

Syllabus
URSP688Y | INST728G Smart Cities and Urban Data Analytics
Spring 2022

Course: URSP688Y | INST728G Smart Cities and Urban Data Analytics

Section: 0101; Tuesdays, 4:00 - 6:30 PM

Room: ARC 1105

Instructor: Dr. C. Scott Dempwolf (he/him/his)

Office Hours: TBA / by appointment

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Catalog Description

This course begins by looking at great cities throughout history and how they were shaped – for better or worse – by emerging technologies that shaped everything from water to sewers, electricity, communications, transportation, shipping, commerce, housing, governance, and services. We then abstract city life into patterns that associate structure in the built environment with human activities. Such patterns are the foundation for an object-oriented perspective on cities that helps frame the development of data-driven models of human activities and the city systems that support them. Ultimately, “Smart” cities are cities that understand that technology must always be in service to humanity. Understanding how and why people use cities must always precede technology adoption. Students will explore these and other smart city concepts through readings, discussions, lectures, reflections, and a semester project.

Course Description and Structure: What are Smart Cities?

“Smart Cities” is an emerging area of research and practice that focuses on the next technological evolution of cities and urban life driven by big data, urban analytics, and widespread connectivity. While individual cities range in age from a few years to a few millennia, the concept of cities as places where people gather to live and trade, is ancient. Urban planners, geographers, sociologists, and economists have studied where and why cities emerged as they did, and how they evolved. This course frames the next technological evolution – the use of data analytics and information technologies to gather, process and transform data into actionable information in real time – in this historical context.

Technological evolutions or revolutions are not easy or fair. Urban sociologist Patrick Geddes said, “a city is more than just a place in space; it is a drama in time.” History teaches us that the process of technological change in cities can have lasting and sometimes damaging impacts on cities, neighborhoods, and people. Periods of rapid technological change have been correlated

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with increasing inequality in cities. The long-term impacts of the process may ripple well beyond a single city or neighborhood. For example, the urban planning profession as we know it today was dramatically restructured – for better and worse – in the wake of the epic battle between Robert Moses and Jane Jacobs in New York City. That restructuring resulted in many more protections against bad redevelopment practices for residents and neighborhoods. However, it can be argued that the backlash against Moses and physical planning sacrificed legitimate public interests and opened the door for suburban sprawl and placeless strip development. Choices and process matter.

Cities that flourished often held comparative advantages over other places in terms of access to raw materials or transportation modes and routes. Technological advancement has always impacted cities. New building materials like concrete; infrastructure from ancient roman aqueducts and public sanitation to electrical power and communications lines; transportation from ox carts to ships, canals, railroads, trolleys, subways, airplanes, and the ubiquitous automobile have all influenced the design, function, and experience of cities. Along with transportation, communications technologies – from the printing press to telegraph, telephone, internet, and latest wireless technologies – have had impacts on cities because they enhance the very reasons why cities formed in the first place – to facilitate social interaction and trade. To understand how smart city technologies might be used we need to understand how and why people use cities. Cities are ultimately about face-to-face interaction and variety. Smart city technologies will succeed to the extent that they facilitate the purpose of cities and enhance their users’ urban experience.

In historical context the smart city evolution is just beginning. Companies, scholars, practitioners, and activists that are focused on smart cities now have an opportunity to help shape the process and legacy of this evolution in their own cities and beyond. The choices we make on a range of critical issues matter to that process and legacy. Interestingly, and perhaps predictably, those issues and choices are about people, not technology.

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Student Learning Outcomes

1. Develop a framework for understanding smart cities and for thinking critically about smart city issues in historical context from a systems perspective.
2. Establish a basic foundation of smart cities knowledge across multiple disciplines.
3. Develop an understanding of the key tensions and debates in the evolution of smart cities and the impacts of choices made on people and cities
4. Gain experience in applying newly acquired smart cities knowledge to real-world problems through the semester project.

Textbooks and Readings

Required (buy this one right away)

Townsend, A. (2013). *Smart Cities*. New York. W.W. Norton & Company, Inc. 388pp.

