributed both across and within countries. Cities real estate and infrastructure face strong challenges with climate change. Infrastructure plays a particularly important role, in addressing vulnerabilities. It is also one of the main victims of extreme weather effects. As stated by the National Climate Assessment 2014 Report “Infrastructure is being damaged by sea level rise, heavy downpours, and extreme heat; damages are projected to increase with continued climate change”. In particular, essential infrastructure systems such as water, energy supply, and transportation will increasingly be compromised. Taking steps to address this crisis is urgent, but it requires a level of global coordination that we are far from reaching. Additionally, polarization in the political scene of this topic has made relevant policy and reform become harder than ever to implement.
   * Main reading Materials:
     + Spiro Pollalis, Andre Georgoulias, Stephen Ramos and Daniel Schodek (editors). **Infrastructure Sustainability and Design.** Edited by Routledge, Taylor and Francis, New York. 2012. Part 2: Sustainable Practice in Infrastructure Systems: pp. 71-168. Part 3: Assessing Urban Infrastructures: pp. 169-244.
     + Cases The Big Easy, Not So Easy and THE POLITICAL ECONOMY OF CARBON TRADING from Harvard Business Publishing case course pack (<http://cb.hbsp.harvard.edu/cbmp/access/55980141> ).
     + [**http://thesolutionsproject.org/infographic/**](http://thesolutionsproject.org/infographic/)
5. **Sustainability at a Building/Neighborhood Level:** Multiple of attributes are at play at the micro-level to reduce the environmental impacts of new construction. Given the large impact construction and operation of buildings has on sustainability (the EPA estimates that these activities account for about 40% of U.S. energy consumption and almost three-quarters of U.S. electricity consumption), as well as on the bottom line of private firms, it is fundamental to understand the benefits of making these operations more energy efficient. Empirical work has shown that energy efficient buildings and related infrastructure not only improves sustainability measures but also increases profits of real estate holdings. In this section we analyze how energy efficient infrastructure, especially buildings, can be implemented and the impact this implementation, especially LEED certification, has on the performance of the real estate assets.
   * Main reading Materials:
     + [**Why LEED Certification Matters to your Bottom Line**](https://www.usgbc.org/sites/default/files/Why%2520Certification%2520Matters-FINAL.pdf)**.** USGBC.
     + Piet Eichholtz, Nils Kok and John M. Quigley. [**The Economics of Green Building**](http://www.mitpressjournals.org/doi/abs/10.1162/REST_a_00291)**.** The Review of Economics and Statistics. Volume 95, Issue 1.
     + Gilbert E. Metcalf and Kevin A. Hassett. [**Measuring the Energy Savings from Home Improvement Investments- Evidence from Monthly Billing Data.**](http://www.mitpressjournals.org/doi/abs/10.1162/003465399558274)Review of Economics and Statistics. Volume 81, Issue 3, August 1999, pp. 516-528.
     + Piet Eichholtz, Nils Kok, and John M. Quigley. [**Doing Well by Doing Good? Green Office Buildings.**](http://urbanpolicy.berkeley.edu/pdf/aer_revised_proof_101910.pdf)American Economic Review Number 100, pp. 2492–2509.
     + Franz Fuerst and Patrick McAllister. [**Green Noise or Green Value? Measuring the Effects of Environmental Certification on Office Values**](http://immobilierdurable.eu/images/2128_uploads/Fuerst_article_autoris_.pdf). Real Estate Economics. Vol 39, No 1, pp. 45–69.
     + Nils Kok, Marquise McGraw, and John M. Quigley. [**The Diffusion of Energy Efficiency in Building**](https://www.aeaweb.org/articles?id=10.1257/aer.101.3.77). American Economic Review. Vol 101, No. 3.
     + Arik Levinson. [**How Much Energy Do Building Energy Codes Save? Evidence from California Houses.**](http://faculty.georgetown.edu/aml6/pdfs&zips/BuildingCodes.pdf) American Economic Review. Vol 106, No 10, pp. 2867–2894.
   * Additional readings:
     + Benjamin F. Zaitchik, Kathleen O’Meara, Kristin Baja, Anna A. Scott, Darryn W. Waugh and Meredith C. McCormack. [**B’more Cool: Monitoring the Urban Heat Island at High Density for Health and Urban Design**](https://earthzine.org/2016/02/23/bmore-cool-monitoring-the-urban-heat-island-at-high-density-for-health-and-urban-design/)**.** earthzine.org.
     + Gensler. Impact by Design. [**Sustainable Performance, Environmental Impact, Design Innovation.**](https://www.gensler.com/uploads/document/545/file/Gensler-Impact-by-Design-2017.pdf)
     + MacCleery, R., Peterson C., and Stern, J.D. **Shifting Suburbs: Reinventing Infrastructure for Compact Development.** Urban Land Institute. 2012.
     + Cases DESIGN CREATES FORTUNE: 2000 TOWER OAKES BOULEVARD, Reawakening the World’s Most Famous Office Building, and THE GREEN DUPLEX (residential) from Harvard Business Publishing case course pack (<http://cb.hbsp.harvard.edu/cbmp/access/55980141>).
6. **Demand and Supply of sustainable infrastructure.** This is one of the most difficult challenges given the lack of data, the proliferation of misinformation, and the politics involved. In emerging economies, the gap between demand and supply is rapidly expanding, while capacity building is severely constrained. Driving demand is the scale and rate of urbanization within developing countries that face serious resource constraints (natural, fiscal, administrative and technical). Driving supply are the international capital markets, entrepreneurship, technology, and political will. Creative, practical and cost-effective measures, many of which are home-grown, are already in use to address local needs and may soon influence the way that demand and supply are traditionally defined and measured.
   * Main reading Materials:
     + McKinsey Quarterly. **Mobilizing for a resource revolution**. McKinsey Global Institute. McKinsey & Company. January 2012.
     + McKinsey Global Institute. **Urban World: Cities and the rise of the middle class**. McKinsey & Company. June 2012.
     + McKinsey Global Institute. **Resource Revolution: Meeting the world’s energy, materials, food and water needs.** McKinsey & Company. 2011.
   * Additional readings:
     + Sustainable Service Delivery in an Increasingly Urbanized World. USAID Policy Note. 2013.
     + [Methodologies and Tools for Forecasting Infrastructure.](http://www.ifs.du.edu/assets/documents/PPHP4/PPHP4_Chapter4.pdf)Patterns of Potential Human Progress Volume 4: **Building Global Infrastructure.** The Frederick S. Pardee Center for International Futures, IFS.

