Spring 2012

School of City and Regional Planning and School of Architecture
College of Architecture, Georgia institute of Technology

CP8873/AR8803 **Urban Ecological Design**

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Contact: perry.yang@coa.gatech.edu
Time: Thu 18:05-20:55
Venue: Clough Common CULC 423

Abstract

The course engages the contemporary issues of urban ecology and its articulation to design in urban settings. The new commitment of the co-habitation of nature and built environment has drawn attentions of city planners, urban designers and architects. The discourses of urban sustainability have to move away from social sufficiency, ecological efficiency to ecosystems compatibility by linking the forms and flows of urban, industrial and natural systems. The new challenges of urban ecological issue require design and planning professionals to deal with how urban and environment spaces could be analyzed, designed, managed, evaluated, represented and changed for responding to the cutting-edge ecologically sustainable issues. Divided by two main categories, *Spatial Typologies* and *Ecological Flows*, the sessions cover the trends and issues of ecologically sound urban design. Following the introductory lecture on ecological urban design in historical context, the Part One *Spatial Forms and Typologies* includes global ecological effects of mega urban form, suburbia, compact city and the debate of sustainable urban form, downtown urban environment, waterfront revitalization, brown field redevelopment, urban-nature edge space and the proposition of landscape urbanism. The Part Two *Ecological Flows* covers the ecological design issues of landscape ecological flow, material and energy flow, water flow and informational flow. The sessions conclude with the discussion of representational dimension of urban and environmental design that is essential to the professional practices of ecologically sound urban design. By selecting one of the specific ecologically sustainable issues, students are required to work on a research project, which is to be presented as a team work during the semester and further developed as an individual term paper at the end of semester.

Learning objectives

Students will be exposed to the following theories, methods and tools:

- A literature review of contemporary debates on urban sustainability
- Theory of urban form
- Landscape ecology and planning
- Industrial ecology and its methods including tools of life cycle assessment and material flow analysis
- Foundation in urban hydrology
- Representational techniques of urban design and form analysis

Course Schedule

1. 1/12 Introduction
2. 1/19 Urban design, urban ecology and ecological design

PART ONE: *Spatial Forms and Typologies*

3. 1/26 Propositions in urban sustainability and ecological urbanism
   Ecological city-regions
4. 2/02 **Seminar (1)** ***sustainable urban form***
5. 2/09 Downtown urban design and environment
6. 2/16 Brown field settings and global waterfront movement
   Urban-nature edges and landscape urbanism

PART TWO: *Ecological Flows*

7. 2/23 Urban ecosystems: scale, complexity and design
   Material and energy flows; design for eco-industrial park; urban metabolism
8. 3/01 **Seminar (2)** ***Low carbon city design and life cycle assessment***
9. 3/08 Students' project presentation and discussion (1) *Design for urban metabolism: high performance landscape, urban farming and productive landscape, eco-industrial park*
10. 3/15 Landscape ecological flow: design for ecologically sound landscape pattern
11. 3/22 Spring Break
12. 3/29 Tutorial session of urban systems design simulation tools* (to be arranged)
13. 4/05 Water flow: water sensitive urban design
14. 4/12 Students' project presentation and discussion (2) *Design for brownfields, waterfront and urban-nature edges/ Eco-cities (models and global comparison)*
15. 4/19 Students' project presentation and discussion (3) *Low carbon and renewable cities (measure, form and design)*
16. 4/26 Informational flow: informational city; Informational layers and representations of city and nature
17. 5/3 Final remarks and term paper submission

Criteria of Performance Evaluation

1. 10% class attendance and discussion
2. 20% research project presentation (group project)
3. 70% regular assignment and final term paper (10% for the 2 pages first draft; 20% for the 6 pages second draft; 40% for the final term paper)

Submission Requirements

1. The weekly readings are divided by **required** and **recommended** categories. Before attending the class, students are required to complete the required reading, which is carefully selected from the whole reading list. The recommended reading is mainly for the long-term interests as well as a source for the research project and individual term paper.

2. Research project is a group project, to be presented by power point or other suitable ways of presentation. The grouping and topics for individual group are to be determined by 1/19.
3. The term paper is about 5000 words with illustrations of images and drawings. The followings are the three submission dates with different requirements:
   1) 2/09, the first draft proposal, up to 2 pages;
   2) 3/15, the second draft of the term paper, 4-6 pages;
   3) **5/03, 6PM**, final term paper, 5000 words.
   4) (The submissions are to be done by both uploading soft copy to T-Square and handing in hard copy at the class.)
4. Please note that research projects (power point) and term papers (word file, including proposal, first draft and final term paper) have to be uploaded to T-Square by the date of presentation or deadline. The file name should include your name, topic and date, e.g. john-ecodesign-030305.