Optional (we will discuss during the first class, including free / low cost online options so don't buy these yet.) What you buy – if anything – may also depend on your background and academic program. So wait until we discuss these before buying any of them.

Pentland, A. (2015). *Social Physics: How Social Networks Can Make Us Smarter*. New York. Penguin Group, Inc. 300pp.

Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King, I., & Shlomo, A. (1977). *A pattern language: Towns, buildings, construction*.

Kitchin, R. (2014). *The Data Revolution*. Thousand Oaks, CA. Sage Publications Inc. 222pp.

Ascher, K. (2005). *The Works: Anatomy of a City*. New York. Penguin Group, Inc. 228pp.

Batty, M. (2013). *The new science of cities*. MIT press.

Papers and Websites (optional / reference)

Annotated bibliographies of papers and websites about smart cities have been compiled and will be provided on ELMS prior to the start of classes.

Selected videos from Complexity Labs YouTube Channel:

<https://www.youtube.com/channel/UCutCcajxhR33k9UR-DdLsAQ>.

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Required Technology

You will need access to a computer and the internet. Beyond that, no special technology is required.

A note on grading and policies

The following sections contain mostly standard language for all undergraduate and graduate level courses. It may be useful in resolving disputes, but I have rarely used any of it. If I were to summarize, I would say this is an advanced graduate course and we should conduct ourselves accordingly.

Grading

Your final grade for the course is computed as the sum of your scores on the individual elements below (100 possible points total), converted to a letter grade:

A+ 97-100*	B+ 87-89.99	C+ 77-79.99	D+ 67-69.99	
A 93-96.99	B 83-86.99	C 73-76.99	D 63-66.99	
A- 90-92.99	B- 80-82.99	C- 70-72.99	D- 60-62.99	F 0-59.99

Please note: iSchool policy states that if this is a core course for your degree program, you must earn a B or higher to remain in good academic standing. Any students who earn a B- or lower must retake the course to remain in the program. If you have any questions about this policy, please contact your academic advisor. The policy is also spelled out on p. 5 of the Program Handbook. <https://ischool.umd.edu/sites/default/files/users/user37/HCIMHandbook2020-2021.pdf> (Links to an external site.)

Course Grading Criteria

Grade Item	Points	Percent of Final Grade
Discussion lead 1	100	10%
Discussion lead 2	100	10%
Reflection paper 1	100	10%
Reflection paper 2	100	10%
Reflection paper 3	100	10%
Reflection paper 4	100	10%
Reflection paper 5	100	10%
Final project proposal	100	10%
Final project	100	10%
Final Reflection	100	10%
Total	1000	100%

Discussion Leads: Each class after the first one will begin with a 15–20-minute student-led discussion. Each student will be responsible for leading at least two of the discussions throughout the course. Topics are up to the student leader but must relate to smart cities in some way.

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Reflection papers: Each paper is intended to facilitate synthesis of the relevant material in the context of each student's major and interests. Each paper should be 3 – 5 pages in length, double spaced with appropriate citations and references.

The **final project** scope and parameters will be developed through one or more class discussions. Students will then prepare a final project proposal and present their project on the last day of class.

Final reflection: Students will combine and edit their five reflection papers (and possibly final project) into a final reflection. While there is no further requirement, students are encouraged to consider this final paper as a manuscript for publication.

Course Policies

COVID-19 COURSE POLICY MODIFICATIONS

As this syllabus is being written the University is still issuing Covid guidance and cases are increasing almost everywhere. Standard course policies are listed below. However, given the unpredictability of living in a pandemic, reasonable accommodations will be made during the fall 2021 semester. Policies concerning attendance and late work should be considered guidelines. If you must miss class or if you will miss an assignment deadline for Covid-related reasons, please email me as soon as possible. I will do my best to produce asynchronous lectures and make them available throughout the semester. This is a goal, not a guarantee. We are all trying to get through this as best we can.

We are all expected to follow University Covid guidance on vaccinations, testing, masks, and other public health measures.

