

**UP 594-CW**

Spring 2015

Day/Time: Tue/3:00 pm – 5:50 pm

Course Type: Laboratory/Discussion

RM 19, Temple Buell Hall

Office Hours: By appointment

**Technology and the Mega-city  
Studio**

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**COURSE DESCRIPTION**

Mega-cities, especially those in developing countries, offer an opportunity to study a variety of critical urban issues, from economic opportunities and resource conflicts to lack of effective governance and inequitable human outcomes. The role of technology in planning, from designing smart cities to analyzing social impact, has emerged as particularly timely and important in this discourse.

In this studio, the students will use Mumbai, India to (1) gain a basic understanding of planning in developing Megacities, (2) explore techniques and data that document and explain observed patterns in urban growth and change, and (3) develop applications of these techniques in planning. The aim will be to create a series of conceptual and technical models and loosely couple them into a broader planning support toolkit. The students will gain skills in working with limited data, volunteered geographic information, remote sensing tools and cyberGIS infrastructure. Discussions will connect to broader issues of decision-making under uncertainty, regional governance and lessons for developed and developing contexts.

**COURSE FORMAT**

This is a studio course with no lectures. The format will be closer to a research group, where the instructors will set the overall theme, identify the initial problems, provide some learning materials and then advise on overall direction. The students should be self-driven and expect some uncertainty with regard to data availability and progress speed. The instructors will also facilitate interactions with professionals and scholars from organizations such as Indian Institute of Technology, Mumbai and Center for Environmental Planning and Technology, Ahmedabad in India to CyberGIS Infrastructure Lab and National Center for Supercomputing Applications on campus. A field trip to Mumbai will be organized around Spring Break for which some subsidy and local support may be available. All students are strongly encouraged to take this opportunity.

## THE PROJECT

### **Title: The impacts of increasing FAR on infrastructure and resources: Exploring different scenarios and mitigation measures**

K-West Ward in Andheri is along the Arabian Sea coast of Greater Mumbai. In less than 30 square kilometers, it houses more than 850,000 residents in settlements ranging from the earliest fishermen's villages to gated communities commanding 'Manhattan prices'. Roughly a quarter of the land area is informal housing for about half of the Ward's population, mostly low income migrant workers. Trendy shopping malls have mushroomed next to natural streams that are now little more than open sewers. Remaining mangrove colonies face encroachment by legal and illegal dumping and settlement activity. The most recent forecasts predict about 15%-20% increase in the population over the next twenty years, which the municipality hopes to accommodate by more than doubling allowable densities. There is little planning, however, on how to absorb the corresponding increase in infrastructure demand and resource needs.

Increasing allowable densities (Floor Area Ratio or, as it is called in Mumbai, Floor Space Index or FSI) is a popular measure for urban redevelopment. Often combined with other policies such as, Transfer of Development Rights (TDR) to sale of higher densities or "air rights", increasing FAR can protect land elsewhere from development or serve municipal financing goals. Such policies have long-term impact on the urban area and, as such, their impact should be well understood in advance. In Mumbai, the ongoing development plan update is exploring increasing allowable densities region-wide from 1.33<sup>1</sup> to 3 or 4. In this project, we will explore the possible impacts of this change in policy on urban form and, consequently, on infrastructure demand and resource use. We will do this by (1) estimating the existing relationships between land use, travel demand, natural resource use, etc., at a smaller scale (K-W Ward) and (2) by extending these relationships into a future build-out scenario and other development possibilities, and (3) by scaling up these connections for the larger Mumbai region. A field trip to Mumbai will help ground-truth the information and models through direct observation and discussions with professionals, scholars and stakeholders. Through this project, we will gain an understanding of context specific planning issues, as well as data development, modeling, web-mapping techniques. Our analysis will aim to identify strategies for local agencies to address the observed impacts.

{Please note: The above scope is tentative and may be revised}

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<sup>1</sup> It should be noted that many existing development have higher than 1.33 densities due to certain exemptions, TDR policies or illegal constructions.