## Carey Business School Policies and General Information

### Blackboard Site

A Blackboard course site is set up for this course. Each student is expected to check the site throughout the semester as Blackboard will be the primary venue for outside classroom communications between the instructors and the students. Students can access the course site at <https://blackboard.jhu.edu>. Support for Blackboard is available at 1-866-669-6138.

### Disability Support Services

All students with disabilities who require accommodations for this course should contact Disability Support Services at their earliest convenience to discuss their specific needs. If you have a documented disability, you must be registered with Disability Support Services ([carey.disability@jhu.edu](mailto:carey.disability@jhu.edu) or 410-234-9243) to receive accommodations. For more information, please visit the [Disability Support Services webpage](http://carey.jhu.edu/life-at-carey/student-resources/disability-services).

### Academic Ethics Policy

Carey expects graduates to be innovative business leaders and exemplary global citizens. The Carey community believes that honesty, integrity, and community responsibility are qualities inherent in an exemplary citizen. The objective of the Academic Ethics Policy (AEP) is to create an environment of trust and respect among all members of the Carey academic community and hold Carey students accountable to the highest standards of academic integrity and excellence.

It is the responsibility of every Carey student, faculty member, and staff member to familiarize themselves with the AEP and its procedures. Failure to become acquainted with this information will not excuse any student, faculty, or staff from the responsibility to abide by the AEP. Please contact the [Student Services office](mailto:carey.student@jhu.edu) if you have any questions. For the full policy, please visit the [Academic Ethics Policy webpage](http://carey.jhu.edu/ethics-policy).

### Student Conduct Code

The fundamental purpose of the Johns Hopkins University’s regulation of student conduct is to promote and to protect the health, safety, welfare, property, and rights of all members of the University community as well as to promote the orderly operation of the University and to safeguard its property and facilities. As members of the University community, students accept certain responsibilities which support the educational mission and create an environment in which all students are afforded the same opportunity to succeed academically. Please contact the [Student Services office](mailto:carey.student@jhu.edu) if you have any questions. For the full policy, please visit the [Student Conduct Code webpage](https://studentaffairs.jhu.edu/policies/student-code/).

### Student Success Center

The Student Success Center offers free online and in-person one-on-one and group coaching in writing, presenting, and quantitative courses. For more information on these services and others, or to book an appointment, please visit the [Student Success Center website](http://carey.jhu.edu/life-at-carey/student-development/academic-support/student-success-center/).

### Other Important Policies and Services

Students are encouraged to consult the [Student Handbook and Academic Catalog](http://carey.jhu.edu/life-at-carey/student-resources/student-handbook-and-academic-catalog/) and [Student Services and Resources](http://carey.jhu.edu/life-at-carey/student-resources/) for information regarding other policies and services.

### Copyright Statement

Unless explicitly allowed by the instructor, course materials, class discussions, and examinations are created for and expected to be used by class participants only. The recording and rebroadcasting of such material, by any means, is forbidden. Violations are subject to sanctions under the [Academic Ethics Policy](http://carey.jhu.edu/ethics-policy).