



*Voronoi Tower* by Chris Joslin  
2008 EVDA 782.01 Advanced Studio

## EVDA 782.01 | CITIES STUDIO | F(0-8) HYPERDENSE CITY & PERFORMATIVE SKYSCRAPER

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MTWF 14:00-17:50, PF 2110 (group discussions & crits)

### Introduction

It is estimated that roughly half of the world's population now lives in cities, whose footprint continues to expand at the expense of the natural environment. Some argue that to prevent the 'cancerous' growth of cities, we should embrace and strive for *hyperdensity* in urban environments. For some, however, a truly vertical city has yet to emerge: Hong Kong and New York are only hints of the future super-tall urban environments that we will likely experience. The search for a livable, viable, sustainable hyperdense urban environment is perhaps one of the most challenging design issues today.

Hyperdensity has become synonymous with very tall buildings (skyscrapers) and therein is a potential problem because the skyscrapers – as designed and built until late 20<sup>th</sup> century – are probably the most ecologically unfriendly of all building types. With the emerging emphasis on performance, architects now have an array of digital tools to model not only building's form and spaces but also to analyze how they perform, with a promise of better buildings. Nowhere is the promise of *performative* architecture more evident than in skyscraper design.

The studio will explore the impact of hyperdensity on contemporary cities and what that entails not only socially and culturally but also in terms of infrastructure, design and environmental impact. The key question the studio will address is: What will urban hyperdensity look and be like? Students will propose an overall conceptual urban design proposal for a hyperdense vertical city and develop a detailed design of a performative super-tall building and its connections to city's infrastructure and its social and cultural fabric.

Students will have the opportunity to enter their design in the 2015 eVolo Skyscraper Design Competition, described on the following page. (Participation in the competition is optional.)

### Schedule (by week)

- 1 Introduction
- 2 Urban Hyperdensity
- 3 High-rise Design Principles
- 4 Skyscraper Conceptual Design
- 5 Performative Studies
- 6 Block week (no classes)
- 7 Mid-term Review (10/21)
- 9 Skyscraper Design Development
- 10 Aerodynamics
- 11 Structural Design
- 12 Environmental Performance
- 13 Final Review (TBA)

Note: The schedule is subject to change.

### Evaluation

The final grade will be based on urban design proposal (25%), skyscraper conceptual (25%) and detailed design (50%). Each of these will be based on development (20%), outcome (30%) verbal (20%) and graphic presentation (30%). Standard EVDS grading scale will be used in all evaluations.

### Objectives

Studio projects will focus on three fundamental aspects of designing very tall buildings in hyperdense urban environments: (1) horizontal and vertical urban connectivity, (2) mixed-use program definition with vertical and horizontal distribution, and (3) building systems and technology (structure, environmental systems, envelope). In addition to exploring the issues associated with hyperdense urban environments, students will learn about the fundamentals of tall building design. They will also learn how to generate, visualize and analyze designs through an iterative, performance-driven design process. Performative considerations will go beyond the technical and will extend into the urban, social and cultural spheres; on the technical side, design considerations will include aerodynamics, structure, environmental design, energy and thermal performance, building envelope and materiality. Students will learn the principles behind the design and construction of skyscrapers and the ways they are designed to withstand forces such as earthquakes, high winds, and fire.

### Teaching Approach

Different topics in the studio will be introduced through readings, lectures and group discussions. Several will involve short, but intense case studies. Some of the assignments will be developed in groups of two. (Group work and group crits and discussions are seen as essential to studio's pedagogy.) Different programs for performance analysis (air flows, energy, structure, etc.) will be introduced through demonstrations of essential features and hands-on tutorials. The use of the performance simulation software is optional, i.e. it is not required.

## 2015 eVolo Skyscraper Competition Brief

<http://www.evolo.us/competition/>

"eVolo Magazine is pleased to invite architects, students, engineers, designers, and artists from around the globe to take part in the eVolo 2015 Skyscraper Competition. Established in 2006, the annual Skyscraper Competition is one of the world's most prestigious awards for high-rise architecture. It recognizes outstanding ideas that redefine skyscraper design through the implementation of novel technologies, materials, programs, aesthetics, and spatial organizations along with studies on globalization, flexibility, adaptability, and the digital revolution. It is a forum that examines the relationship between the skyscraper and the natural world, the skyscraper and the community, and the skyscraper and the city.