## COURSE OUTLINE

Date	Week	Theme	Activities and Deliverables	Readings & references
20-Jan	1	Introductions, studio overview; Discussion on interests, skills, tasks and travel; Team assignments	In class research	See list below
27-Jan	2	Mumbai and site overview, Conceptual models	PRESENT: Review of Mumbai Development Plan Studies and other relevant information; Preliminary conceptual models.	See List below
3-Feb	3	Project Organization: Data development, Modeling and Web tools	DISCUSS: List of tasks, potentially useful tools, needed and available data, expected challenges and solutions	See List below
10-Feb	4	Data development workshop	MEMO: Research plan with timeline	See List below
17-Feb	5	Modeling and web tools workshop	DISCUSS: Project updates	See List below
24-Feb	6	Work session: Preliminary analysis	MEMO: Project updates	TBA
3-Mar	7	Work session: Preliminary analysis contd.	DISCUSS: Preliminary findings	TBA
10-Mar	8	Mid-term review	REPORT: Mid-term report w/ outline of remaining tasks	TBA
17-Mar	9	Field work preparation	DISCUSS: Field work agenda	TBA
24-Mar	10	FIELD WORK	FIELD WORK	TBA
31-Mar	11	No Class	N/A	N/A
7-Apr	12	Work session	MEMO: Travel diary/Project update	TBA
14-Apr	13	Work session	TBD	TBA
21-Apr	14	Work session	REPORT: Preliminary Report from individual teams	TBA
28-Apr	15	Work session	Compile one package: report/website, tools and database	TBA
5-May	16	Final review and wrap up	FINAL PRODUCT: report/website, tools and database	TBA

## READINGS AND REFERENCES

The included readings are only for the first few sessions of the studio to provide some background. These include both prescriptive and critical materials on megacity planning, Mumbai, India, technical methods, and the role of technology. Additional readings and references, including those identified by the students, will be added as the course progresses.

### Readings

#### WEEK 1: Megacity/Mumbai General Background

- Batty, M. At the crossroads of urban growth, *Environment and Planning B: Planning and Design* 2014, volume 41, pages 951 – 953
- The Economist, 2014 Dec. The Suburbanisation of the World
- Khilnani, Sunil. *The idea of India*. Penguin Books India, 1999. Chapter 3. Cities

#### WEEK 2: Mumbai and site overview, Conceptual models

- Mumbai Development Plan: Existing Conditions Reports Part 1 to 3
- Coelho, Dana, and Matthias Ruth. 2006. "Seeking a unified urban systems theory." In *The sustainable city IV: Urban regeneration and sustainability*, Mander, Ülo, C. A. Brebbia, and Enzo Tiezzi (eds.). Southampton, UK: WIT Press.

#### WEEK 3: Project Organization: Data development, Modeling and Web tools

- Assigned from references list

#### WEEK 4: Data development workshop

- Assigned from references list

#### WEEK 5: Modeling and web tools workshop

- Assigned from references list

### Reference readings by topic:

(Note : Not all students will need all the skills but shared learning is expected)

#### Basic Planning Analysis

- Berke P.R., D.R. Godschalk, E.J. Kaiser and D.A. Rodriguez, Chapter 5: Population and Economy, Pages 117-148. Chapter 6: Environmental Systems, Pages 149-196. In *Urban Land Use Planning*. University of Illinois Press. 2010.
- Garcia, M.W., R.O. Olshansky and R.J. Burby. Chapter 5: Environmental Analysis. Pages: 87-118. In Hoch, C.J., L.C. Dalton and F.S. So (eds). *The practice of local government planning*. International City and County Managers Association. 2000. Lieske, Scott N., Roger H. Coupal, Jeffrey D. Hamerlinck, Donald M. McLeod, and Anna M. Scofield. 2013. "Planning Support Systems for Fiscally Sustainable Planning." In *Planning Support Systems for Sustainable Urban Development*, pp. 127-147. Springer Berlin Heidelberg.

#### Planning support systems

- Berke P.R., D.R. Godschalk, E.J. Kaiser and D.A. Rodriguez, Chapter 4: Planning Support Systems, Pages 89-116, In Urban Land Use Planning. University of Illinois Press. 2010.

#### Urban Growth Modeling

- Sohl, Terry L., and Peter R. Claggett. 2013. "Clarity versus Complexity: Land-Use Modeling as a Practical Tool for Decision-Makers." *Journal of Environmental Management* 129: 235–43. doi:10.1016/j.jenvman.2013.07.027.
- Chaudhuri, G., & Clarke, K. C. (2013). The SLEUTH land use change model: A review. *International Journal of Environmental Resources Research*, 1 (1), 88-104.
- Landis, John. "CUF, CUF II, And CURBA: A Family of Spatially Explicit Urban Growth and Land-Use Policy Simulation Models," In *Planning Support Systems: Integrating Geographic Information Systems, Models, and Visualization Tools*, Edited by Richard K. Brail and Richard E. Klosterman, 2001, ESRI Press: Redlands, California.\
- Mir, M., K. Rao, and J. Hunt. 2010. "Space Development Modeling of Urban Regions in Developing Countries." *Journal of Urban Planning and Development* 136 (1): 75–85.