A Note on Standard Policies

The essential purpose of the university's policies (<https://president.umd.edu/administration/policies>) is to enable all of us to fully participate in an equitable, accessible and safe academic environment so that we each can be challenged to learn and contribute most effectively. Policies are, by necessity, often written in impersonal, legalistic language. Nevertheless, we are all responsible for following them. The following sections summarize selected policies as implemented for this course and provide links to additional information. We are all responsible for knowing and following all university policies.

Participation Policy

Participation grades involve engaging effectively with in-class exercises, participating in group work, interacting with your instructor and peers, and attending class regularly.

Late Work

Late work is not accepted in this course. In the event of an unforeseeable, documentable emergency an exception may be made at the sole discretion of the instructor.

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1. Regular punctual attendance is expected of all students. Students are expected to remain for the entire class period. Students are responsible for all announcements, material covered, and assignments due when absent from class. The instructor recommends exchanging contact information with other students to share lecture notes. Tardiness and repeated class interruptions may reduce the student's participation grade.
2. Students are expected to read all assignments before coming to class and be prepared to discuss the topics and participate in class/group activities and exercises in class.
3. Late project submissions are not accepted. Projects not submitted by the deadline will receive an automatic grade of zero.
4. Each assignment must be submitted via the method requested in the instructions. Assignments submitted via email will not be graded. Assignments not submitted as required by the instructions will not be graded.
5. Students are expected to put away all electronic devices during lectures. The use of mobile devices (i.e., phones, tablets, etc.) during the lecture is disruptive and disrespectful. Texting, using email, playing games, chatting, and browsing the web is not permitted during the lecture session unless doing so is a part of the class session's planned activities and students are instructed to do so by the instructor. Failing to follow this expectation may result in a reduced participation grade.
6. This class frequently requires group work, in-class exercises, and in-class research so DO bring a mobile device, tablet, or laptop to class for use during designated times.
7. Exams must be taken as scheduled. If you are unable to take your exam at the scheduled time due to an emergency (hospitalization, car accident, etc.) contact the instructor prior to the exam time to make arrangements to take the exam. Documentation will be required. Make-up exams will only be given in the event of an extreme emergency and at the sole discretion of the instructor.
8. The instructor will reply to student emails within 72 hours Monday through Friday. Emails received on university holidays or during the weekend will receive a response when the university reopens.
9. Students shall use APA formatting for all written assignments in this course.
In the event of university closure due to inclement weather or other unanticipated events, due dates as posted on the course schedule will remain in effect unless a change is made by the instructor. Such a change will be posted in the course management system as an announcement and sent via email.

Syllabus Change Policy

This syllabus is a guide for the course and subject to change. Changes will be posted in ELMS.

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Academic Integrity

Academic dishonesty is a corrosive force in the academic life of a university. It jeopardizes the quality of education and depreciates the genuine achievements of others. Apathy or acquiescence in the presence of academic dishonesty is not a neutral act. All members of the University Community - students, faculty, and staff - share the responsibility to challenge and make known acts of apparent academic dishonesty. As a student, you have a responsibility to avoid violations of the Code of Academic Integrity. This includes:

- Cheating: "Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise."
- Fabrication: "Intentional and unauthorized falsification or invention of any information or citation in an academic exercise."
- Facilitating Academic Dishonesty: "Intentionally or knowingly helping or attempting to help another to commit an act of academic dishonesty."
- Plagiarism: "Intentionally or knowingly representing the words or ideas of another as one's own in an academic exercise."

For additional information on the Code of Academic Integrity see:

<http://shc.umd.edu/SHC/StudentAcademicDishonesty.aspx> (Links to an external site).

Students with Disabilities

The University is legally obligated to provide appropriate accommodations for students with disabilities. The campus' Accessibility & Disability Service (ADS) works with students and faculty to address a variety of issues ranging from test anxiety to physical and psychological disabilities. If a student or instructor believes that the student may have a disability, they should consult with ADS (301-314-7682, adsfrontdesk@umd.edu, <https://www.counseling.umd.edu/ads/> (Links to an external site)). To receive accommodations, students must first have their disabilities documented by ADS. The office then prepares an Accommodation Letter for course instructors regarding needed accommodations. Students are responsible for presenting this letter to their instructors.

