The “Architectural Lobotomy”, The New Skyscraper in the New Metropolis (06.06.16)

“no manifesto, no architectural debate, no doctrine, no law, no planning, no ideology, no theory; there is only - Skyscraper.” Rem Koolhaas - Delirious New York

Synopsis:
The studio will be devoted to research of the Skyscraper building typology and its role as a driver in the re-organization of the new Metropolis. Since the opening of the first Skyscraper, the Home Insurance Building in 1885, Skyscrapers have been conceived primarily as stand alone objects designed to cram more space into a small footprint. What if a Skyscraper was to manifest itself as an integral part of the City and was conceived to solve problems of the New Metropolis. It would be a Hero!

What types of problems will the New Metropolis face? Overpopulation, Crime, Homelessness, Infrastructural Decay, Poor Urban Design, and more… Can a Skyscraper be invented to solve these problems? Can a novel approach be generated that positions the Skyscraper as the most important building in the Metropolis? This research studio will use the Skyscraper typology to develop a formal strategy that tries to solve important problems that the New Metropolis will face. This studio will also spawn novel radical forms, material applications, and organizational approaches.

The research will also serve as a protagonist of ‘The New Skyscraper’. It will initiate a critical academic debate about the contrasting IIT COA decrees of past and current research on the role of the ‘Tall Building’ formulated by past PhD thesis, current CTBUH research, and studios led by Peter Land. ‘The New Skyscraper’ will be situated between Rem Koolhaas’ 1978 Manifesto, Delirious New York and Ken Yeang’s 2002 book Reinventing the Skyscraper.

There will be (3) main components to the studio:
A.) Satellite Cities
B.) Composite Material applications to tall buildings
C.) Radical design and new tall building typologies

For the Midterm we will be working to submit for the CTBUH Tall Building Student Research Competition. Please see the link below for more info:


For the Final we will be working to submit for the CTBUH Tall Building Design Competition. Please see the link below for more info:


Tutor:
Studio Associate Professor, Alphonso Peluso

Tutor Skyscraper Project Experience:
Tall Buildings: Deutsche Post, Sofitel Hotel, Hochhauskomplex Max, Langenscheidt-Hochhaus, 600 North Fairbanks, Doha Convention Center and Tower
Why Skyscrapers:
“They make land pay” - Cass Gilbert, the Architect of the Woolworth building

In the early days Skyscrapers were built as status symbols by corporations, i.e. Woolworth, Chrysler, Home Insurance, Sears etc. Cass Gilbert, the Architect of the Woolworth building stated, “They make land pay” referring to the small foot print / floor area ratio of the skyscraper. This made Skyscrapers profitable building typologies. Today Skyscrapers are built primarily for 4 reasons. First, they are still status symbols but what changed is they no longer represent corporations, they represent cities, countries, and Freedom, i.e. Burj Kahlifa (formerly Burj Dubai), Shanghai Tower, Freedom Tower, etc... The second reason is Skyscrapers are one way to sustainably address population increase. Data shows that “Today, 54 percent of the world's population lives in urban areas, a proportion that is expected to increase to 66 percent by 2050” (http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html). Where will these people live and work? The third reason is to reduce suburban sprawl. It’s important that the world's greenbelt and farming areas do not get swallowed up by horizontal spread. The fourth reason, as Adrian Smith states is, “Skyscrapers create value around their sites.” London, New York, Hong Kong, Singapore, Tokyo, Seoul and others have all been able to capitalize on Tall Buildings. These cities were able to establish themselves as important financial centers and the Skyscraper helped them do it.

Resource Videos:
https://www.youtube.com/watch?v=HJXhWSKqegE
http://channel.nationalgeographic.com/big-bigger-biggest/videos/skyscraper-history/
https://www.youtube.com/watch?v=WvXLwQo04zE
http://www.schooltube.com/video/1c35c485f17549cfba1/America’s%20early%20skyscrapers

Reading:
http://www.treehugger.com/urban-design/how-skyscrapers-are-killing-great-cities.html
http://marketurbanism.com/2011/04/21/how-important-really-are-skyscrapers/
What is a Skyscraper:
“It’s a building block of the urban environment” - Moshe Safdie

At the moment Skyscrapers fall into (3) categories:

- **Tall** - Is a relationship between height and context
- **Super Tall** - Over 300 meters (984.252 feet)
- **Mega Tall** - Over 600 meters (1968.5 feet)

This semester we will focus on the Super and Mega Tall. The Sears Tower (Willis Tower) is 442 meters (1450 feet) to give you a scale reference. 1 mile is 1610 meters (5,280 feet) - an insane height that even Frank Llloyd Wright dreamed about in 1957 for Chicago as shown in this video: [https://vimeo.com/4937909](https://vimeo.com/4937909). Today there is speculation of 2 mile high towers made of wood which I think is not appropriate in today’s world but who knows, maybe in the future.