#### Travel Demand modeling, Land Use and Transportation modeling

- Beimborn, E. A. (2006) A Transportation Modeling Primer.
- Comprehensive Mobility Plan Toolkit(Revised), Institute of Urban Transport India (<http://www.iutindia.org/downloads/Documents.aspx>)

#### Water demand (and run-off) modeling

- Hebbert, Michael. 2014. "Climatology for City Planning in Historical Perspective." *Urban Climate*, ICUC8: The 8th International Conference on Urban Climate and the 10th Symposium on the Urban Environment, 10, Part 2 (December): 204–15. doi:10.1016/j.uclim.2014.07.001.
- Stone, Brian, Jason Vargo, and Dana Habeeb. 2012. "Managing Climate Change in Cities: Will Climate Action Plans Work?" *Landscape and Urban Planning* 107 (3): 263–71. doi:10.1016/j.landurbplan.2012.05.014.

#### Remote sensing, Image processing

- Richards, John A. 2013. *Remote sensing digital image analysis: An introduction*. New York, NY: Springer-Verlag. (available as e-Book)

#### Energy/Heat modeling

- US National Renewable Energy Laboratory's Geospatial Toolkit (focus on India data) [http://www.nrel.gov/international/geospatial\\_toolkits.html](http://www.nrel.gov/international/geospatial_toolkits.html)
- data USERL

#### Development typology

- Dovey, K. and R. King. 2011. Forms of informality: Morphology and visibility of informal settlements. *Built Environment* 37 (1): 11-29.

#### Volunteered geographic information

- Elwood, Sarah, Michael F. Goodchild, and Daniel Z. Sui. 2012. "Researching Volunteered Geographic Information: Spatial Data, Geographic Research, and New Social Practice." *Annals of the Association of American Geographers* 102 (3): 571–90. doi:10.1080/00045608.2011.595657.

#### Web-based mapping and visualizations

- Wang, Shaowen. 2010. "A CyberGIS Framework for the Synthesis of Cyberinfrastructure, GIS, and Spatial Analysis." *Annals of the Association of American Geographers* 100 (3): 535–57. doi:10.1080/00045601003791243.
- Peterson, Michael P. 2014. *Mapping in the cloud*. New York, NY: Guilford Press. (available as e-Book)

### **TENTATIVE FIELD TRIP ITINERARY**

19-Mar	Thursday	Depart Champaign/Chicago
20-Mar	Friday	Arrive Mumbai,
21-Mar	Saturday	Mumbai Orientation
22-Mar	Sunday	Visit to K-W Ward
23-Mar	Monday	Visit to K-W Ward, Interviews, data collection, office visits
24-Mar	Tuesday	Interviews, data collection, office visits
25-Mar	Wednesday	Joint activity with scholars from India
26-Mar	Thursday	Local Workshop
27-Mar	Friday	Visit to select urban development projects/Free travel
28-Mar	Saturday	Travel on your own or Depart Mumbai/Arrive Chicago/Champaign
29-Mar	Sunday	Travel on your own or Depart Mumbai/Arrive Chicago/Champaign
30-Mar	Monday	Travel on your own or Depart Mumbai/Arrive Chicago/Champaign

### **GRADING**

Memos: 30%

Participation in class activities: 20%

Mid-term report and presentations: 20%

Final report and presentation: 30%

Attendance is mandatory.

### **ACADEMIC INTEGRITY**

Please be aware of the university guidelines regarding academic integrity, which can be found under Article 1, Part 4 of the student code

(<http://www.admin.uiuc.edu/policy/code/>). Academic dishonesty includes such things as cheating, inappropriate use of university equipment/material, fabrication of information, plagiarism (presenting someone else’s work from any source as your own such as copying someone else’s post), and so on. All forms of academic dishonesty will be reported to the student’s home department, the College of Fine and Applied Arts, and to the Senate Committee on Student Discipline.

### **SPECIAL ACCOMMODATIONS**

If you have any condition, such as a physical or learning disability, which will make it difficult for you to carry out the work as outlined or which will require academic accommodations, please notify me during the first week of the course. I will strive to accommodate you.