Course Policy

In general, the following guidelines apply to this course:

1. Engage yourself in class activities so you can maximize your learning. Before coming to the class, please read all required materials and be prepared for discussion. Class participation grades will reflect your participation in these activities, not just your attendance.
2. If events prevent you from attending a class, please let me know in advance by e-mail.
3. Please follow the due date on your problem sets or assignments. Late work will not be accepted unless emergent events happen.
4. Academic honor code and student code of conduct**:**
   All students should be knowledgeable of the Georgia Institute of Technology Academic Honor Code. The Georgia Tech Academic Honor Code (http://www.catalog.gatech.edu/rules/18b.php) and Student Code of Conduct (http://www.catalog.gatech.edu/rules/19b.php) outline the Institute's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading these two documents fully and for living up to them. Among the Codes' provisions are expectations about unauthorized access, unauthorized collaboration, plagiarism, false claims of performance, grade alteration, falsification, forgery and distortion. You should be absolutely clear in indicating when you have used ideas or words that are not your own. You are permitted to discuss the written assignments in this course with your fellow classmates, but, except for group assignments, you should not collaborate on your submissions.
5. Students with disabilities:
   Students with disabilities needing academic accommodation should provide documentation to the Access Disabled Assistance Program for Tech Students (http://www.adapts.gatech.edu/) and bring an ADAPTS accommodation letter to the instructor indicating the nature of accommodations required. This should be done within the first week of class or as soon as possible after a new disability condition arises. All effort will be made to provide reasonable accommodation.

Reading List

Introduction/ Urban Design, Urban Ecology and Ecological Design

(required)

- Graedel T E, Allenby B R, 2010, Ch1-3 in *Industrial Ecology and Sustainable Engineering*, Prentice Hall.
- Lynch K, 1990, "Urban Design", in *City Sense and City Design: Writings and Projects of Kevin Lynch*, pp 511-534, edited by T. Banerjee and M. Southworth, MIT Press.
- Marzluff J M et al. eds., 2008, Introduction in *Urban Ecology: An International Perspective on the Interaction* Between Humans and Nature, Springer.
- Steinitz C, 2002, CH 10 On Teaching Ecological Principles to Designers in *Ecology and Design: Frameworks for Learning*, Johnson B R, Hill K eds., Island Press.

(recommended)

- Alberti M, 2009, *Urban Ecology: Integrating Humans and Ecological Processes in Urban Ecosystems*, Springer
- Lynch K, 1990, *City Sense and City Design: Writings and Projects of Kevin Lynch*, edited by T. Banerjee and M. Southworth, MIT Press.
- McHarg I L, Steiner F R, 1998, *To Heal the Earth: Selected Writing of Ian L. McHarg*, Island Press. Washington D C.
- Thompson G, Steiner F R eds., 1997, *Ecological Design and Planning*, John Wiley & Sons, Inc.

Propositions in Urban Sustainability/ Ecological Urbanism

(required)

- Huber J, 2006, Ch.2 "TEI in Discourse Context" in *New Technologies and Environmental Innovation*, Edward Elgar, Northhampton, MA.
- World Architecture (WA), 2010, January Issue *Ecological Urbanism*, Tsinghua University, Beijing China.
- Yang, P P J, 2009, Questioning urban sustainability: social sufficiency, ecological efficiency and ecosystems compatibility. In *Journal of Urbanism*, November 2009, Vol. 2, Issue 3.

(recommended)

- Cronon W, 1991, "Introduction: In Search of Nature" in *Uncommon Ground: Toward Reinventing Nature*, edited by Cronon, W. W. Norton & Company, New York & London.
- Economy E C, 2007, The Great Leap Backward? *Foreign Affairs*; *Yale Global On-line Magazine* (http://yaleglobal.yale.edu).
- Huber J, 2006, *New Technologies and Environmental Innovation*, Edward Elgar, Northhampton, MA.
- Kellert S, 2005, *Building for Life: Designing and Understanding the Human-Nature Connection*, Island Press, Washington D C.
- Mostafavi M ed., 2010, *Ecological Urbanism*, Harvard Graduate School of Design
- Yang, P P J, 2010, *Ecological Urbanism: Scale, Flow and Design*, China Architecture and Building Press, Beijing.

