CE 699-001

The Science of Cities

Fall 2020
3 Credits
Time: MWF 9-9:50 am
Location: F Paul Anderson Tower (FPAT) 253
Zoom: https://uky.zoom.us/j/2204743066

Instructor Information

Instructor: Professor Greg Erhardt
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Office Hours: Monday 10-11 am and Thursday 9:30-10:30 am

I expect to be on-campus on Mondays and Thursday. You are welcome to stop by. I will be available for Zoom office hours at the times noted above at: https://uky.zoom.us/j/2204743066

Course Description

This course covers contemporary research topics about cities, focusing largely on transportation systems. In doing so, students will examine what it means to be an engineer and a scientist and a researcher, and practice the skills necessary to do so successfully, including research design and written and oral communication.

Civil Engineers design the infrastructure that enables cities to function. But how do cities themselves function? How do people interact with that infrastructure? How can we better inform the design and selection of that infrastructure? This course examines how science can help us answer those questions, with the ultimate goal of promoting the public health, safety and welfare.

It is intended for graduate students in civil engineering, urban planning and related disciplines who share a common interest in cities and science. It will cover contemporary research topics about cities, focusing largely on the transportation systems that form their backbone. In doing so, students will examine what it means to be an engineer, a scientist and a researcher, and practice the skills necessary to do so successfully. These include effectively engaging with academic literature, crafting research questions that tie into broader design and policy questions, and communicating a clear story through their writing.

Format

This will be an in-person COVID-adaptive course. We will follow the risk levels defined by the Harvard Global Health Institute (https://globalhealth.harvard.edu/key-metrics-for-covid-suppression-researchers-and-public-health-experts-unite-to-bring-clarity-to-key-metrics-guiding-coronavirus-response/). Following our initial meeting, subsequent classes will take place in-person if the risk level is green or yellow. They will take place online if the risk level is orange or red. Students will be notified of any changes, and are expected to participate accordingly.

Student Learning Outcomes

After completing this course, the student will be able to:

1. Articulate the value of cities and the challenges they face.
2. Anticipate how both the value and challenges of cities may or may not change due to COVID-19.
3. Describe the role of engineers, scientists and policy-makers in supporting cities.
4. Understand contemporary academic literature related to transportation, urban form, and environmental impacts.
5. Efficiently read a relevant research paper and formulate an effective *Nature* summary paragraph for that paper.
6. Conduct a rapid evidence assessment (a type of literature review).
7. Evaluate the scientific merits of a relevant research paper and write a peer review.
8. Write an effective research proposal.

Required Reading

Glaeser, Edward L., *Triumph of the City* (New York, 2011)
Heard, Stephen B., *The Scientist's Guide to Writing* (Princeton, 2016)
Journal articles and other readings as assigned.

Activities, Assignments and Grading

Grading Scale

90 - 100% = A
80 – 89% = B
70 – 79% = C
Below 70%= E

Grading Components

40% - in-class participation and exercises
60% - assignments

Expected Assignments

A typical week will include a lecture on content, a lecture or activity on process, and a student-led discussion of research papers. On a typical week, students will be expected to read ~2 journal articles, write a *Nature* summary paragraph for each, and in rotation lead a discussion of the paper. In addition, several assignments are expected as follows:

- Following from the themes in *Triumph of the City*, write an ~5 page essay to 1) explain why UK is committed in the long-term to an in-person residential experience, and 2) propose what aspect of that experience we should prioritize or replicate during COVID restrictions.
- Conduct a peer-review of a selected paper
- Conduct a rapid-evidence assessment on a topic of your choosing
- Write a concise research proposal
- Review a classmate's research proposal
- Revise your research proposal based on the reviews you receive.

Students may select topics that are of interest to them and/or relevant to their research. All assignments should be submitted on-time via canvas.

Tentative Course Schedule

The expected course schedule is below. All components are subject to change.

Week	Content Topics	Process Topics	Reading	Assignments Due
1	Why cities?		Editorial Board, "The Cities We Need", New York Times, May 11, 2020 O'Sullivan, Chapter 1: Introduction and the Axioms of Urban Economics O'Sullivan, Chapter 2: Why do Cities Exist?	
2	Why science?	What makes something scientific? Papers as stories	Heard, Part 1: What Writing Is Casadevall, Arturo, and Ferric C. Fang. "Rigorous Science: A How-To Guide." MBio 7, no. 6 (December 30, 2016): e01902-16.	
3	What's special about the fire hydrant? Water, sewers and public services	Research questions and policy questions	Roche Phillips, Lynn. "A Comparative Study of Growth Management Effectiveness and Urban Sprawl in Two Thoroughbred Landscapes in the U.S." Applied Geography 65 (December 2015): 58–69. Walski, Thomas M. "A History of Water Distribution." Journal - American Water Works Association 98, no. 3 (March 2006): 110–21.	
4	Is transportation a good investment? The economics of transportation and accessibility	Efficient multi-level reading	Heard, Part 2: Behavior Drennan, Mathew, and Charles Brecher. "Does Public Transit Use Increase the Economic Efficiency of Urban Areas?" Journal of Transport and Land Use 5, no. 3 (December 26, 2012). Wachs, Martin. "Transportation, Jobs, and Economic Growth." Access Magazine, Spring 2011.	
5	If you build it, will they come? Induced demand and sprawl	Literature Reviews	Volker, et al (2020). "Induced Vehicle Travel in the Environmental Review Process." Transportation Research Record. Hoque, Jawad Mahmud, Gregory D. Erhardt, David Schmidt, Mei Chen, Ankita Chaudhary, Martin Wachs, and Reginald Souleyrette. "The Changing Accuracy of Traffic Forecasts." Transportation, in-review.	
6	Why is transit ridership declining?	Peer Reviews	Boisjoly, et al. (2018) "Invest in the Ride: A 14 Year Longitudinal Analysis of the Determinants of Public Transport Ridership in 25 North American Cities." Transportation Research Part A: Policy and Practice. Graehler, et al (2019). "Understanding the Recent Transit Ridership Decline in Major US Cities: Service Cuts or Emerging Modes?" In Transportation Research Board Annual Meeting.	UK COVID Assignment
7	What's the impact of the "ridesharing"?	Paper Structure	Heard, Part 3: Content and Structure Erhardt, et al. (2019) "Do Transportation Network Companies Decrease or Increase Congestion?" Science Advances	Paper Peer Review