Attendance Policy

University policy excuses the absences of students for illness, religious observances, participation in university activities at the request of university authorities and compelling circumstances beyond the student's control. Students who miss a single class for a medical reason are not required to provide medical documentation, but students who are absent more than once are responsible for providing various forms of documentation, depending on the nature of the absence. For additional information on attendance policies, see <https://www.usmd.edu/regents/bylaws/SectionIII/III510.html> (Links to an external site.) (religious observance) and <https://president.umd.edu/administration/policies/section-v-student-affairs/v-100g> (Links to an external site.) (medical absence).

Course Evaluation

Course evaluations are a part of the process by which the University of Maryland seeks to improve teaching and learning. The University Senate approved the implementation of a

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standard, online, University-wide course evaluation instrument. Each course evaluation contains a set of universal questions, and some are supplemented by questions from specific colleges. Students who leave no "Pending" evaluations in their Evaluation Dashboard each semester can view the aggregate results of a sub-set of universal items online. Across the University, course evaluations are being administered through a web-based system called CourseEvalUM. All information submitted to the Evaluation System is confidential. Instructors and academic administrators can only view summarized evaluation results after final grades have been submitted. Instructors and academic administrators cannot identify which submissions belong to which students. This standardized set of evaluation results provides the University with useful information on teaching and student learning across the campus. For additional info see Student Fast Facts at <https://www.irpa.umd.edu/Assessment/CourseEval/StuFastFacts.html> (Links to an external site).

Emergency Preparedness

See: <https://prepare.umd.edu/> (Links to an external site.)

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Course Schedule

This preliminary schedule provides *approximate* dates of topics and major assignments. The ELMS course will be used to provide specific dates and detailed information on all assignments (major and otherwise).

Week 1 1/24/2022

Course overview

The World's Great Cities

What makes them great? Is it technology, the people, buildings, or something else?

Week 2 2/1/2022

Cities Through History and the Role of Technology

How have cities evolved in response to technological innovations?

Reflection Paper I: Traditional perspectives on cities as places in space

Week 3 2/8/2022

Cities as a Pattern Language

Technology in service to enduring humanity

Week 4 2/15/2022

A Tale of Two Cities: Cities as Networks

"A city is more than a place in space; it is a drama in time." (Patrick Geddes)

Reflection Paper II: Alternative perspectives on cities as patterns and networks

Week 5 2/22/2022

Cities as Object Models

Urban Data Systems

Week 6 3/1/2022

City Life Abstracted

Patterns of objects, events, properties, and methods

Urban Analytics and Applications

Reflection Paper III: Alternative perspective on cities as object models

Week 7 3/8/2022

City Systems I: Buildings, Places, and Transport

Implications for data collection and analytics

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Week 8 3/15/2022

City Systems II: Utilities

Implications for data collection and analytics

Semester Project discussion 1

Week 9 3/22/2022

Spring Break

Week 10 3/29/2022

City Systems III: Services and Governance

Implications for data collection and analytics

Semester Project Proposals

Week 11 4/5/2022

Proximity and Diversity: The Competitive Advantages of Cities

Implications for data collection and analytics

Reflection Paper IV: Smarter competitive advantage

Week 12 4/12/2022

Smart Cities: What Could We Do?

Implications for data collection and analytics

Week 13 4/19/2022

Smart Cities: What Should We Do?

Implications for data collection and analytics

Week 14 4/26/2022

Smart Cities: What Could Possibly Go Wrong?

Implications for data collection and analytics

Reflection Paper V: Strategic synthesis of smart cities (weeks 12 - 14)

Week 15 5/3/2022

Smart Cities: What Will We Do?

Implications for data collection and analytics

Week 16 5/10/2022

Final Project Presentations