Ecological city-regions: mega urban forms, urban sprawl and the debate of sustainable urban form

(required)

- Easterling K, 1999, Part one in *Organizational Space: Landscapes, Highways and Houses in America*, MIT Press.
- Forman R R T, 2008, Ch1-5, in *Urban Regions: Ecology and Planning Beyond the City*, Cambridge University Press.
- Hall P, 2002, Ch.5 "The City in the Region: The Birth of Regional Planning; Edinburgh, New York, London 1900-1940" in *Cities of Tomorrow: An Intellectual History of Urban Planning and Design in the Twentieth Century*, Blackwell.

(recommended)

- Barnett J, 1995, Introduction and Part one in *The Fractured Metropolis: Improving the New City, Restoring the Old City, Reshaping the Region.* Icon Edition, New York.
- Bernick M, Cervero R, 1997, *Transit Villages in the 21st Century*, McGraw-Hill Inc., New York.
- Calthorpe P, 1993, *The Next American Metropolis: Ecology, Community, and The American Dream*, Princeton Architectural Press, New York.
- Calthorpe P, Fulton W, 2001, *The Regional City: Planning for the End of Sprawl*, Island Press.
- Cronon W, 1991, *Nature's Metropolis: Chicago and the Great West*, W. W. Norton & Company.
- European Commission, 1996, *European Sustainable Cities: Report by the Expert Group on the Urban Environment*.
- Forman R R T, 2008, *Urban Regions: Ecology and Planning Beyond the City*, Cambridge University Press.
- Hall P, Pain K, 2006, *The Polycentric Metropolis: learning from mega-city regions in Europe*, Earthscan, London ; Sterling, VA.
- Hall P, 2002, *Cities of Tomorrow: An Intellectual History of Urban Planning and Design in the Twentieth Century*, Blackwell.
- Koolhaas, R. (2000) "PRD Pearl River Delta" in Mutations, Actar Press.
- Jenks, M, Dempsey N eds., 2005, *Future Forms and Design for Sustainable Cities*, Architectural Press.
- Jenks M, Burton E, Williams K, eds., 1996, *The Compact City: A Sustainable Urban Form?* E & FN SPON, London.
- Jenks M, Williams K, Burton E, eds., 1999, *Achieving Sustainable Urban Form*, E & FN SPON, New York.
- Jenks M, Burgess R, 2000, *Compact Cities: Sustainable Urban Form for Developing Countries*, E & FN SPON, London.
- Katz P, 1994, *The New Urbanism: Toward an Architecture of Community*, McGraw-Hill Inc.
- Meacher M, Ravetz J, 2000, *City-Region 2020: Integrated Planning for a Sustainable Environment*, Earthscan Publications Ltd.
- Rogers R, Burdett R, 2001, "Let's Cram More Into The City", in *Cities For The New Millennium*, edited by Echenique M. & Saint, A., Spon Press, London.
- Talen E, 2005, Ch.7 Regionalism in *New Urbanism and American Planning: The Conflict of Cultures*, Routledge.

- Sanders W S ed., 2005, *Sprawl and Suburbia*, A Harvard Design Magazine Reader, University of Minnesota Press, Minneapolis.
- Simmonds R, 2001, *Global City Regions: Their Emerging Forms*, Routledge.
- Warren R, 1998, *Urban Oasis: Guideways and Greenways in the Human Environment*, McGraw-Hill Inc., New York.
- Welter V M, 2002, *Biopolis: Patrick Geddes and the City of Life*, MIT Press.
- Wu F, Xu J, Yeh A, 2007, *Urban Development in Post-Reform China*, Routledge.

Downtown urban design and environment

(required)

- Allen S, 2009, "Part three: Cities" in Practice: Architecture Technique + Representation, Routledge.
- Burdett R, Sudjic D, 2007, the part 'Cities' in *The Endless City: The Urban Age Project by the London School of Economics and Deutsche Bank's Alfred Herrhausen Society*, Phaidon Press Ltd.
- Cherry N, Nagle K, 2009?, *Grid/Street/Place: Essential Elements of Sustainable Urban Districts*, American Planning Association.
- Martin L., & March L., 1972, Ch1-2 in *Urban Space and Structures*. London: Cambridge University Press.

