
UP 494-BW, FALL 2017

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Civic Technology and the Digital City

Lecture: Tu, Th 2:00–3:20 PM
Location: Temple Hoyne Buell Hall, Room 223
CRN: 31061
Office Hours: By appointment

COURSE DESCRIPTION

Information and communication technologies (ICTs) are fundamentally changing the way we plan, understand, and experience cities. The use of these technologies, from sensors to web-based applications for managing urban systems, lies at the heart of the current investment in and discourse surrounding Smart Cities. In addition to providing a basic understanding of the debate regarding Smart Cities, this course introduces data science fundamentals and emphasizes civic technology as bridge between the technologies themselves, what planners do, and what communities need. Civic technology can help to democratize these advancements and leverage them to help make government more transparent, facilitate more efficient use of existing systems and resources, further social equity, and enhance quality of life.

Students will complete exercises designed to “bootstrap” familiarity and build proficiency with tools like Amazon Web Services, R, SQL databases, and GitHub. There will be an opportunity to make a daylong trip (this field trip is optional and will require a \$10 contribution for transportation costs) to Chicago to attend [Chi Hack Night](#) and connect with members of the civic technology community in the city. Students will also be expected to attend the local [CU Hack Night](#) event one or more times during the semester. The centerpiece of the course will be the identification, scoping, and development of an online tool, database, or resource that helps to advance the public interest or responds to the needs of Champaign-Urbana community. Students are expected to form teams and work closely with one or more local organizations (e.g., government, nonprofits, neighborhood associations, advocacy groups) of their choosing to increase the likelihood that the data and tools developed will be used and make a positive impact.

LEARNING OBJECTIVES

The overall objective of the course is to introduce students to the range of ways that information and communication technologies (ICTs) and are reshaping cities, urban planning, and the urban experience. Students will develop a foundation in basic data science principles and techniques using open source software and cloud computing resources. Students who have successfully completed UP 494-BW will be able to:

1. Articulate the main arguments for the deployment of Smart City technologies as well as summarize the leading critiques;
2. Explain what civic technology is and how it fits within the broader framework of urban planning practice;
3. Connect with members of the civic tech community in Chicago and Champaign-Urbana;
4. Perform basic data cleaning, visualization, and analysis tasks with R;
5. Understand the fundamentals of database management and cloud computing;
6. Collect, analyze, and visualize data that helps to fill existing gaps, inform discussion, and facilitate action on an important issue, questions, or initiative in Champaign-Urbana;
7. Create and deploy a web application to support planning and decision-making regarding an important issue of local, regional, or national significance.

COURSE FORMAT

A tentative schedule is included in this syllabus. UP 494-BW follows a lecture and discussion format. Specifically, the Tuesday meetings will consist of a lecture that presents the primary themes and concepts from the assigned readings, with an opportunity for questions and comments from students. The Thursday sessions alternate between: (1) hands-on work with data and technology that focuses on some aspect of civic technology as a framework for planning in contemporary urban environments and (2) structured discussion of examples and case studies related to the lectures and readings. If you are not able to attend a class session, please notify the instructor via email in advance.

REQUIREMENTS & EVALUATION

Students are expected to attend and participate during class meetings. The class participation component of the final grade consists of (1) attendance at lecture, discussion, and work sessions as well as (2) *active involvement* in the discussion, careful listening, and respect for the opinions of others. At the date of the midterm presentation, you will receive a written evaluation of your class participation to date. This is intended to provide an opportunity for students to make adjustments, as necessary.

Three memos (15% of course grade) are required and are intended to document the scope and overall methodology of the term project. A series individual lab exercises corresponding to the “data science” entries on the session schedule contribute an additional 20% of the course grade. A midterm presentation summarizing preliminary work and identifying obstacles as well as remaining tasks will count for 10% and a final presentation will count for an additional 10% of the course grade. The remaining 35% of the course grade is based on the quality of the final report and deliverables produced by the group. Students will be asked to evaluate the contributions of their classmates to group work and these evaluations will be considered in the assignment of course grades. More detailed instructions regarding the format and content of the final report will be provided over the course of the semester and will reflect input from our local partners.

Students are expected to **bring a laptop computer to class** because the software and services we will be using require administrative privileges.

