

ARCH 6340 Special Topics

## Designing with Urban Data

### Creatively connecting the physical and the digital

CRN: 17153 | Fall 2014 | Wednesday 1:35-4:35 | Ryder 204

Office hours: Wednesdays, 10:00 – 1:00 | Ryder #448D

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#### COURSE DESCRIPTION

This seminar course will introduce students to an array of critical themes and concepts to creatively work at the intersection of digital systems data and physical objects and space - the emerging domain of what can be referred to as urban computing or ambient informatics. The course will include lectures, discussions, writing assignments and design exercises.

Over the past years, much of our environment has been pervaded by networks and systems that generate digital bits as part of their operations (think of public transport electronic ticketing systems, telecommunication services, the electricity grid, logistic operations, etc.). These systems generate a massive amount of data related to human activity, which inform us about human actions and allow us to reflect about their effects (for example, the digitization of the public transport system has enabled the real-time location and arrival of buses/trains as well as real-time origin-destination patterns of all passengers at every instant).

This phenomenon is not only changing the way we explore our environment, but it opens up new possibilities for how we develop tools for people to design, manage and experience systems in our everyday lives. In this course we will look at urban data as a new kind of material for architects and designers to work with in constructing experiences when interacting with and in digitally mediated spaces, objects, and information.

#### LEARNING OBJECTIVES

- obtain an understanding of the challenges and opportunities presented by pervasive digital networks in urban space for the design disciplines.
- develop a critical capacity to integrate data driven functionalities with more traditional notions related to design in the urban context.
- explore methods of research, design and evaluation in urban informatics.

#### RULES AND CONDITIONS

<b>Attendance</b>	Full attendance of all classes is mandatory. Missed classes will mean that you will miss valuable information. Absences for health or other personal reasons need to be communicated to the lecturer in advance. Frequent tardiness and unexcused absences will impact your final course grade.
<b>Class-discussions</b>	A significant part of this class will be devoted to discussion of the lecture topics and student submissions. You are encouraged to actively participate in all activities.
<b>Assignments</b>	6 short exercises and 6 writing assignments. All assignments need to be submitted on the day indicated on the assignment handout. Late submissions will not be accepted except if discussed and agreed upon by lecturer before the submission date.
<b>Integrity</b>	You are requested to abide by Northeastern University's Academic Integrity Policy, which you can read at: <a href="http://www.northeastern.edu/osccr/academicintegrity/">http://www.northeastern.edu/osccr/academicintegrity/</a>

## GRADING

You are expected to demonstrate week-to-week progress and you will be graded upon the completion of specified assignments. Assignments are due as indicated on the handout. Every submission will be graded and the final grade takes into consideration the criteria and weights described below, and will include a peer evaluation.

### Criteria:

**60% exercises and writing assignments:** how each of these reflect critical consideration of the lecture content, class discussions, and reading.

**30% class participation:** how you use critical language in the class presentation of your exercises and writing assignments as well as during class discussion and critique of classmates work.

**10% peer evaluation:** each submission will be evaluated by your peers.

### System:

The grading system follows the University Policies (<http://www.northeastern.edu/registrar/gradingsystem.html>):

- A outstanding achievement
- B good achievement
- C satisfactory achievement
- D poor achievement
- F failure

## GUEST SPEAKERS

Guest speakers with directly relevant research work and experiences from the industry and public sector will contribute to specific course topics during the semester. We have speakers lined up from MIT, Continuum, Boston University, US Department of Health and Human Services.

## ASSIGNMENTS

This course is based on lectures, discussions as well as **6 short writing assignments** and **6 project exercises** that encourage students to practically experiment with the theory of this course. Every week students will be given either a project exercise or a writing assignments. These will be **one-week assignments** for the most part and will be **submitted electronically the morning of the class the following week** and presented/discussed during that class.

## COURSE BOOK

The exercise assigned in session 12 will consist of the **compilation of all your work produced throughout the course in one comprehensive course book** to be submitted as a digital pdf file at the final course session. This is an opportunity to revise the work done previously by critically integrating comments and suggestions from the group discussions.

