URSP 688Y / INST 728G SMART CITIES AND URBAN DATA SCIENCE

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Lectures: NCSG Conference Room 1112V Preinkert
Mondays 4pm - 6:40pm

COURSE DESCRIPTION

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. While individual cities range in age from a few years to a few millennia, the concept of cities as places where people gather in particular places 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. The technologies are new and their prospects are exciting. This often leads to a focus on the technologies themselves and what we can do with them. The historical frame reminds us that whether we developing new products, writing apps or planning cities we are building bending and shaping technology to meet the needs of our users. Only after we have internalized a primary focus on people and their process of technological adoption will we focus on specific smart city technologies.

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 particular 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.

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 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.

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 the smart cities 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.

Course Description and Structure

There are many ways to understand cities. This course will approach them as complex, adaptive, socio-technical systems where multiple academic disciplines are involved in developing a holistic, systems-level understanding. Urban planning itself is multi-disciplinary in many respects, and serves as the central organizing discipline for the course. New smart-city paradigms increase the necessity for deeper understanding of the engineering involved in cities; the dynamics of social interactions among people and between people and place; the increasingly important roles and structures of data analytics and information science; and the science of complex adaptive systems.

The intent of this course is to establish a framework for understanding smart cities and for thinking critically about smart city issues in historical context from a systems perspective. This framework is supported by a core readings in each major discipline to establish a shared knowledge foundation. From this shared foundation we will synthesize new understandings of what smart cities are along with the social and technological transformations involved as existing cities become “smart”. Students will be expected to add their own disciplinary perspective to this synthesis.

Readings, lectures, and discussions will be supplemented by a site visit and/or guest discussions with key players in current smart city initiatives including nearby Seat Pleasant, MD.

The final part of the course will apply this new understanding to the development of a smart cities readiness assessment tool to be used in assessing the readiness of communities throughout Maryland for the adoption of smart cities technologies and strategies. This semester project will consider all aspects of the tool, including its structure, methods, data sources, analytics, the aggregation of results, audiences, validity, etc. In addition to one or more demonstration assessments by the class, this tool is expected to be used by graduate assistants to develop a statewide community-by-community assessment to be shared with the Maryland Department of Planning and the Maryland Municipal League, among others.

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LEARNING OBJECTIVES

• Develop a framework for understanding smart cities and for thinking critically about smart city issues in historical context from a systems perspective.
• Establish a basic foundation of smart cities knowledge across multiple disciplines.
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

Gain experience in applying newly acquired smart cities knowledge to real-world problems through the semester project.

**Course Texts:**

There are four core texts and a video series that together are intended to create a knowledge foundation for understanding smart cities.


Selected videos from Complexity Labs YouTube Channel:
[https://www.youtube.com/channel/UCtCcajhR33x9UR-DoLsAQ](https://www.youtube.com/channel/UCtCcajhR33x9UR-DoLsAQ)

**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.

**Evaluation Method:**

Regular attendance and active participation in lectures expected. During class, students are expected to actively discuss ideas, concepts, and readings. Each student will have multiple opportunities to lead discussions in class. Grades are based on points accumulated from class participation, a midterm paper, and final report and presentation. Detailed description and grading scale are provided below.

**Discussion Leads and Class Participation: 25%**

Students are expected to not only attend lectures, but also be active participants. Each student will have multiple opportunities to lead the discussion.

**Midterm Exam: 25%**

The midterm exam will follow a short essay format and will be based on the topics and information covered in weeks 1 through 7 in class and the readings. Student opinions are generally split on the question of whether to assign the exam over spring break. In trying to accommodate both, the exam will be handed out the class before spring break and due the class after spring break. However, no additional work or readings are scheduled during that time.

**Final Exam: 25%**
The final exam will follow a short essay format and will be based on synthesis and issues covered in the second half of the course.

**Final Project Report & Presentation: 25%**

The project for this semester is the development of a smart cities readiness assessment tool for Maryland. Students will consider, design, test, and document all aspects of the tool. This is a “real” project with the expectation that the tool will be used by NCSG after the course ends, and that assessment results will be shared with state and local governments and intermediaries.