Resource Videos:
[https://youtu.be/Ogf5gG3ORPk](https://youtu.be/Ogf5gG3ORPk)
[https://youtu.be/Cy883zhWZuQ?list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B](https://youtu.be/Cy883zhWZuQ?list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B)
[https://www.youtube.com/watch?v=MtiWOw0Q93Q](https://www.youtube.com/watch?v=MtiWOw0Q93Q)
[https://www.youtube.com/watch?v=H1P1kkoFzWM](https://www.youtube.com/watch?v=H1P1kkoFzWM)
[https://vimeo.com/160148973](https://vimeo.com/160148973)

Reading:
Satellite Cities: “You have to build out from the city’s core.” - Adrian Smith
“To get rich is glorious” - Deng Xiaoping

The ‘Machine is a Garden’ was the idea of the British stenographer Ebenezer Howard. Howard believed that ‘Garden Cities’ could save the world from the dirty overcrowded cites of the time. In 1898 he wrote the book titled ‘To-Morrow: A Peaceful Path to Real Reform’, later the book was renamed ‘Garden Cities of To-Morrow’. These ‘Garden Cities’ were to be new cities started from scratch away but possibly tied to the current large cities. This studio will explore the idea of Satellite Cities as a main research component. Students working in teams of 2-3 will select a city from the list below (first come first serve).
Aurora, IL
Hammond, IN
Naperville, IL
Oakbrook, IL and Oakbrook Terrace, IL
Rockford, IL
Rosemont, IL
Schaumburg, IL
Waukegan, IL

Resource Video:
https://youtu.be/3aKClfVsKSc?list=PLbX3Yc-TNhphiAkrFWytJgAN5xIpS3y_B

Reading:
http://urbanplanning.library.cornell.edu/DOCS/howard.htm
http://foreignpolicy.com/2014/09/26/the-machine-is-a-garden/
History of the Skyscraper:

The world’s first modern day Skyscraper was the Home Insurance building in Chicago by William Le Baron Jenney. It was the first steel frame structure which allowed it to soar 12 stories and 180 feet. The early Skyscrapers were a result of two new technologies. The first was America’s inventor and tinkerer Elisia Otis’s platform lift and the second was England’s Chemist Sidney Gilchrist Thomas’s formula to make steel stronger. Amongst it’s predecessors such as the Monadnock Building in Chicago by Daniel Burnham and John Wellborn Root, the Philadelphia City Hall by John McArthur, Jr. Thomas U. Walter, and Masonic Temple in Chicago by Daniel Burnham, the Home Insurance Building was lighter, more slender and faster to erect. Other early steel frame Skyscrapers were the Wainright Building in St. Louis by Adler & Sullivan and the Flatiron Building in New York by Daniel Burnham.

Resource Video:
https://www.youtube.com/watch?v=4-sGkfmlgzk&list=PL9jDk6Ta0NqYhhshKvRlZY4JcTNkBRyxC&index=1

Reading:
http://www.theguardian.com/cities/2015/apr/02/worlds-first-skyscraper-chicago-home-insurance-building-history
http://skyhigh.city/meet-the-worlds-first-skyscraper-the-eight-of-them/
http://skyscraper.org/EXHIBITIONS/PAPER_SPIRES/nw03_tribune.php
The Elevator and it's impact:

In front of a large crowd of people inside the Crystal Palace at the New York World's Fair in 1853 Elisha Graves Otis went up on a platform suspended by a single rope 40' high in the air. He then had his assistant cut the rope engaging the safety brake. The platform did not fall to the ground and hence the modern day elevator was born. Elisha Otis repeated his performance on the hour every hour convincing people to trust his safety elevators. The highest floors in a skyscraper soon went from the least expensive to the most expensive. In 1889 the Eiffel Tower was built with an Otis Elevator.

Resource Videos:
https://www.youtube.com/watch?v=GZZB6b1GDHA
https://www.youtube.com/watch?v=sSiJiKcoNRk&spfreload=1
https://www.youtube.com/watch?v=Ow9xCRYjeA4

Readings:
http://otiselevator.umwblogs.org/impact/
http://www.pbs.org/wgbh/nova/tech/elevator-inventor.html
http://www.theelevatormuseum.org/early2.php
The Effects of Carbon Fiber:

It's been two years since my former students and I designed and fabricated the FIBERwave Pavilion. Since then I’ve witnessed a large growth of composite applications in architecture. Last year while designing and fabricating the pavilion we were inspired by the work of Greg Lynn and his pioneering use of composites. His RV PROTOTYPE house takes advantage of carbon fiber’s light weight allowing a robotic armature to rotate the house in two directions. We also extensively researched the work of cutting edge composites fabricator Kreysler & Associates. In fact, it was the Kreysler & Associates fireproof composite facade panels for the San Francisco Museum of Modern Art expansion by Snøhetta that inspired me to continue to research the application of composites on buildings. How can lightweight materials affect ‘The New Skyscraper’?