You are also expected to integrate photographs of any non 2-D material produced throughout the course such as models etc.

## REQUIRED READINGS

Texts will be indicated throughout the course syllabus for the 6 writing assignments. In addition to the mandatory texts, a course bibliography is listed below. I encourage you to read at least some parts to inform your course work.

## COURSE SESSIONS

### 01. 09/03 INTRODUCTION AND OVERVIEW

Introduction to and discussion of research and projects developed at the MIT Senseable City Lab and the University IUAV of Venice in the realms of urban informatics, ambient computing, interaction design, information design. Overview of course structure and lecture topics.

#### **class structure**

project presentation.  
course intro and overview.  
discussion.

#### **reading and writing assignment 01 – due 09/10, 10am**

**read:** Greenfield, A., & Shepard, M. (2007). *Urban Computing and Its Discontents*. New York: The Architectural League of New York.

**read:** Roche, S., Nabian, N., Kloeckl, K., & Ratti, C. (2012). Are 'Smart Cities' Smart Enough? In A. Rajabifard & D. Coleman (Eds.), *Spatially Enabling Government, Industry and Citizens: Research and Development Perspectives* (pp. 215–235). GSDI Association Press.

**write:** Using references to these two texts, critically describe in one page your daily experience of navigating urban space while interacting with digitally connected information technologies.

### 02. 09/10 DIGITAL CITY WANDER

We will be going on an exploratory walk in a specified area of the city of Boston equipped with photo cameras, paper and pencil. We will look for and critically observe all those instances in which the physical and the virtual connect in urban space. Where human activity and urban dynamics are converted into digital bits and where digital data manifest in perceivable ways.

#### **class structure**

exploratory city walk.  
discussion at a cafe in the walking area.

#### **exercise 01 – mapping a digital city wander – due 9/17, 10am**

With the material, insights and questions from our digital city wander, document, map and analyze those devices and systems in your city where human activity and urban dynamics generate digital traces and where digital information is made accessible to people in perceivable ways.

Identify, study and describe the technologies involved in the process of passing information from the physical dimension to the digital and vice versa (sensors, imaging technologies, audio technologies,...). In your analysis try to document a large number of observations collected in urban space and explore meaningful classifications and categories for these observations.

media: combine various media such as photography, freehand sketches, collages, maps,...

presentation: present the results of this assignment on printed ANSI C (17 x 22 inch) size posters together with digital pdf files of these.

### 03. 09/17 SPACE

On how we perceive and inter-act with and within space and how this changes in the context of pervasive digital networks. On how to leverage and valorize both virtual and actual spaces in a new dialectic as part of architectural and design projects.

#### **class structure**

student presentation of exercise 01 – digital city wander.  
lecture.  
discussion.

#### **reading and writing assignment 02 – due 9/24, 10am**

**read:** Mumford, L. (2010). Space, Distance, Movement. In *Technics and civilization* (pp. 18–22). Chicago: The University of Chicago Press.

**read:** Dodge, M., & Kitchin, R. (2004). Flying through code/space: the real virtuality of air travel. *Environment and Planning A*, 36(2), 195–211.

**write:** Compare how the perception and construction of space are discussed in these two texts. (1 page)

#### 04. 09/24 TIME

On time as an artificial construct linked to cultural context as well as to the emergence of technologies that impact its perception. On working with the temporal dimension in the context of urban informatics, connotated by the co-presence of real-time information exchanges, historic data aggregations, and data driven future predictions.

##### **class structure**

lecture.

discussion of writing assignment.

guest speaker.

##### **exercise 02 – exploring personal time – due 10/01, 10am**

Do different activities (read in a park, walk along a busy road, talk to someone, stroll along a street, ...) and estimate the duration of 5 minutes. Compare your own estimation with the reading of a timer that you had running hidden from your view. How long are your personal estimates of 5 metric minutes? Carry out and document at least 5 such experiments.