### Registration

Multidisciplinary teams are encouraged.  
Individual entries are accepted.  
Participants must register by 1/13/2015.  
Early Registration: US\$95 until 11/18.  
Late Registration: US\$115 after 11/18.  
The registration fee is non-refundable.

The participants should take into consideration the advances in technology, the exploration of sustainable systems, and the establishment of new urban and architectural methods to solve economic, social, and cultural problems of the contemporary city including the scarcity of natural resources and infrastructure and the exponential increase of inhabitants, pollution, economic division, and unplanned urban sprawl.

The competition is an investigation on the public and private space and the role of the individual and the collective in the creation of a dynamic and adaptive vertical community. It is also a response to the exploration and adaptation of new habitats and territories based on a dynamic equilibrium between man and nature – a new kind of responsive and adaptive design capable of intelligent growth through the self-regulation of its own systems.

There are no restrictions in regards to site, program or size. The objective is to provide maximum freedom to the participants to engage the project without constraints in the most creative way. What is a skyscraper in the 21st century? What are the historical, contextual, social, urban, and environmental responsibilities of these mega-structures?"

### Competition Schedule

7/1/2014 – Registration begins  
11/4/2014 – Deadline for questions  
11/18/2014 – Early registration due  
1/13/2015 – Late registration due  
1/27/2015 – Submission deadline  
3/24/2015 – Winners announced

### Awards

1st place – US \$5000  
2nd place – US \$2000  
3rd place – US \$1000

### Submission Requirements

This is a digital competition and no hardcopies are necessary. Entrants must submit their proposal no later than January 27, 2015 (23:59 hours US Eastern Time). Registered participants will receive instructions to upload their submission to the competition's dropbox. The project submission must contain the following files:

(1) Two boards with the project information including plans, sections, and perspectives. Participants are encouraged to submit all the information they consider necessary to explain their proposal. These boards should be 24" (h) X 48" (w) in HORIZONTAL format. The resolution of the boards must be 150 dpi, RGB mode and saved as JPG files. The upper right corner of each board must contain the participation number. There should not be any marks or any other form of identification. The files must be named after the registration number followed by the board number. For example: 0101-1.jpg and 0101-2.jpg.

(2) A DOC file containing the project statement (600 words max). This file must be named after the registration number followed by the word "statement". For example: 0101-statement.doc.

(3) A DOC file containing the entrants' personal information, including name, profession, address, and email. This file must be named after the registration number followed by the word "info". For example: 0101-info.doc.

(4) All the files must be placed in a ZIP folder named after your registration number. For example: 0101.zip.

### Jury

Massimiliano Fuksas, principal Studio Fuksas  
Michael Hansmeyer, CAAD group at Swiss Federal Institute of Technology  
Richard Hassell, principal WOHA  
Alvin Huang, principal Synthesis Design + Architecture  
Yong Ju Lee, winner 2014 eVolo Skyscraper Competition  
Wenchian Shi, project manager MVRDV  
Renske van der Stoep, project manager/architect MVRDV  
Wong Mun Summ, principal WOHA  
Benedetta Tagliabue, principal EMBT Miralles Tagliabue

## Reading List

The following is a list of recommended readings; those shown in bold are available on reserve in the library. Excerpts from some of these may be provided for discussion in class.