Resource Videos:
https://vimeo.com/67909059
https://www.youtube.com/playlist?list=PLC923666EAD588B18
https://www.sfmoma.org/watch/reimagining-the-museum-the-first-sketches/
http://www.architectmagazine.com/videos/molded-panels-at-kreysler-associates
https://www.youtube.com/watch?v=mPIW5eKiAug
http://www.dwell.com/video/art/sn%C3%B8hettas-sfmoma-expansion
https://www.youtube.com/watch?v=vRGqYL0XGOA

Readings:
http://www.bmwguggenheimlab.org/what-is-the-lab/architecture
Early Skyscrapers were merely a floor plate repeated and extruded vertically. Today Skyscrapers need to be ‘Cities in the Sky’. Ken Yeang, Architect and Author, has spent much of his life researching and designing ‘Cities in the Sky’. The programs of the early Skyscrapers were typically mono-function; either Office or Residential. Occasionally Residential towers would incorporate Hotel floors into their programs and in some case Skyscrapers were divided with the lower half programmed as Office and the upper half programmed as Residential. The New Skyscrapers are multi-function containing Office, Residential, Hotel, Retail etc.. They need to be designed as vertical extensions of the City that contain everything that the flat city has to offer.

Resource Videos:
https://www.youtube.com/watch?v=MtiW0Q93Q
https://www.youtube.com/watch?v=H1P1kEzWM
https://vimeo.com/160148973
https://www.youtube.com/watch?v=6gp4kVm7IZM

Reading:
http://www.dezeen.com/2014/09/01/endless-city-by-sure-architecture-conceptual-skyscraper-london/
http://www.citylab.com/design/2016/01/skyscrapers-cities-tall-buildings/431655/
http://www.theatlantic.com/technology/archive/2015/05/the-skyscraper-of-the-future/387118/
The Core:

The core of the Skyscraper is also multi-functional. It’s used for vertical transportation. It houses both elevators and fire stairs. It also serves as the main resistor against wind loads. Core configurations as of late have become more creative allowing for more ‘rent-able’ floor space. The core is one of the most important components of a Skyscraper. It should respond to the program and be flexible. It should expand to enclose use-able space when necessary and contract to enclose only vertical transportation. It should not just be an extrusion. It should be a flexible complex solid.

Resource Videos:
https://www.youtube.com/watch?v=IdxAyJZVNGw
https://www.youtube.com/watch?v=MtiWOw0Q93Q

Reading:
http://www.ctbuh.org/LinkClick.aspx?fileticket=Xi%2BUFQbyzzg%3D&tabid=4016&language=en-US
https://www.sefindia.org/rangarajan/CoreDesign.pdf
Is density Justified? Do we even have an option to discuss? Sometimes population increases are autonomous. Can we control population increase or do we need to react to it with suitable design and planning. Not only should we react to it we should plan ahead. As previously mentioned Data shows that “Today, 54 percent of the world’s population lives in urban areas, a proportion that is expected to increase to 66 percent by 2050” (http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html). Can Skyscrapers be the solution to population increase? Are there ways to appropriately and comfortably deal with population increase while leaving space for the future?

Resource Videos:
http://www.skyscraper.org/PROGRAMS/VERTICAL_DENSITY/vertical_density_premises.php

Reading:
http://www.citylab.com/design/2016/01/skyscrapers-cities-tall-buildings/431655/
http://www.citylab.com/design/2012/05/limits-density/2005/
http://www.skyscraperdictionary.com/?project=vertical-density
Skyscrapers have two kinds of structural loading conditions. The first and less complex is gravity. Gravity loads are more straightforward and easy to understand and analyze. The second and more complex is wind. Wind loads are more difficult to analyze and understand. Wind loads on buildings are the result of the building’s shape, height, and orientation as well as its relationship to its surrounding buildings. We will develop a workflow for analyzing the wind conditions of our proposed Skyscrapers and the proposed and existing context around them.

Resource Videos:
- https://www.youtube.com/watch?v=vJ6-qNTaqz4&list=PLVjfknRH6tRdlXyahVca_rgsUr8JHNED3&index=5
- https://www.youtube.com/watch?v=-86A8kVKzwQ&list=PLVjfknRH6tRdlXyahVca_rgsUr8JHNED3&index=6
- https://www.youtube.com/watch?v=8agAcpnPlQ4&list=PLVjfknRH6tRdlXyahVca_rgsUr8JHNED3&index=7
- https://www.youtube.com/watch?v=AbbNP-GVRXw&list=PLVjfknRH6tRcvUtaSg1HTvYbmf_Hlpw
- https://www.youtube.com/watch?v=EqWxCDsr1qU
- https://www.youtube.com/watch?v=NgZaDPIAwmg
- https://www.youtube.com/watch?v=d2QsHzyxNE

Reading:
- https://www.google.com/search?q=the+density+of+a+skyscraper&oq=the+density+of+a+skyscraper&aqs=chrome..69i57j69i64l3.7815j0j8&sourceid=chrome&ie=UTF-8#q=tall+building+g
Mass Dampers:

All tall buildings sway from side to side. How far can they sway? It’s really a matter of how much we perceive it. Or in other words how much sway can we handle before we feel uncomfortable. This comfort level varies per individual but it can be extremely important when designing 10 million dollar penthouse suites. Mass Dampers can help soften the sway in tall buildings. The theory being that if a building sways back and forth at a rapid rate it will be uncomfortable and could feel more like a tower of terror. The mass damper will slow down the sway from side to side by swinging in the opposite direction of the sway. Luckily there are places that you can go to simulate what it might feel like with and without a mass damper. These companies have pseudo roller coaster rides that will simulate the different conditions of movement or sway to find what’s acceptable. Acceptable movement in a tall building is typically around 10 milli-g’s or one hundredth of the force of gravity. (source: SOM, et al., ‘The Future of the Skyscraper: SOM Thinkers Series’, D. A. P./Distributed Art Publishers, 2015)

Resource Videos:
https://www.youtube.com/watch?v=JhJzdtzl6KY
https://www.youtube.com/watch?v=ACKMPD6MySs
https://www.youtube.com/watch?v=ohKqE_mwMmo
https://www.youtube.com/watch?v=f1U4SAgy60c

Reading:
http://www.rwdi.com/services/dampers/
Recent advances in elevator technology are allowing skyscrapers to soar even higher. Until now elevators could only soar 500 meters (1,640 feet) due to the limitations of steel cable. Using Carbon Fiber cables elevators can soar to double the height of steel cables about 1000 meters (3,280 feet). The other extraordinary fact is that the energy to move an elevator that uses Carbon Fiber cables 1000 meters is equal to the height of only 100 meters using conventional steel cables. How can we implement these new technologies and what will they change?

Resource Videos:
http://download.kone.com/ultraropec/index.htm
https://www.youtube.com/watch?v=iIBg0Sr1RqE
https://www.youtube.com/watch?v=lzY8SFKS-PA
https://www.youtube.com/watch?v=Ow9xCRYjeA4

Reading:
http://www.theguardian.com/cities/2014/aug/01/new-lift-technology-ultraropecities
http://collections.vam.ac.uk/item/O1292483/ultraropecable-kone/
Stack Effect:

We've all heard the phrase hot air rises but when it comes to Skyscrapers this can be problematic. It's called 'Stack Effect' and it can also cause havoc on heating and cooling a Skyscraper. Doors can fly open or can become too hard to open due to the pressure differential which is the reason that revolving doors, also known as air locks, are used in Skyscrapers. Stack Effect can also cause problems in a Fire. Dangerous smoke can make it's way into fire stairs leaving the building occupants unable to escape down the fire stairs. However in a brilliant creative way Architects can control the Stack Effect to work in their favor for ventilation and to bring in fresh air. It can also be used to passively cool a building.

Resource Videos:
https://www.youtube.com/watch?v=M5RA90KfNuM
https://www.youtube.com/watch?v=jz1HqL4PHVQ
https://www.youtube.com/watch?v=CoTqobif4J40
https://www.youtube.com/watch?v=8vqMotb6m3c
https://www.youtube.com/watch?v=mmB-o5AUF-s
https://www.youtube.com/watch?v=025JsG3VHKM
https://www.youtube.com/watch?v=sIrJOrTAJjg

Reading:
Double Skin Facades: 

Double Skin Facades are one solution to dealing with keeping the solar heat gain and cold temperatures out of an all glass curtain wall facade. In the past 15 years Architects have designed Skyscrapers with double skins as a way to trap that warm air caused by solar heat gain from entering the programmed space of a tower. That air continues to heat up and rise and is allowed to escape at multiple locations in the double skin. The space that is created by the double skin also houses shading devices, heating, and cooling equipment.

Resource Videos:
https://vimeo.com/38803128
https://vimeo.com/144081898

Reading:
http://www.rawnarch.com/pdf/CPL_WRA.pdf
http://isites.harvard.edu/fs/docs/icb.topic831443.files/WK8-DoubleSkinFacades.pdf
http://www.ecbcs.org/docs/Annex_43_Task34-Double_Skin_Facades_A_Literature_Review.pdf
Building Blocks of the Urban Environment:

For Skyscrapers to become the building blocks of a city we must address the public perception. To the public a Skyscraper can appear to be ‘standoffish’. This might be due to it’s singular attitude. Or it could be that most towers were designed without ever thinking about designing the public realm. They are usually “designed as objects in the urban landscape” _ Moshe Safdie. For a skyscraper to become the building block of a city it needs to create public space. It needs to be an extension of the “Vertical condition of the city” _ Rafael Viñoly. We must also think about the “Sphere of influence of a Tower” _ Moshe Safdie. How far do we want it to reach? If the Skyscraper becomes the building block of the city then creating a dialogue between towers becomes important. This dialogue will speak to the arrangement of the urban environment and has the potential to become the thread that ties the entire city together.