8	When does the math matter?	Methods Papers	Bhat, Chandra R. "A Heteroscedastic Extreme Value Model of Intercity Travel Mode Choice." Transportation Research Part B: Methodological 29, no. 6 (December 1995): 471–83.	
9	Why is the rent so damn high?		Dougherty, Connor, "Build Build Build Build Build Build Build Build Build Build Build Build", New York Times, Feb 13, 2020 Been, Vicki, Ingrid Gould Ellen, and Katherine O'Regan. (2019) "Supply Skepticism: Housing Supply and Affordability." Housing Policy Debate.	Literature Review Matrix
10	When do markets matter?	Proposal Structure	Waddell, Paul. "UrbanSim: Modeling Urban Development for Land Use, Transportation, and Environmental Planning." Journal of the American Planning Association 68, no. 3 (September 30, 2002): 297–314. Kahlenberg, Richard D. "Minneapolis Saw That NIMBYism Has Victims." The Atlantic, October 24, 2019.	Draft Proposal Story Summary
11	What will happen when the cars drive themselves?		Millard-Ball, Adam. (2019) "The Autonomous Vehicle Parking Problem." Transport Policy. National Association of City Transportation Officials. "Blueprint for Autonomous Urbanism: Second Edition," September 5, 2019.	Literature Review Summary
12	But the design guide told me to! The importance of context-sensitive design	Style	Heard, Part 3: Style Stamatiadis, N. (2005) "Context-Sensitive Design: Issues with Design Elements." Journal of Transportation Engineering. Stamatiadis and Hartman. (2011) "Context-Sensitive Solutions versus Practical Solutions: What Are the Differences?" Transportation Research Record.	Proposal Story Summary
13	Why are cars still so dangerous? Analyzing traffic safety	Revision	Zipper, David. "The Life-Saving Car Technology No One Wants." Bloomberg CityLab, August 12, 2020. Casualty Actuarial Society Automated Vehicles Task Force. (2014) "Restating the National Highway Transportation Safety Administration's National Motor Vehicle Crash Causation Survey for Automated Vehicles." Casualty Actuarial Society E-Forum.	
14	What are the structures of structural racism?	Communicating with Policy-Makers	Wilkerson, Isabel, "America's Enduring Caste System", New York Times Magazine, July 1, 2020 TBD	Draft Proposal
15	Wild card & Thanksgiving			Proposal Peer Reviews
Finals Week				Final Proposals

Technology Information and Requirements

Minimum technical requirements for UK courses and suggested hardware, software, and internet connections are available at ITS Student Hardware & Software Guidelines.

Students should have a computer with a webcam, microphone, and stable internet connection suitable for participation in an online class. Students should sign up for their own Zoom account for use in interacting with small groups and homework partners. All UK students receive a free Zoom Pro account. For collaborative problem solving, I recommend that you use your phone as a document camera, or that you use a drawing program such as the Zoom whiteboard or Google Jamboard in conjunction with a tablet.

For account help, contact UK's Information Technology Customer Services online, by email, or by phone at 859-218-HELP (4357). For general technical support, contact Engineering Computing Services via their request form.

Attendance

This is a small class and active participation is central to its success, so is required. This means being present and engaged in the discussion. If the meeting is online, students should participate on-camera and with sound.

Excused absences are allowed in accordance with *Senate Rules 5.2.5.2.3.3*, described below. Students who do not feel well, who have a fever, who are under a quarantine order, or who may have been exposed to COVID-19 should self-isolate and avoid coming to class. They should notify the instructor. When practical, they can participate remotely and when not practical, a suitable make-up assignment will be arranged.

Behavior

Students are expected to live up to the principles of the University of Kentucky creed:

- I promise to strive for academic excellence and freedom by promoting an environment of creativity and discovery.
- I promise to pursue all endeavors with integrity and compete with honesty.
- I promise to embrace diversity and inclusion and to respect the dignity and humanity of others.
- I promise to contribute to my University and community through leadership and service.
- I promise to fulfill my commitments and remain accountable to others.

The student code of conduct, along with the policies of the university and the College of Engineering, puts these principles into practice. Details of the code of conduct can be found at http://www.uky.edu/StudentAffairs/Code/part1.html.

Any form of academic dishonesty will not be tolerated. Bullying, acts of hate, or discrimination on the basis of race, sex, religion, national origin, age, disability status or sexual orientation will not be tolerated. Masks and social distancing is required for any in-person interaction. Appendix A lists detailed class and university policies.

Resources

Appendix B lists relevant resources. The Writing Center may be of value in this class. Students are encouraged to take advantage of it.