Work in pairs with a colleague of yours. Your partner sets a timer for a specific duration (between 1-15 minutes). You carry out different activities in that time (as above), without having access to view of any time measuring device. When the timer's alarm goes off, estimate in metric time how long the interval was. Carry out and document at least 5 such exercises.

media: combine various media such as video, audio recordings, text, collages, diagrams, maps,...

presentation: present the results of this assignment as video, digital presentation and/or on printed ANSI C (17 x 22 inch) size posters together with digital pdf files of these.

#### 05. 10/01 TECHNOLOGIES FOR URBAN INFORMATICS

Focus on the technical components of urban informatics. On sensing, actuating, controlling, tagging, networking, displaying,... And on how to creatively work with these components in projects in urban space.

##### **class structure**

student presentation of exercise 02 - exploring personal time.

lecture.

discussion.

##### **reading and writing assignment 03 – due 10/08, 10am**

**read:** Cuff, D. (2003). Immanent Domain: Pervasive Computing and the Public Realm. *Journal of Architectural Education*, 57(1), 43–49.

**write:** Dana Cuff's article was published in 2003, and is looking ahead at a time when pervasive computing would have become a reality in the public realm. What has happened since then? How do you see pervasive computing play a role in cities today, in your daily life,... and what are your views on these changes in respect to the authors positions? (1 page)

#### 06. 10/08 ACTIVITY

On how we act and what motivates and shapes our actions. On how components of information technology in our environment become agents in our interactions with them, with information, with space, and with each other.

##### **class structure**

lecture.

discussion of writing assignment.

guest speaker.

##### **exercise 03 – tracking activities – due 10/15, 10am**

Using a smartphone or other digital device capable of monitoring location, acceleration, temperature,..., track your own movement and activities over the course of two days. Combine the resulting data traces with data from other time/location related information you can retrieve from personal (social networks, twitter,...) and public online sources and also integrate your own time/location specific notes about your activities.

In this way generate a rich data driven map of your activities over the two day period.

presentation: use data driven 3D technologies (3D printing, laser cutter,...) to represent the data you collected. integrate this structure with various media such as video, audio recordings, text, diagrams, maps, data visualizations,... to present the results of this assignment.

#### 07. 10/15 CONVERSATION

On real time interaction, cybernetics, complex systems, and conversations in urban space between and through pervasive information technologies.

##### **class structure**

student presentation of exercise 03 - tracking activities.

lecture.

discussion.

##### **reading and writing assignment 04 - due 10/22, 10am**

read: Pask, G. (1969). The architectural relevance of cybernetics. *Architectural Design*, 39(9), 494–496.

read: Kloeckl, K. (english version in press). The City as a Digital Public Space – Notes for the Design of Live Urban Data Platforms. In D. Offenhuber & C. Ratti (Eds.), *Decoding the City. How Big Data Can Change Urbanism*. Birkhäuser.

write: Describe how you see Pask's notions on cybernetics and architecture unfold in relation to present day urban informatics projects such as the ones described in the second article. In particular, focus on how real time and location specific technologies enable what Pask describes as dialogue with the urban environment. (1 page)

#### 08. 10/22 TOOLS

On the nature of tools as human extensions, networks of equipment, mediators in activities, memory and virtualization of actions. And on the role of persistent structures, or of 'the solid side' of things in the Information Age.

##### **class structure**

lecture.

discussion of writing assignment.

guest speaker.

##### **exercise 04 - critical redesign of an app - due 10/29, 10am**

Over the past months several smartphone apps have been released that claim to improve the public parking situation in cities on a payed for basis. Now, several of these apps have been banned by the city of San Francisco for charging an additional use fee for what is essentially public space.

Reconstruct this issue in the form of a case study through a literature research. Highlight and critically comment on the key issues raised that led to the apps being banned. Illustrate a way in which you would redesign this app in order to provide the benefit of easing the parking issue in cities while addressing the critical issues raised.