Resource Videos:
https://www.youtube.com/watch?v=PjDyodbOmp8
https://www.youtube.com/watch?v=vKu30aDY654&list=PLbX3Yc-
https://www.youtube.com/watch?v=HsqkX9vYzU&index=47&list=PLbX3Yc-
https://www.youtube.com/watch?v=F5sdOrgssAw&list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B&index=46
https://www.youtube.com/watch?v=ZMVtY0YCUS4&list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B&index=16
https://www.youtube.com/watch?v=fygPeubskl4&list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B&index=45

Reading:
http://www.planetizen.com/node/27
Building Skinny:

A new category of Skyscrapers as emerged called ‘Super Skinny’. The Sears Tower has a height to width ratio also called ‘Slenderness Ratio’ of 7:1. The new breed of Skinny Skyscrapers start with a slenderness ratio of 10:1. Shop Architects currently has a tower, 111 West 57th Street, scheduled for completion next year with a Slenderness Ratio of 23:1. So what’s the point literally? What this allows is for development on parcels of land that were previously too small to build the kind of density that a Skyscraper affords. Skinnies are a new rare breed that can’t be built everywhere; for instance in seismic areas or areas with extreme wind conditions. They do have some amazing views near and at the top.

Resource Videos:
https://www.youtube.com/watch?v=T0c-XMb8IvE
https://www.youtube.com/watch?v=lIy2HPTCz3g
https://www.youtube.com/watch?v=tllQu9ym_sk

Reading:
http://www.curbed.com/2015/9/24/9917752/the-engineering-tricks-behind-building-slender-taller-towers-and
http://nymag.com/daily/intelligencer/2015/03/how-tall-can-tall-skyscrapers-be.html
http://www.bdcnetwork.com/7-towers-define-skinny-skyscraper-boom-slideshow
Social Urbanism:

This topic expands on the idea of the potential of a Skyscraper being the building block of the urban environment. This topic addresses two things, the first is how do these towers communicate with the context that they are placed in? The second is, what happens inside these Skyscrapers? What is the “Social contact configuration” _ Werner Sobek? Do people feel lonely? “Loneliness is very bad for your health” _ Jane-Frances Kelly. ‘The New Skyscraper’ needs to connect the different types of people that will occupy them. Different races, wealth classes, levels of education, and social classes all need to connect. This idea of different people connecting can also be applied to ‘The New Skyscraper’ and it’s connection to it’s context. What does it mean to connect? That is a great question to answer.

Resource Videos:
https://www.youtube.com/watch?v=4mYsOiFGNfw&list=PLbX3Yc-TNhpjAkrFWytJgAN5xIpS3y_B&index=14
https://www.youtube.com/watch?v=9ezWLwhwk24
https://www.youtube.com/watch?v=ziKWVSgBEag

Reading:
http://ctbuh.org/LinkClick.aspx?fileticket=Ali%2FLuryya8%3D
http://web.uvic.ca/~esplab/sites/default/files/ASR%20High%20Rises%20proof.pdf
http://studiogang.com/researchproject/three-points-for-the-residential-highrise-designing-for-social-connectivity
Remembering that the Miesian modernist towers of the 1960’s were radical, ‘The New Skyscraper’ should also be radical. Radical is not arbitrary, it should be a response, a solution, an innovation, an advancement etc... I grew up watching the cartoon the ‘Jetsons’ and as a child I couldn’t wait for the future. Well the future has come and gone and it’s no where near as thrilling as life on the ‘Jetsons’. To be fair the ‘Jetsons’ was set in 2062 so I guess we have 46 years to catch up. In fact most Sci-Fi movies predicted Architecture and Cities to be far more advanced than they are today. Films such as ‘Metropolis’ (1927), ‘Red Dessert’ (1964), Alphaville (1965), ‘Logan’s Run’ (1976), ‘Escape from New York’ (1981), ‘Blade Runner’ (1982) could tell us a lot about what could be good and bad about the cities of the future.

Resource Videos:
https://youtu.be/CsaxwUkIdWw?list=PLbX3Yc-TNhphjAkrFWytJqAN5xlpS3y_B
https://youtu.be/t-0sNwo-37g?list=PLbX3Yc-TNhphjAkrFWytJqAN5xlpS3y_B
https://www.youtube.com/watch?v=qDgXBOFkUU0
https://youtu.be/CjrXr4TXOuw
https://vimeo.com/75772112
https://www.youtube.com/watch?v=G8w4UQL6al0

Reading:
https://www.linkedin.com/pulse/20140626225233-93991782-science-fiction-and-its-influence-on-architecture
http://www.theatlantic.com/technology/archive/2015/05/the-skyscraper-of-the-future/387118/
http://www.australiandesignreview.com/features/31832-the-new-radical-pragmatist
As an Architect, understanding the developer’s point of view is extremely important. In most cases it’s the developer that makes these enormous projects happen. One interesting aspect of the development of these projects is that they take 10 to 20 years to complete. As Architects we need to learn how to be committed for the long haul. What are some of the challenges that developers face? Zoning, Context, Building Departments, Friends of everything and anything, Funding, and the list goes on and on ..... As Architects we can assist in solving these challenges by devising new and creative solutions.