**Attendance Policy:**

I realize that extenuating circumstances sometimes preclude students from attending every class. If you are absent from class, you are still responsible for ensuring that all assignments are completed by the due date.
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Chapters</th>
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<th>Chapters</th>
<th>Assignments and due dates</th>
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<tbody>
<tr>
<td>1</td>
<td>1/28/19</td>
<td>Urbanization and Ubiquity</td>
<td>From Ideas to Actions: Using Big Data to Understand How Human-Social Systems Evolve</td>
<td>Introduction to course, topic, and texts</td>
<td>Discussion lead</td>
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<td>2</td>
<td>2/4/19</td>
<td>Cybernetics Redux Moving People</td>
<td>Exploration: How can we find good ideas and make good decisions</td>
<td>21st century design context</td>
<td>Discussion lead</td>
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<td>3</td>
<td>2/11/19</td>
<td>Cities of Tomorrow Moving Freight</td>
<td>Idea Flow: the building blocks of collective intelligence</td>
<td>Design abstraction and methods</td>
<td>Discussion lead</td>
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<td>4</td>
<td>2/18/19</td>
<td>The Open-Source Metropolis Power</td>
<td>Engagement: How can we all work together?</td>
<td>Networked system design</td>
<td>Discussion lead</td>
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<td>5</td>
<td>2/25/19</td>
<td>Tinkering Towards Utopia Communications</td>
<td>Collective Intelligence: How patterns of interaction translate into collective intelligence</td>
<td>Service-oriented architecture</td>
<td>Discussion lead</td>
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<td>6</td>
<td>3/4/19</td>
<td>Sanitation</td>
<td>Supporting organizations: Social Intelligence through visualization of interaction patterns</td>
<td>Design thinking</td>
<td>Discussion lead</td>
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<td>A</td>
<td>3/11/19</td>
<td>Reinventing City Hall</td>
<td>Organizational change: using incentives to guide change</td>
<td>The governmental and business rationale for big data</td>
<td>Midterm assigned</td>
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<td>3/18/19</td>
<td>Spring Break</td>
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<td>9</td>
<td>3/25/19</td>
<td>Start Final Project</td>
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<td>Midterm due</td>
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<td>10</td>
<td>4/1/19</td>
<td>A Planet of Civic Laboratories</td>
<td>Sensing cities</td>
<td>The reframing of science, social science and humanities research</td>
<td>Discussion lead</td>
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<td>11</td>
<td>4/8/19</td>
<td>Buggy, Brittle and Bugged</td>
<td>City science</td>
<td>Technical and organizational issues</td>
<td>Discussion lead</td>
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<td>12</td>
<td>4/15/19</td>
<td>Data Model examples</td>
<td>Ecosystem Modeling - Data Structures</td>
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<td>Discussion lead</td>
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<td>13</td>
<td>4/22/19</td>
<td>Analytic examples</td>
<td>Ecosystem Modeling - Analytics</td>
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<td>Discussion lead</td>
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<td>14</td>
<td>4/29/19</td>
<td>Synthesis: privacy, ethics, and a new civic for smart cities</td>
<td>New Civic</td>
<td>The Future</td>
<td>Discussion lead</td>
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<td>15</td>
<td>5/6/19</td>
<td>Final Project Prep</td>
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<td>Final due</td>
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<td>16</td>
<td>5/13/19</td>
<td>Final Presentations</td>
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**SPECIAL NEEDS FOR STUDENTS:**

If you need course adaptations or accommodations due to a disability, please consult Disability Support Services in 0126 Shoemaker Hall to make necessary arrangements. The rules for eligibility and the types of accommodations a student may request can be reviewed on the DSS website: http://www.counseling.umd.edu/DSS/ Religious Observances: The University System of Maryland policy provides that students should not be penalized because of observances of their religious beliefs. Students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the responsibility of the students to inform the instructor of any intended absences for religious observances in advance. Notice should be provided as soon as possible but no later than the end of the schedule adjustment period. Prior notification is especially important in connection with final exams, since failure to reschedule a final exam before the conclusion of the final exam period may result in loss of credits during the semester. The problem is especially likely to arise when final exams are scheduled on Saturdays.

**ACADEMIC INTEGRITY:**

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu.

**COURSE EVALUM:**

Your participation in the evaluation of courses through CourseEvalUM is a responsibility you hold as a student member of our academic community. Your feedback is confidential and important to the improvement of teaching and learning at the University as well as to the tenure and promotion process. CourseEvalUM will be open for you to complete your evaluations for fall semester courses beginning in early December. You can go directly to the website (www.courseevalum.umd.edu) to complete your evaluations. I will alert you to the opening date when it becomes available. By completing all of your evaluations each semester, you will have the privilege of accessing the summary reports for thousands of courses online at Testudo.