ASSIGNMENT	CONTRIBUTION
Class Participation	10%
Memos (3)	15%
Lab Exercises (4)	20%
Group Presentation (Midterm)	10%
Group Presentation (Final)	10%
Group Final Report, Data, and Code	35%

Assignments must be submitted via the Compass website by 5:00 pm on the day that they are due, unless otherwise noted. If Compass crashes or is unavailable, please send the assignment to the instructor and teaching assistant via email attachment. *In fairness to all students, ten points will be deducted for late assignments, with an additional ten points deducted for each subsequent day until it is received. No exceptions can be made without a formal notice from the Emergency Dean. Due dates for assignments are not flexible, so please make your travel plans and schedule other commitments accordingly.*

The final grade for the course is derived from the components listed above, subject to the percentage weights listed in the preceding table. All of these components are scored on a 100 point scale, which makes it easy for students to gauge their standing as the semester progresses—grades are not curved.

FINAL GRADE	TOTAL	FINAL GRADE	TOTAL
A+	98 to 100	C	74 to 77
A	94 to 97	C-	71 to 73
A-	91 to 93	D+	68 to 70
B+	88 to 90	D	64 to 67
B	84 to 87	D-	61 to 63
B-	81 to 83	F	0 to 60
C+	78 to 80		

Detailed instructions for completing each assignment will be provided. Submitted assignments will be graded and returned promptly with detailed feedback. The general grading rubric is as follows:

- An assignment at the A level demonstrates original thought and synthesis of ideas, sophisticated, cogent analysis, and is clearly written or presented. Outstanding work.
- An assignment at the B level presents above average analysis with appropriate evidence to support the ideas and is clearly written or presented. Very good work.
- An assignment at the C level shows a basic level of understanding, with analysis limited to the most obvious arguments. Writing is competent. Adequate work.
- An assignment at the D level misunderstands or misrepresents the material, or is so poorly written or presented as to obscure the analysis. Inadequate work.

Students will have an opportunity to evaluate the contributions of group members for each group assignment to ensure all students are contributing the work products. Remember that in academic discourse, your opinions must be supported with appropriate evidence and logical arguments. Your grade will reflect the quality of your work and fulfillment of the expectations outlined in this syllabus.

READING MATERIAL

There is no required text for this course. All assigned readings and supplementary material are available by clicking the hyperlinks in this document or have been posted on the UP 494-BW **Compass website**:

<https://compass2g.illinois.edu>

Note that while several weeks have no assigned reading, links to appropriate technical training materials will be posted throughout the semester in the corresponding “Readings” folders on the Compass website. Students should make use of these supplementary training materials in addition to the primary lab exercises that will be graded (see Page 2 of this syllabus).

COURSE POLICIES

Disability Services: This course will accommodate students with documented disabilities. Please refer to the [Disability Resource Guide](#) for more information and inform the instructor of any requests at the beginning of the semester.

Academic Integrity: The UIUC Student Code requires all students to support academic integrity and abide by its provisions, which prohibit cheating, fabrication, plagiarism, and facilitation of these and related infractions. According to [Section § 1-401](#), “students have been given notice of this rule by virtue of its publication” and “regardless of whether a student has actually read this rule, a student is charged with knowledge of it.” The provisions of the Student Code are applicable to this course. *In written work, all ideas (as well as data or other information) that are not your own must be cited.*

Diversity: The Department of Urban and Regional Planning (DURP) is committed to creating an environment of inclusion and opportunity that is rooted in the very goals and responsibilities of practicing planners. Conduct that interferes with the rights of another or creates an atmosphere of intimidation or disrespect is inconsistent with the environment of learning and cooperation that the program requires. By enrolling a course in the Department of Urban and Regional Planning, students agree to be responsible for maintaining a respectful environment in all DURP activities, including lectures, discussions, labs, projects, and extracurricular programs. We will be governed by the University Student Code. Please see the [Student Code Article 1—Student Rights and Responsibilities](#) for further details.

Counseling Services: The [Counseling Center](#) is committed to providing a range of services intended to help students develop improved coping skills in order to address emotional, interpersonal, and academic concerns. The [Counseling Center](#) provides individual, couples, and group counseling. All of these services are paid for through the health services fee. The [Counseling Center](#) offers primarily short-term counseling, but they do also provide referrals to the community when students could benefit from longer term services.