Resource Videos:
https://youtu.be/oByMRm_yaYo
https://www.youtube.com/watch?v=4i1kaRwFA3E
https://www.youtube.com/watch?v=KaBn4dBwL1s
https://www.youtube.com/watch?v=LrT9EpxD4nQ

Reading:
http://www.economist.com/node/7001496
http://www.citylab.com/housing/2015/06/the-big-money-behind-tall-buildings/395690/
http://www.building.co.uk/cost-model-tall-buildings/5067937.article
Global Markets:

Historically Skyscraper developments were funded by local companies. For example in 1971 the Sears Tower was owned by Sears, a local Chicago company. Today many of the Skyscraper developments are funded from all over the world. Not only are they funded from all over the world the tenants are from all over the world. Is this bad or good? What does this mean for the future of cities? In general Tall building investment has been a safe bet. Recent projects in New York such as Hudson Yards and Time Warner Center were built from a melting pot of investors. How will global exchanges change the way we develop future cities?

Resource Videos:
https://www.youtube.com/watch?v=nNQmtl-TDi0
https://www.youtube.com/watch?v=fN5BUOdJblA
https://www.youtube.com/watch?v=3aKCifVsKSc
https://www.youtube.com/watch?v=K-wP8l0H7kY

Reading:
http://2015.ctbuh.org/session/?id=8
Sustainable Skyscrapers:

We have passed the era of so called ‘sustainable buildings’ with their ad hoc sustainable features. We have moved into the era of integrated sustainable approaches. Sustainability covers a broad range of topics such as embodied energies, annual energy consumption, material choices, and the “so-called 3 pillars of sustainability: ecology, economy, and social cultural aspects.

Resource Videos:
https://youtu.be/wU5F48-0hJI
https://youtu.be/Wi6T3nSauwY
https://youtu.be/rA502HXgwXQ
https://youtu.be/JW59kIJE06I
https://www.youtube.com/watch?v=QemV42bNdsU
https://www.youtube.com/watch?v=-6CeqhCP8bo
https://www.youtube.com/watch?v=8gao-Ak2puE
https://www.youtube.com/watch?v=rFfzTLRa1Cs

Reading:
http://www.ctbuh.org/LinkClick.aspx?fileticket=qBdStLBjdn0%3D&tabid=2331&language=en-GB
Schedule

Monday June 6th
Topics: Introduction _ Syllabus _ Studio Brief _ Satellite Cities

Reading: Delirious New York

Workshop: Intro to Parametric Design (Grasshopper)

Assignment: Research Satellite Cities. Develop a hypothesis of how Satellite cities would impact Chicago. Write an essay on your hypothesis.

Person: Myron Goldsmith

Firm: Adrian Smith + Gordon Gill http://smithgill.com/

Resource Video: https://youtu.be/3aKClfVsKSc?list=PLbX3Yc-TNhphjAkrFWytJgAN5xlP3y_B

Reading:
http://urbanplanning.library.cornell.edu/DOCS/howard.htm
http://foreignpolicy.com/2014/09/26/the-machine-is-a-garden/

Wednesday June 8th
Topics: History of the Skyscraper _ The Elevator and it’s impact _ The Effects of Carbon Fiber

Reading: Delirious New York

Workshop: Parametric Design (Grasshopper) _ Physical Model Building

Assignment: Research the history of the Skyscraper. Develop a hypothesis of how carbon fiber would effect tall building performance.

Person: Fazuler Kahn

Firm: SOM http://www.som.com/

Resource Videos:
https://vimeo.com/152443224
https://youtu.be/ujh4CFhitho?list=PLbX3Yc-TNhphjAkrFWytJgAN5xlP3y_B

Friday June 10th
Topics: Cities within a City _ Tall, Super Tall, & Mega Tall _ The Core

Reading: Read chapters 1-4 of Ken Yeang’s Reinventing the Skyscraper

Assignment: Develop a tall building program. Define the spaces, core, and circulation. Design a Skyscraper prototype. Draw typical plans, elevations, and sections.

Person: Ken Yeang

Firm: Snohetta http://snohetta.com/

Resource Videos:
https://youtu.be/Cy883zhWZuQ?list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B
https://www.youtube.com/watch?v=MtiWOw0Q93Q
https://www.youtube.com/watch?v=H1P1kkcEzWM
https://vimeo.com/160148973

Monday June 13th

Workshop: Say hello to Roland _ RhinoCAM basics

Reading: Read chapters 4-8 of Ken Yeang’s Reinventing the Skyscraper

Assignment: Generate preliminary tool paths for an iteration of your design

Person: Ole Scheeren

Firm: KPF http://www.kpf.com/

Resource Videos:
https://youtu.be/KwcMLK72LVw
https://youtu.be/iQsnObyii4Q?list=PLs6rfCOqpsQiC5b96WJ6eav2zYY2qRto0