(recommended)

- Appleyard D, 1976, *Planning a Pluralist City: Conflicting Realities in Ciudad Guayana*, MIT Press.
- Bacon E, 1969, "Putting Ideas to Work—Philadelphia" in *Design of Cities*, pp. 264-307, MIT Press.
- Carr S, Francis M, Rivlin L G, Stone A M, 1992, *Public Space*, Cambridge University Press.
- Gehl J, Gemzoe L, 2001, *New city spaces*, Danish Architectural Press, Copenhagen.
- Gosling D, 2003, *The Evolution of American Urban Design*, Wiley-Academy.
- Jacobs A, 1993, *Great Streets*, MIT Press.
- Jacobs J, 1962, *The Death and Life of Great American Cities*, originally published Random House.
- Koolhaas R, Nouvel J, Portzampark C, Vasconi C, Duthilleul J, 1995, *Euralille: The Making of a New City Center*, Birkhauser, Berlin.
- Lang J, 2005, *Urban Design: A Typology of Procedures and Products*, Oxford: Elsevier/Architectural Press.
- Latham I, Swenarton M eds., 1999, *Brindleyplace: A Model for Urban Regeneration*, Rightangle Publishing.
- Loukaitou A, Banerjee T, 1998, *Urban Design Downtown: Poetics and Politics of Form*, University of California Press.
- Lynch K, 1972, *What Time Is This Place*, MIT Press.
- Lynch K, 1972, *Managing the Sense of a Region*, MIT Press.
- Marshall R, 2003, *Emerging Urbanity: Global Urban Projects in the Asia Pacific Rim*, SPON Press, London.
- Powell K, 2000, *City Transformed: Urban Architecture at the Beginning of the 21st Century*, Laurence King Publishing, London.

- Redstone L G, 1976, *The New Downtowns: Rebuilding Business Districts*, McGraw-Hill Book Company.
- Rogers R, Gumuchdjian P, 1997, *Cities for a Small Planet*, Faber & Faber Limited, London.
- Sarkis H, Allard P, Hyde T, 2002, *Case: Le Corbusier's Venice Hospital and the Mat Building Revival* , Harvard Graduate School of Design.
- Terry Farrell & Partners, 1998, *Kowloon: Transport Super City*, PACE publishing Ltd., Hong Kong.
- Yang, P P J, 2005, "From Central Business District to New Downtown: Designing Future Sustainable Urban Forms in Singapore", in *Future Forms and Design for Sustainable Cities*, Jenks M & Dempsey N eds. Architectural Press.

Brown fields and global waterfront movement; urban-nature edge and landscape urbanism

(required)

- Berger A, 2006, Drosscape in *The Landscape Urbanism Reader*, Waldheim C ed., Princeton Architectural Press.
- Charles W ed, 2005, City Edge: Case Studies in Contemporary Urbanism, Architectural Press.
- Corner J, 2006, Terra Fluxus in *The Landscape Urbanism Reader*, Waldheim C ed., Princeton Architectural Press.
- Czerniak J ed., 2001, *Case: Downsview Park Toronto*, Harvard University Graduate School of Design. Prestel Verlag Press.
- Hall P, 1993, "Waterfronts: A New Urban Frontier", in *Waterfronts: A New Frontier for Cities on Water*, Bruttomesso, R. ed., International Centre Cities on Water, Venice.
- Marshall R ed., 2001, Ch.1, Ch.3 in *Waterfronts in Post-Industrial Cities*, SPON Press, London.
- Waldheim C, 2006, Landscape as Urbanism in *The Landscape Urbanism Reader*, Waldheim C ed., Princeton Architectural Press.

(recommended)

- Berger A, 2006, *Drosscape: Wasting Land in Urban America*, Princeton Architecture Press.
- Gastil R W, 2002, *Beyond the Edge: New York's New Waterfront*, Princeton Architectural Press.
- Kirkwood N ed., 2001, *Manufactured Sites: Rethinking Post-industrial Landscape*, Spon Press.
- Marshall R ed., 2001, *Waterfronts in Post-Industrial Cities*, SPON Press, London.
- Meyer H, 1999, *City and Port: Urban Planning as a Cultural Venture in London, Barcelona, New York, and Rotterdam: Changing Relations Between Public Urban Space and Large-scale Infrastructure*, Utrecht: International Books.
- Mostafavi M, Najle C eds., 2003, *Landscape Urbanism: A Manual for the Machinic Landscape*, Architectural Association.
- Waldheim C ed., 2006, *The Landscape Urbanism Reader*, Princeton Architectural Press.