Irregular Attendance: Class attendance is expected of all students at the University of Illinois, however instructors must reasonably accommodate a student’s religious beliefs, observances, and practices in regard to class attendance and work requirements if the student informs his or her instructor of the conflict within one week after being informed of the attendance or work requirements. It is the instructor’s decision as to when a student’s absences become excessive and should be reported. If in the opinion of an instructor the attendance of a student becomes so irregular that his or her scholarship is likely to be impaired, the instructor may submit an [irregular attendance form](#) to the Associate Dean of the student’s college. A copy is forwarded to the student, who should contact the instructor immediately to work out a solution. If irregular attendance continues without excuse, the instructor may request the student be withdrawn from the course. This request for withdrawal would result in a grade of E for the course. Extenuating circumstances will always be considered when supporting evidence is presented. See [Rule 1-501](#) and [Rule 1-502](#) in the Student Code for more information.

SUMMARY SCHEDULE OF SESSIONS

SESSION	WEEK	DATE	DAY	TOPIC
1	1	Aug-29	Tu	Introductions and Course Overview: What Is Civic Tech?
2	1	Aug-31	Th	Unpacking the Smart Cities Frenzy
3	2	Sept-5	Tu	*** FIELD TRIP TO CHICAGO (1:00 PM TO MIDNIGHT) ***
4	2	Sept-7	Th	Brainstorm Term Project Ideas & Form Teams [[Begin First Memo]]
5	3	Sept-12	Tu	Introduction to Amazon Web Services & Bash
6	3	Sept-14	Th	Relational Databases in a Nutshell: Introduction to SQL
7	4	Sept-19	Tu	Lightning Talk: What's Your Term Project?
8	4	Sept-21	Th	Working with Data in R (Part 1)
9	5	Sept-26	Tu	Understanding the Data Landscape: Existing Data, Gaps, and Integration Needs
10	5	Sept-28	Th	Data Science: Working with Data in R (Part 2)
11	6	Oct-3	Tu	Building Web Apps with R: The <i>shiny</i> package
12	6	Oct-5	Th	Best Practices for Data Visualization [[Begin Second Memo]]
	7	Oct-10	Tu	*** NO CLASS MEETING (FAA ARTS EXCHANGE) ***
13	7	Oct-12	Th	Data Ethics: Balancing Privacy Needs with Policy Questions
14	8	Oct-17	Tu	*** MIDTERM PRESENTATION ***
15	8	Oct-19	Th	Deploying Web Apps with R: Shiny Server on AWS
16	9	Oct-24	Tu	Data Science: Working with Geospatial Data in R (Part 1)
17	9	Oct-26	Th	Data Science: Working with Geospatial Data in R (Part 2) [[Begin Third Memo]]
18	10	Oct-31	Tu	Project-Specific Discussion, Training, or Site Visit
19	10	Nov-2	Th	Project-Specific Discussion, Training, or Site Visit
20	11	Nov-7	Tu	Build, Deploy, and Test the Prototype (Part 1)
21	11	Nov-9	Th	Build, Deploy, and Test the Prototype (Part 2)
22	12	Nov-14	Tu	Arrange/Confirm Beta Tests with Target User Groups
23	12	Nov-16	Th	Conduct Beta Tests with Target User Groups
		Nov-21	Tu	*** FALL VACATION ***
		Nov-23	Th	*** FALL VACATION ***
24	13	Nov-28	Tu	Refine the Prototype Based on Feedback
25	13	Nov-30	Th	Draft Documentation for Data, Code, and Tools
26	14	Dec-5	Tu	Final Materials Preparation (Part 1)
27	14	Dec-7	Th	Final Materials Preparation (Part 2)
28	15	Dec-12	Tu	*** FINAL PRESENTATION ***
		Dec-21	Th	Submit Final Report, Data, Code, Documentation, and Tools

SESSION TOPICS AND READINGS**Week 1—August 29 and August 31**

McCann, L. (2015). *Experimental modes of civic engagement in civic tech*. Chicago, IL: Smart Chicago Collaborative. (pp. 3-31)

Kitchen, R. 2014. "Open and linked data." In *The data revolution: Big data, open data, data infrastructures and their consequences*. Los Angeles, CA: SAGE. (pp. 48-66)

Week 2—September 5 and September 7

American Planning Association. 2015. *Smart cities and sustainability initiative*. Chicago, IL: American Planning Association.

Batty, M. 2013. Big data, smart cities and city planning. *Dialogues in Human Geography*, 3(3), 274-279.

Skim as Needed:

Goerge, R. M. 2014. "Data for the public good: Challenges and barriers in the context of cities." In *Privacy, Big Data, and the Public Good: Frameworks for Engagement*. Cambridge, UK: Cambridge University Press.