Wednesday June 15th
Topics: CTBUH Research #01 _ Tuned Mass Dampers

Workshop: Carbon Fiber Layup _ Get friendly with Roland _ Preparing your foam molds

Reading: Composite Materials Fabrication Handbook #1

SFMOMA Video and Readings:
http://www.architectmagazine.com/videos/molded-panels-at-kreysler-associates
Assignment: Use Roland to mill foam molds of your Skyscraper Prototypes

Person: Bruce Graham  
Firm: Jahn  
http://www.jahn-us.com/

Resource Videos:  
https://www.youtube.com/watch?v=tlQu9ym_sk&index=20&list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B  
https://www.youtube.com/watch?v=Ze1GkzH4Es?t=261  
https://www.youtube.com/watch?v=bupAxrq1_Iw  
https://www.youtube.com/watch?v=iX80TF-SIL4&index=2&list=PLC923666EAD588B18

Friday June 17th  
Topics: CTBUH Research #02 _ Advances in Elevator Technology

Reading: Composite Materials Fabrication Handbook #1  

Composite Facades:  

Assignment: Layup Carbon Fiber on your milled foam prototypes. Begin writing your CTBUH research paper

Person: Rafael Vinoly  
Firm: Gensler  
http://www.gensler.com/

Resource Videos:  
https://youtu.be/PrH_6ttt06k  
https://youtu.be/7gh6XW98HGM  
https://www.youtube.com/watch?v=vKu30aDY654&list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B&index=15

Monday June 20th  
Topics: CTBUH Research #03 _ Stack Effect _ Double Skin Facade _ Building Blocks of the Urban Environment (Moshe Safdie)

Workshop: Carbon Fiber Finishing

Reading: Composite Materials Fabrication Handbook #1
Composite Facades:

Assignment: Finish you Carbon Fiber Prototypes

Person: Moshe Safdie

Firm: Transsolar  http://www.transsolar.com/

Resource Videos:
https://youtu.be/PrH_6ttt06k
https://youtu.be/7gh6XW98HGM
https://www.youtube.com/watch?v=vKu30aDY654&list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B&index=15

Wednesday June 22nd

Topics: Building Skinny _ Height to Width Ratio _ Social Urbanism

Workshop: Computational Fluid Dynamics for Wind Analysis

Reading: Emily Badger’s Essay on Living Tall from SOM Thinkers, “The Future of the Skyscraper”

Assignment: Generate a booklet containing the following: Typical Floor Plans, Typical Overall Sections, Detail Sections,

Person: Werner Sobek

Firm: Foster + Partners  http://www.fosterandpartners.com/

Resource Videos:
https://www.youtube.com/watch?v=4mYsOiFGNfw&list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B&index=14
https://youtu.be/kUyiH7RW1cl?list=PLbX3Yc-TNhphjAkrFWytJgAN5xIpS3y_B
https://youtu.be/a1DOQSKmlnw

Friday June 24th

Topics: The Radical #01 _ The New Skyscraper #01

Reading: Bruce Sterling’s Essay on Four Futures for Towers from SOM Thinkers, “The Future of the
Assignment: Complete your CTBUH Research Paper

Person: Bjarke Ingles

Firm: BKL http://bklarchitecture.com/

Resource Videos:
https://www.youtube.com/watch?v=WLeuJSZK6Z4
https://www.youtube.com/watch?v=T0c-XMb8lyE
https://www.youtube.com/watch?v=7S4dd6FNHGQ
https://youtu.be/CsaxwUkIdWw?list=PLbX3Yc-TNhphjAkrFWytJgAN5xIps3y_B
https://youtu.be/t-0sNwo-37g?list=PLbX3Yc-TNhphjAkrFWytJgAN5xIps3y_B
https://youtu.be/CjrXr4TXOuw

Monday June 26th
Work-in-Class - Finalize CTBUH Research Submittal

Wednesday June 28th
Work-in-Class - Finalize CTBUH Research Submittal

Friday July 1st
Submit CTBUH Research Document _ Midterm Presentation

Monday July 4th
No Class - Independence Day

Wednesday July 6th
Topics: The Developers Point of View _ Start CTBUH Design Competition

Workshop: 3D Printing Prototyping _ Meet the PP3DP
Reading: Diana Lind’s Essay on Building Typology Trends of new Economic Industries from SOM Thinkers, “The Future of the Skyscraper”

Assignment: Read the CTBUH Design Competition Brief _ Write a Conceptual Design Statement

Person: Jorg Schlaich

Resource Videos:  
https://youtu.be/oByMRm_yaYo  
https://youtu.be/etsKPdCp7UE?list=PLvy119PeSK5hVVZOZfRgHre3zNaphXQVO