Urban ecosystems: scale, system complexity and design

(required)

- Alberti M, 2009, Ch9 Future of Urban Ecosystems, in *Advances in Urban Ecology:*

Integrating Humans and Ecological Processes in Urban Ecosystems, Springer.

- Oswald F, Baccini P, 2003, *Netzstadt: Designing the Urban*. Birkhauser, Berlin.
- Steinitz C, 2008, On Scale and Complexity and the Needs for Spatial Analysis, Working Paper, Graduate School of Design, Harvard University.
- Walker B, Holling S C, Carpenter, S R, Kinzig, 2004, Resilience, Adaptability and Transformability in Social-Ecological Systems, in *Ecology and Society 9 (2): 5*.

(recommended)

- Batty M, 2005, *Cities and Complexity: Understanding Cities with Cellular Automata, Agent-Based Models, and Fractals*, MIT Press.
- Chermayeff S, Tzonis A, 1971, *Shape of Community: Realization of Human Potential*, Penguin Books.
- Forman R T T, 1995, *Land Mosaics: The Ecology of Landscapes and Regions*, Cambridge University Press, London.
- Graedel T E, Allenby B R, 2010, *Industrial Ecology and Sustainable Engineering*, Prentice Hall.
- Grimm, V., Revilla, E., Berger, U., Jeltsch, F., Mooij, W. M., Railsback, S. F., Thulke, H. H., Weiner, J., Wiegand, T., DeAngelis, D. L., 2005, Pattern-Oriented Modeling of Agent-Based Complex Systems: Lessons from Ecology. *Science* 310, 987.
- Holling C S, 2001, Understanding the Complexity of Economic, Ecological, and Social Systems, in *Ecosystems* (2001) 4: 390-405.

Material and energy flows, urban metabolism and design for eco-industrial park

(required)

- Chertow M R, 2000, "Industrial Symbiosis: Literature and Taxonomy", in *Annual Review of Energy and the Environment* 25: 313-37.
- Droege P, 2006, Introduction in *The Renewable City: A Comprehensive Guide to an Urban Revolution*, John Wiley & Son Inc.
- Thomas R, Fordham M, eds., 2003, Ch.6-7, In *Sustainable Urban Design: An Environmental Approach*. SPON Press, London.

(recommended)

- Ashfold N A, Cote R P, 1997, "An Overview of the Special Issue", in *Journal of Cleaner Production* Vol. 5, No.1-2: i-iv.
- Breuste J, Feldmann H, Uhlmann O, 1998, *Urban Ecology*, Springer-Verlag, Berlin.
- Droege P, 2006, *The Renewable City: A Comprehensive Guide to an Urban Revolution*, John Wiley & Son Inc.
- Graedel T E, Allenby B R, 2010, *Industrial Ecology and Sustainable Engineering*. Prentice Hall.
- Guy S, Marvin S, Timothy M, 2001, *Urban Infrastructure in Transition*, Earthscan, London.
- Hough, M, 1995, "Climate: Making Connections" in *Cities and Natural Process*, Routledge, New York and London.
- Yang, P P J, 2008, Tracking Sustainable Urban Forms and Material Flows in Singapore. In *World Cities and Urban Form: Fragmented, Polycentric, Sustainable?* edited by Mike Jenks, Daniel Kozak and Pattaranan Takkanon, Routledge.

- Yang P P J, Ong B L, 2004, "Applying Ecosystem Concepts to the Planning of Industrial Areas: A Case Study of Singapore's Jurong Island", in *Journal of Cleaner Production* (special issue on applications of industrial ecology), 12, 8-10, October 2004.

Landscape ecological flow: design for ecologically sound landscape pattern

(required)

- Dramstad W E, Olson J D, Forman R T T, 1996, *Landscape Ecology Principles in Landscape Architecture and Land-Use Planning*, Harvard GSD & American Society of Landscape Architects, Island Press.
- Forman R T T, 1995, Ch. 1-4 in *Land Mosaics: The Ecology of Landscapes and Regions*, Cambridge University Press, London.

(recommended)

- Forman R T T, 1995, *Land Mosaics: The Ecology of Landscapes and Regions*, Cambridge University Press, London.
- Fabos J, Ahern J, eds., 1996, *Greenways: the beginning of an international movement.* Elsevier, New York, USA.
- Jeffrey M, Klopatek R, Gardner H eds., 1999, *Landscape ecological analysis: issues and applications.* Springer, New York, USA.
- Leitao A B, Miller J, Ahern J, McGarigal K, 2006, *Measuring Landscapes: A Planner's Handbook.* Island Press, Washington, USA.
- McHarg I, 1992, *Design with Nature*, John Wiley & Sons Inc., New York.