NOTE: Students who can are expected to participate in an optional class field trip to Chi Hack Night in Chicago on Tuesday September 5th. There will be \$10 fee to cover the cost of transportation and parking. We will depart Temple Buell Hall at 1:00 pm and return by midnight.

Week 3—September 12 and September 14

Furht, B. 2010. "Cloud computing fundamentals." In *Handbook of Cloud Computing*. New York, NY: Springer.

Blum, R., and C. Bresnahan. 2015. "Basic bash shell commands." In *Linux Command Line and Shell Scripting Bible*. Indianapolis, IN: John Wiley & Sons, Inc.

Skim as Needed:

Bramer, M. 2015. "Using a MySQL Database I", "Using a MySQL Database II", and "Creating and Updating MySQL Tables." In *Web Programming with PHP and MySQL*. Cham, Switzerland: Springer.

Week 4—September 19 and September 21

Desouza, K. C., & Bhagwatwar, A. (2014). Technology-enabled participatory platforms for civic engagement: the case of US cities. *Journal of Urban Technology*, 21(4), 25-50.

Boehmke, B. C. 2016. “Introduction to R” and “The Basics.” In *Data Wrangling with R*. Cham, Switzerland: Springer.

Skim as Needed:

RStudio. 2016. [RStudio Cheat Sheets](#).

Week 5—September 26 and September 28

Goodchild, M. F. 2007. Citizens as sensors: The world of volunteered geography. *GeoJournal*, 69(4), 211-221.

Open Knowledge Foundation. 2017. [Data Portals](#).

Leeper, T. et al. 2017. [CRAN Task View: Web Technologies and Services](#).

Radcliffe, D. 2016. [Web Scraping in R: A Tutorial Using Super Bowl Data](#). *R Pubs*. January 18, 2016.

Skim as Needed:

Boehmke, B. C. 2016. *Data Wrangling with R*. Cham, Switzerland: Springer.

Week 6—October 3 and October 5

RStudio Project. 2016. [Teach Yourself Shiny](#).

Cotgreave, A. 2016. [100 Yrs of Data Visualisation Best Practice](#).

Kelleher, C., and T. Wagener. 2011. Ten guidelines for effective data visualization in scientific publications. *Environmental Modelling & Software*, 26(6), 822-827.

Skim as Needed:

Beeley, C. 2016. [Web application development with R using shiny](#). Birmingham, UK: Packt Publishing. [available as an e-book through the library]

RStudio. 2014. [Shiny HTML Tags Glossary](#).

Collins, M. J. 2017. “Hypertext Markup Language”, “Cascading Style Sheets”, and “JavaScript Essentials.” In *Pro HTML5 with CSS, JavaScript, and Multimedia Complete Website Development and Best Practices*.

Week 7—October 10 and October 12

Zhang, S. 2016. [“Scientists Are Just as Confused About the Ethics of Big-Data Research as You.”](#) *Wired*. May 20, 2016.

Schweitzer, L. A., & Afzalan, N. (2017). 09 F9 11 02 9D 74 E3 5B D8 41 56 C5 63 56 88 C0: Four reasons why AICP needs an open data ethic. *Journal of the American Planning Association*, 83(2), 161-167.

Week 8—October 17 and October 19

RStudio. 2016. [Installing Shiny Server Open Source](#).

Skim as Needed:

RStudio. 2016. [Shiny Server Administrator's Guide](#).

Week 9—October 24 and October 26

Bivand, R., E.J. Pebesma, and V. Gómez-Rubio. 2013. "Classes for Spatial Data in R." In *Applied spatial data analysis with R, 2nd edition*. New York, NY: Springer. (pp. 21-57)

Cheng, J. 2015. [Leaflet for R](#). [access online by clicking the link]

Week 10—October 31 and November 2

We will focus on project specific discussions, training, or site visits this week. This time should be used to move the term project forward.

Week 11—November 7 and November 9

We will build and deploy a prototype, then conduct in-house testing. We will also devise a strategy for beta testing with target user groups.

Week 12—November 14 and November 16

We will implement the beta testing strategy and document the results.

Week 13—November 28 and November 30

We will refine the prototype based on the feedback received during beta testing. We will also begin drafting formal documentation for the data, code, and tools we have developed or are using.

Week 14—December 5 and December 7

We will prepare materials for a final presentation and rollout the final version of the tools. We will also devise a strategy for promoting use of the tools by target user groups.

Week 15—December 12

Deliver the final presentation to local partners, classmates, and others who are interested during the normal class period.