*Some online literature references as starting point:*

[http://bits.blogs.nytimes.com/2014/06/23/san-francisco-plans-to-ban-certain-parking-apps/?\\_php=true&\\_type=blogs&\\_r=0](http://bits.blogs.nytimes.com/2014/06/23/san-francisco-plans-to-ban-certain-parking-apps/?_php=true&_type=blogs&_r=0)

<http://www.bbc.com/news/technology-27995429>

<http://arstechnica.com/tech-policy/2014/06/san-francisco-orders-parking-spot-auction-app-to-cess-and-desist/>

<http://www.engadget.com/2014/06/23/san-francisco-parking-app-illegal/>

[http://techcrunch.com/2014/06/27/sf-parking-app-warned-by-sf-city-attorney-open-sources-its-code/?utm\\_content=buffer09f4d&utm\\_medium=social&utm\\_source=twitter.com&utm\\_campaign=buffer](http://techcrunch.com/2014/06/27/sf-parking-app-warned-by-sf-city-attorney-open-sources-its-code/?utm_content=buffer09f4d&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer)

utm\_content=buffer09f4d&utm\_medium=social&utm\_source=twitter.com&utm\_campaign=buffer

#### 09. 10/29 STRATEGIES FOR DATA DRIVEN PROJECTS

On strategies to engage multiple agents and organizations in projects that require joint data generation or data sharing and on how to creatively work with different data types as proxies for seemingly unrelated dynamics.

**class structure**

student presentation of exercise 04 - what data tells.

lecture.

discussion.

**reading and writing assignment 05 – due 11/05, 10am**

**read:** Eisenmann, T., Parker, G., & Van Alstyne, M. W. (2006). Strategies for two-sided markets. *Harvard business review*, 84(10), 92-101.

**read:** Cusumano, M. (2010). Technology strategy and management The evolution of platform thinking. *Communications of the ACM*, 53(1), 32-34.

**write:** based on these articles and on the topics covered in the course so far, how can we look at "the city as a platform" for the development of novel urban functionalities and what are challenges and opportunities in doing so? (1 page)

**10. 11/05 BOUNDARY OBJECTS AND DIGITAL PLATFORMS**

Considering data as a boundary object insofar as that it has different meanings in different social worlds yet with a common enough structure to function as a means of translation between diverse realms. On the role of digital platforms and the development of tool networks for the creation of tools by multiple agent groups.

**class structure**

lecture.

discussion on writing assignment.

guest speaker.

**exercise 05 – combining multiple sets of data + project scenarios – due 11/12, 10am**

1. Using your data from exercise 03, work together as a class and integrate all student information into one comprehensive map/data visualization to illustrate the class's activities over the course of the two days.
2. Based on at least 2 of the provided list of data types develop and illustrate three distinct scenarios for data driven urban functionalities that either open up a novel opportunity or respond to a concrete challenge for urban dwellers in Boston.

**11. 11/12 IDENTITY AND PRIVACY**

On what constitutes identity and the notion of privacy. On how digital information technologies impact these domains and contribute to modalities of expression and protection of identity.

**class structure**

student presentation of exercise 05.1.

revision of exercise 05.2.

lecture.

guest speaker.

**reading and writing assignment 06 – due 11/19, 10am**

**read:** Weitzner, D. J., Abelson, H., Berners-Lee, T., Feigenbaum, J., Hendler, J., & Sussman, G. J. (2008). Information accountability. *Communications of the ACM*, 51(6), 82-87.

**write:** In the ongoing exercise 05.02, describe how each of your three project scenarios deals with aspects of identity and privacy of individuals or user groups. (1 page)

**12. 11/19 ACCESS AND AVAILABILITY**

On the nature and state of the digital divide and issues of accessibility to novel kinds of data driven services. On the phenomenon of blind spots in the digital information age or the territorial inconsistencies in digital data generation and coverage.

**class structure**

lecture.

revision of exercise 05.02 and discussion of writing assignment.

discussion.

### **exercise 06 – course book – due 12/03, 10am**

Revise all exercises and written assignments developed throughout the course by critically integrating comments and suggestions from the group discussions and combine them in a digital pdf course booklet.

### **13. 12/03 SUMMARY AND CONCLUSION**

Discussion of the project scenarios and the course book developed by students.

Summary of the course's main points in relation to key issues that emerged during class discussions.

#### **class structure**

student presentation of exercise 05.02.

presentation and discussion of exercise 06 – course book.

course summary and conclusion.

### **BIBLIOGRAPHY**

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