Water flow: water sensitive urban design

(required)

- France, R L, 2003, *Wetland Design: Principles and Practices for Landscape Architects and Land Use Planners*, W. W. Norton and Company.
- Hough M, 1995, Ch. 2 "Water" in *Cities and Natural Process*, Routledge, New York and London.
- Spirn A W, 1984, Ch. 6 "Floods Droughts and Poisoned Water" in *The Granite Garden: Urban Nature and Human Design*, Basic Books, New York.

(recommended)

- Balmori D, Benoit G, 2007, Ch. 2 "Water" in *Land and Natural Development (LAND) Code: Guidelines for Sustainable Land Development*, John Wiley & Son Inc.
- Ferguson B K, 1998, *Introduction to Stormwater: Concept, Purpose and Design*, John Wiley & Son Inc.
- France R C, 2002, *Handbook of Water Sensitive Planning and Design: Integrative Studies in Water Management and Land Development*, CRC Press LLC.
- Kloster T, Leybold T, Wilson C, 2002, Green Streets: Innovative Solutions for Stormwater and Stream Crossings, in *Urban Drainage*. Redistribution subject to ASCE license or copyright; http://www.ascelibrary.org.
- Marsh W M, 2005, Ch. 7-14 in *Landscape Planning: Environmental Applications*. 4th edition, John Wiley & Son Inc.
- Riley A L, 1998, *Restoring Streams in Cities; A Guide for Planners, Policy Makers, and Citizens*, Island Press, Washington D C.
- Wynkoop S E, 2000, *Low Impact Development: An Integrated Design Approach*, Department of Environmental Resources, Prince George's County, Maryland.

Informational flow and pedestrian flow: space of flow, space of place and the shaping of contemporary informational urbanscapes

(required)

- Castells M, 1989, "The Reconstruction of Social Meaning in the Space of Flows", in *The Informational City: Information Technology, Economic Restructuring, and The Urban-Regional Process*. Blackwell, Cambridge, USA.
- Mitchell W J, 1999, E-topia, MIT Press, Cambridge.
- Yang P P J, 2006, Book review of Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing, *Environment and Planning B: Planning and Design*. , Vol 33, 793-795.

(recommended)

- Batty M, 2001, "The Computable City", in *Online Planning Journal*, CASA, University College London
- Castells M, 2000, *The Rise of the Network Society*, Blackwell, Malden, MA.
- Castells M, Hall P, 1994, *Technopoles of the World: the Making of Twenty-First-Century Industrial Complexes*, Routledge, London.
- Graham S, Marvin S, 2001, *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, Routledge, London.
- McCullough M, 2004, *Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing*, MIT Press, Cambridge.
- Mitchell W J, 2003, *Me++: The Cyborg Self and the Networked City*, MIT Press, Cambridge.
- Mitchell W J, 1995, *City of Bits: Space, Place and the Infobahn*, MIT Press, Cambridge.

Representation of nature and city: technique of urban and environmental design analysis

(required)

- Lynch, K. (1972) "Appendix 2: A Glossary of Technique" in *Managing the Sense of a Region*, pp. 88-164, MIT Press.
- Bosselmann P. (1998) *Representation of Places: Reality and Realism in City Design*, University of California Press, Berkeley, CA.

(recommended)

- Allen, S. (2009) *Practice: Architecture Technique + Representation*, Expanded Second Edition. Routledge.
- Batty M, Longley P A, 2003, Ch1 & Ch21, In: *Advanced Spatial Analysis: the CASA book of GIS*, ERIS Press.
- Brail R, Klosterman R, 2001, *Planning Support Systems: Integrating Geographic Systems, Models, and Visualization Tools*, ESRI Press.
- Dodge M, Kitchin R, 2001, *Mapping Cyberspace*, Routledge, New York and London.
- Lynch K, 1990, "City Design and City Appearance" in *City Sense and City Design: Writings and Projects of Kevin Lynch*, pp465-497, edited by T. Banerjee and M. Southworth, MIT Press.
- Lynch K, 1972, *Managing the Sense of a Region*, MIT Press.
- Vale L J, Warner S B, 2001, *Imaging the City: Continuing Struggles and New Directions*, Center for Urban Policy Research, Rutgers, New Jersey.