Course Syllabus:

A4114 INTEGRATED DESIGN: BUILDING SCALE
FALL 2016

1. Class Description & Objectives

This course is a workshop and lecture series in which students develop a design proposal with integrated technical systems. Structural form, environmental systems, materials, construction methods and fire protection elements are developed systematically and integrated with one another. Essentially, this is a technical studio where engineering systems are conceptualized, developed and resolved.

We will take a fresh look at each key building system from a practical eye. What are the key issues to understand in planning a building? What techniques lead to rapid iteration around design ideas and strategies? This is not science, more a developed and applied understanding of how the pieces of constructed form get put together. The course will start with key ideas around integration at the building scale. What drives the first decisions to be made on a project? Where do the first technical constraints appear in massing, egress, structure, mechanical systems? We will explore through lectures some fundamental ways of looking at the basic drivers for decision making and use of tools and support information to assist you in developing your future projects, including the project for this class.

This class is the capstone course of the Master of Architecture technical sequence, where theoretical knowledge gained in previous courses is applied. *A4114 Integrated Design: Building Scale* brings together key areas of study from environmental systems, structural systems and enclosures. Concepts and principles learned in these previous courses are applied to the comprehensive design of a fully detailed building.

Fundamentally, integration is about problem solving. Architects, engineers and builders work at the building scale alongside of one another making a complex set of decisions for every move in designing buildings. The architect has a key role in ensuring the synthesis of many demands – economy, elegance, efficiency. Through a better understanding of all systems, architects are able to integrate systems more completely. A well-integrated building is an efficient one. A well-integrated building gets built.

A4114 Integrated Design: Building Scale forms the basis of a year-long exploration on integration across multiple scales in the built environment. While we will begin with building scale in the fall semester, the spring semester will build on this knowledge at the urban and city scale. Façade systems will be explored simultaneously in *A4113 Envelopes in Architecture* and work in this class will support the project work we will be doing in *A4114 Integrated Design: Building Scale*.

2. Class Hours

Lectures:	Tuesday 2-3 pm Wood Auditorium
Workshops:	Tuesday 3-6pm Rooms will be assigned based on teams
Reviews:	3 Reviews. On the days when reviews are held, there will be no lecture. Reviews will begin at 2pm. Students must be pinned up by 2pm sharp in review rooms. All students must be present for the full review from 2-6pm.
Site Visits:	Friday 9-11am. Three site visits are organized for the course.
TA Office Hours:	Monday 6-8pm

3. Instructors & Critics

Professor:	Sarrah Khan, sk1286@columbia.edu
Teaching Assistant:	Wen Zhou, wz2307@columbia.ed and Jorge Cornet, jjc2257@columbia.edu

Critic Team #1	Room # 505	Arch	Clementina Ruggieri	Space4 Arch	cr@space4architecture.com
		SE	Jason Stone	LERA	jason.stone@lera.com
		MEP	Junko Nakagawa	Atelier 10	junko.nakagawa@atelierten.com

Critic Team #2	Room # 412	Arch	Joe Hand	SHoP	jah@shoparc.com
		SE	Enrica Oliva	Werner Sobek	enrica.oliva@wernersobek.com
		MEP	Ciaran Smyth	WSP	ciaran.Smyth@wspgroup.com

Critic Team #3	Room # 504	Arch	Sarrah Khan	Agencie	sk1286@columbia.edu
		SE	Anton Nelson	SOM	anton.nelson@som.com
		MEP	Alan Glynn	Arup	alan.glynn@arup.com

4. Course Requirements

a. Lectures

Weekly lectures will introduce key concepts and principles to be applied in the workshops. The lectures will be present structural, environmental, and life safety issues through design and case studies.

b. Project Workshop

Students will form an "office" or "team" of four for the project workshop. Each team will develop a detailed building project and a corresponding series of drawings for all systems. The drawings will be developed through weekly reviews and assignments. Weekly reviews will be held with a critic group consisting of an architect, a structural engineer, and an environmental engineer. The end product of these will be a final set of construction drawings for the class as the final project. Use of BIM or AutoCAD 2D + Rhino 3D software, is required. The workshop will mimic the design process ranging from conceptual design to construction documents in typical project phases. This is an iterative design approach, refined through drawing and analysis. The project will begin with a scheme design in which environmental concept, structural system, egress, and construction systems are investigated. Through design development the building will be refined by sizing and integrating mechanical and structural system components as well as by developing the construction of the building envelope. Finally, in the construction documents students will develop details, budgets and assembly sequences. Enclosures critics will join the DD review and outside critics will join the final review.

c. Site Visits

Exposure to construction practices is a critical part of the architecture process. This class will require three site visits for projects currently under construction in the local NYC market. These site visits will explore current class discussion areas and be an opportunity to share best (and not so best) building construction technology practices in the field today. The three site visits will be hosted on Fridays from 9-11am. Students will need to make accommodations to ensure they can attend all site visits. Attendance is mandatory and site visit reports will be required as part of the studio work. NOTE: STUDENTS MUST WEAR APPROPRIATE CLOTHING TO SITE VISITS. Thick soled shoes, long sleeved shirts, no shorts or skirts. Without appropriate attire, you will not be allowed into site or site offices.

5. Grading

Project development is a team effort. Cohesive group participation is critical to a successful project Grades are assigned in groups. On the rare occasion, individual grades may be awarded for exceptional performance within a group. Grading is based on the following criteria:

Concept	10%
Individual System Design	20%
Integration of Systems	20%
Quality of Drawings and Oral Presentation	40%
Attendance	10%

Students who have missed more than 2 classes and/or pinups and reviews may be subject to withdrawal from the class or an incomplete grade at end of semester at the discretion of the professor.