Friday July 8th
Topics: Global Markets

Reading: The Endless City

Assignment: Create 3D Models of several prototypes of your Conceptual Designs

Person: Dr Andy Davids
Firm: HOK  http://www.hok.com/

Resource Videos:  
https://youtu.be/nNQmTl-TDi0  
https://www.youtube.com/watch?v=vaVLkgwJWBWU  
https://www.youtube.com/watch?v=Sn4f__RM-Gg  
https://www.youtube.com/watch?v=2kmoqOhxUD58  
https://www.youtube.com/watch?v=4mshr6MnDU

Monday July 11th
Topics:  
The Radical #02 _ The New Skyscraper #02

Workshop: Say Hello to the Precix and the Shop Sabre

Reading: The Endless City
Assignment: Use the Precix or Shop Sabre to Mill foam molds of your design at 1/8" = 1'-0" _ Layup Carbon Fiber over your molds

Person: Stefano Boeri [http://www.stefanoboeriarchitetti.net/en/]

Firm: NBBJ [http://www.nbbj.com/]

Resource Videos:
https://vimeo.com/147902610
https://youtu.be/RiSvFl tstFM

Wednesday July 13th
Topics: Sustainability _ On-site energy production

Workshop: Get Friendly with the Precix and Shop Sabre

Reading: Tall Building: Imagining the Skyscraper

Assignment: Generate the following: Typical Floor Plans, Typical Overall Sections, Detail Sections

Person: Daniel Winey

Firm: Thornton Tomasetti [http://www.thorntontomasetti.com/]

Resource Videos:
https://youtu.be/Agei8pMxi9q?list=PLbX3Yc-TNhphjAkrFWytJgAN5xI pS3y_B
https://youtu.be/rA502HXgwXQ
https://youtu.be/JW59kJJE06I
https://youtu.be/OyiWhtLacw

Friday July 15th
Topics: Geo-thermal in case-ons _ Vertical Turbines

Reading: Tall Building: Imagining the Skyscraper

Assignment: Complete all of the Required Deliverables (**see the final assignment PDF**)

Person: Cesar Pelli

Firm: Arup [http://www.arup.com/]
Resource Videos:
https://youtu.be/wU5F48-0hJl
https://youtu.be/Wi6T3nSauwY
https://youtu.be/MbheaLxALM4

Monday July 18th
Topics: **Registration for CTBUH Student Tall Building Design Competition**
Work-in-Class - Finalize CTBUH Design Competition

Wednesday July 20th
Work-in-Class - Finalize CTBUH Design Competition

Friday July 22nd
Work-in-Class - Finalize CTBUH Design Competition

Monday July 25th
Submit CTBUH Design Competition

Wednesday July 27th
Work-in-Class - Finalize Final Presentation

Friday July 29th
CTBUH Design Competition _ Final Presentation
**Reading List:** (the Internet is the place to start, the publication is the place to end)


Burdett, *The Endless City*, Phaidon Press, 2010

Dunn, *Digital Fabrication in Architecture*, Laurence King, 2012


Lynn, Gage. et al., *Composites, Surfaces, and Software*, Yale School of Architecture, 2010


**Reference Projects:**

Monadnock Building, 1891

John Hancock, 1965

Habitat 67, 1967

Sears Tower, 1972

Pearl River Tower, 2013

Golden Dream Bay, 2015

...to be continued

**Grading:** Students will submit all assignments with good documentation for each

Final grade is based on the three percentages below:

10% for attendance

(attendance is mandatory, signing in for someone and/or 3 unexcused absences will result in a failing grade)

30% for the Midterm

60% for the Final

**Please note:** attendance, completion and submission of all course work on time is the minimum requirement and does not mean that you will receive an A grade. All grades are subject to the grade judging criteria below:

**Grades are determined by judging 4 different categories:**

**Craft** - Working with composites requires a high level of craft and precision. It’s required that all fabrications are made to look like works of art.

**Legibility** - Make sure that your assignment documentation is clear and easy to read. Use spell check (all software apps have it). Your portal page should also be neat and organized with labels. It should
contain all of the required deliverables.

Composition - In addition to being legible you should apply all the concepts of composition that you have previously learned. Specifically in this course composition refers to process documentation i.e. writing, photography & fabrication.

Innovation - Expand upon the skill sets taught in the course and apply them to the assignments. Research additional learning resources found on the Internet and in libraries. Create your own way to apply the fabrication concepts discussed in the course. Share your innovation in your research booklet.

Students with Disabilities Statement:
Americans with Disabilities Act (ADA) Policy Statement
Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must go through the Center for Disability Resources office. The Center for Disability Resources (CDR) is located in Life Sciences Room 218, telephone 312 567.5744 or disabilities@iit.edu.

Fabrication strategies:
Make "real" things
Learn from precedents (understand them through "deep" research)
Learn by making
Understand the fabrication processes
Design based on fabrication processes
Prototype, Prototype, Prototype (you never get it right on the first try)
Start small then move up in scale
Document the process and results

Processes / Machines:
Subtractive Fabrication / CNC Router
Mold Making / Vacuum Former
Composite Components / CNC, Vacuum Former & Hands