- Abalos, Iñaki, and Juan Herreros, *Tower and office: from modernist theory to contemporary practice*, Cambridge, MA: MIT Press, 2003.
- Aiello, Carlo, *Evolvo Skycrapers*, Los Angeles: eVolo Publishing, 2012.
- Aiello, Carlo, *Skyscraper for the XXI century*, Los Angeles: eVolo Publishing, 2008.
- Al-Kodmany, Kheir, *The future of the city: tall buildings and urban design*, Boston: WIT Press, 2013. (accessible electronically through UofC Library)
- Ascher, Kate, *The heights: anatomy of a skyscraper*, New York: Penguin Press, 2011.
- Beedle, Lynn S., *The skyscraper and the city: design, technology, and innovation*, Lewiston: Edwin Mellen Press, 2007.
- Chakrabarti, Vishaan, *A Country of Cities: A Manifesto for an Urban America*, New York: Metropolis Books, 2014.
- Chew, M. Y. L., *Construction technology for tall buildings*, Singapore and Hackensack, NJ: World Scientific, 2012.
- Douglas, George H., *Skyscrapers: a social history of the very tall building in America*, Jefferson, NC: McFarland, 1996.
- Firley, Eric, *The urban towers handbook*, New York: John Wiley & Sons, 2011.
- Gonçalves, Joana, *The environmental performance of tall buildings*, Washington, DC: Earthscan, 2010.
- Günel, Halis, *Tall buildings: structural systems and aerodynamic form*, Abingdon: Routledge, 2014.
- Höweler, Eric, *Skyscraper*, New York: Universe, 2003.
- Huxtable, Ada Louise, *The tall building artistically reconsidered: the search for a skyscraper style*, Berkeley: University of California Press, 1992.
- Johnson, Scott, *Tall building: imagining the skyscraper*, Los Angeles: Balcony Press, 2008.
- Johnson, Scott, *Performative skyscraper: tall building design now*, Los Angeles: Balcony Press, 2014.**
- Meyer, Han, and Daan Zandbelt (eds.), *High-rise and the sustainable city*, Amsterdam: Techne Press, 2012.
- Moudry, Roberta, *The American skyscraper: cultural histories*, Cambridge, UK: Cambridge University Press, 2005.
- Parker, Dave and Anthony Wood (eds.), *The tall buildings reference book*, Abingdon: Routledge, 2013.**
- Sarkisian, Mark P., *Designing tall buildings: structure as architecture*, Abingdon: Routledge, 2012. (accessible electronically through UofC Library)
- Short, Michael J., *Planning for tall buildings*, Abingdon: Routledge, 2012.
- Yeang, Ken, *Eco skyscrapers*, Mulgrave, Victoria: Images Publishing, 2007.
- Yeang, Ken, *The green skyscraper: the basis for designing sustainable intensive buildings*, Munich: Prestel, 1999.
- Wells, Matthew, *Skyscrapers: structure and design*, New Haven: Yale University Press, 2005.

## Notes

1. Written work, term assignments and other course related work may only be submitted by e-mail if prior permission to do so has been obtained from the course instructor.

2. It is the student's responsibility to request academic accommodations. If you are a student with a documented disability who may require academic accommodation and have not registered with the Disability Resource Centre, please contact their office at 220-8237. (<http://www.ucalgary.ca/drc/node/46>) Students who have not registered with the Disability Resource Centre are not eligible for formal academic accommodation. You are also required to discuss your needs with your instructor no later than fourteen (14) days after the start of this course.

3. Plagiarism - Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Most commonly plagiarism exists when:(a) the work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work (this includes having another impersonate the student or otherwise substituting the work of another for one's own in an examination or test),(b) parts of the work are taken from another source without reference to the original author,(c) the whole work (e.g., an essay) is copied from another source, and/or,(d) a student submits or presents work in one course which has also been submitted in another course(although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved. While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic offence. It is recognized that clause (d) does not prevent a graduate student incorporating work previously done by him or her in a thesis. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar.

4. Information regarding the Freedom of Information and Protection of Privacy Act (<http://www.ucalgary.ca/secretariat/privacy>) and how this impacts the receipt and delivery of course material

5. Emergency Evacuation/Assembly Points (<http://www.ucalgary.ca/emergencyplan/assemblypoints>)

6. Safewalk information (<http://www.ucalgary.ca/security/safewalk>)

7. Contact Info for:

Student Union (<http://www.su.ucalgary.ca/page/affordability-accessibility/su-structure/contact-info>); Graduate Student representative( <http://www.ucalgary.ca/gsa/>) and Student Ombudsman's Office (<http://www.su.ucalgary.ca/page/quality-education/academic-services/student-rights>).