FINAL GRADING ASSESSMENT:

High Pass	>90%
Pass	60 – 90%
Low Pass	50 – 60%
Fail	<50%

6. Class References

The class will use the following reference texts:

- Building Code of the City of New York 2014 and Referenced Standards
- Fundamentals of Building Construction, Allen and Iano.***
  Strong generalist background book and a good reference companion for the course and future studio work.
- The Architects Studio Companion, Allen and Iano.***
  Helpful rule of thumb guide to many early decisions in architectural practice. Useful to determine sizing and overall initial dimensions for planning purposes. A good reference companion for the course and future studio work.
- Heating, Cooling, Lighting. Lechner.
  Leading text book on hvac and other design elements related to environmental systems.
- Structures. Schodek, Daniel. Bechthold, Martin.
  Good Structural Resource Book. Has span tables similar to Iano.
- Professional Practice of Architectural Working Drawings. Wakita, O et al.
  Good reference text for working drawing conventions.
- Building Systems Integration. Vassigh, S. and Chandler J.
  Case study examples of integrated design work, mainly from UK.
- Integrated Buildings : Systems Basis of Architecture. Bachman, L.
  Well-developed case studies for integrated design work across projects in various sectors types for buildings such as laboratories, commercial office, etc. Some strong historical case studies included.
- Integrated Design in Contemporary Architecture. Moe, K.
  Contemporary case studies for integrated design.
- Structures. Schodek, Daniel. Bechthold, Martin.
  Good Structural Resource Book. Has span tables similar to Iano.

*Reference excerpts from these texts will be provided for relevant class assignments and in support of lecture and crit materials. The reference books will be provided at the library.

*** These are very useful reference books and it is recommended that students purchase the texts for future reference in studio work.

7. Class Schedule & Outline

Week 1: Sep 6 2016

Lecture	• Course Overview • Integration – Considerations on integration in building design. Historical context and current approach to integration in the digital era. • Project Overview – Theatre case studies, program, and site. • Fire Protection – Understanding egress and designing egress passages. Developing wall types and other such strategies for understanding a building's performance in a fire event.
Workshop	#1 • Form offices/teams. • Develop technical concept driver; design massing with program; develop ancillary program. Calculate egress requirements. Diagram egress and circulation strategy. • Deliverables are floor plans of each floor.

Reading	Precedents in Integration

Week 2: Sep 13 2016

Lecture	• Acoustics? • Accessibility? • Capitalizing on Inherent Resources – Natural ventilation, daylighting, building orientation, solar modelling, wind direction studies, rainwater collection, green roofs and walls. • Introduction to Critics
Workshop	#2 • Natural ventilation; daylighting strategies; acoustic design of hall • Section showing natural ventilation; overall massing of building with daylighting strategy; exit/entrance strategy in relation to mass transit shown on first floor plan.
Site Visit	Alice Tully Hall

Week 3: Sep 20 2016

Lecture	• Theatre Planning – Introduction to theatre planning and case study of St Ann's Warehouse. Guest lecture by John Owens, Principal and Theatre Planner at Charcoal Blue.
Workshop	#3 • Refine theatre geometry in terms of acoustics; flexible space strategy.

Week 4: Sep 27 2016

Lecture	• Structural Systems I – Organization and design of gravity and lateral systems. Basics of loads and force resisting systems. Integrating and coordinating structure with architecture. Structural
Workshop	#4 • Select structural material; layout structural system; locate columns and shear walls; • Structural plans

Week 5: Oct 4 2016, 2-6pm

Lecture Workshop	Schematic Design (SD) Review

Week 6: Oct 11 2016

Lecture	• Mechanical Systems – Introduction to mechanical systems for heating and cooling a theatre space. Guest lecture by Niall Cooper, Principal and Mechanical Engineer at Buro Happold.
Workshop	#6 • Locate mechanical room; determine heating system; determine cooling system; define mechanical strategy; diagrammatic plans of mechanical systems

Week 7: Oct 18 2016

Lecture	• Structural Systems II – Long span structures, edge conditions, enclosures attachments. Structural drawing conventions.
Workshop	#7 Wall section at 1-½"=1'-0" scale showing all system, from foundation to roof, illustrating the load path and line of enclosure. Include at least 3 detail

Week 8: Oct 25 2016, 2-6pm

Lecture Workshop	Design Development (DD) Review with Enclosures

Week 9: Nov 1 2016

Lecture	• Plumbing – Water supply and • Electrical – Guest lecture by electrical engineer
Workshop	#9 Plumbing riser diagrams; RCPs

Week 10: Nov 8 2016

Lecture Workshop	ELECTION DAY BREAK – No class

Week 11: Nov 15 2016

Lecture	• Detailing • Wall Assemblies • Coordination • Drawing Conventions
Workshop	#11 3D details of key areas of wall and floor.

Week 12: Nov 22 2016

Lecture	• Cost estimating and budgeting – Guest lecture by Cost Consultant • Assembly and sequencing – Case study of Crystal Bridges installation
Workshop	#12 • Develop budget. Develop an assembly sequence for a portion of the building.

Week 13: Nov 29, 2-6pm & Dec 1, 9-11am 2016

Lecture Workshop	Construction Document Review with Enclosures