School of Architecture | Georgia Tech | Fall 2026
ARCH 4433/8833 Integrated Building Systems I (3 Credits)
Required Course for NAAB Programs (M.Arch 2 and M.Arch3)
Graduate Offering

Credit Hours:	3 Credits
Classroom:	TBD
Modality:	In-Person
Days and hours of class:	Tuesday and Thursday 08:00 am to 09:15 am
Prerequisites:	Graduate Standing (undergraduates allowed with permission)
Instructors:	**Russell Gentry** (MS Teams preferred, please do not send emails)
	Patrick Kastner (MS Teams preferred, please do not send emails)
	Office Hours: By Appointment
Teaching Assistant:	**TBD**

Course Description (from the Catalog) "Examines approaches to building design and systems integration. Introduces resiliency as a means of integrating environmental assessment for energy efficiency and design for natural forces."

This is the first in the series of three courses that focus on technical issues of building design and systems integration. The course is taught in two modules with the first focusing on the environmental impact of buildings and the design of building systems to respond to the climate in which they are placed. The second module focuses on the structural environment, with a focus on lateral forces and the building systems used to resist them. Both modules will use the Kendeda Building on the Georgia Tech campus as a testbed for discussion and analysis of building environmental and structural systems.

Module 1 focuses on lateral forces in buildings and on how life safety is ensured in building structural systems under extreme wind and seismic loading. The module builds awareness of the coordination required between architects and structural engineers in the analysis of buildings under extreme loading and the design and integration of lateral force resisting systems into buildings. Students will complete an assessment of the lateral force demand from code-specified wind and earthquake loading on buildings in multiple locations in the United States and select and proportion lateral force resisting systems (LFRS) for those loads. The class will involve an understanding of the code required forces, computation of lateral forces and an introduction to reading structural drawings. One project includes building idealized lateral systems and loading them to failure for reflection and comparison among project groups. Another project will include comprehending structural drawings of a building on campus; documenting the loads and their paths for gravity and lateral forces; and exploring an alternate lateral force resisting for the building. Projects will be done in groups. There will be weekly homework assignments completed individually.

Module 2 introduces the students to the basics of equilibrium as a guiding principle for designing building systems. The module explores thermal, and luminous environmental design in the context of architectural building systems. The course

first focuses on the building envelope as a fundamental element in defining a building and then explores how it integrates with other systems in a unified ecosystem. Furthermore, integrated building systems are emphasized, including active mechanical systems, plumbing, electrical systems, and lighting. The module assignments are individual and connect performance analysis with design through Building Performance Simulation (BPS). This module focuses on the active systems in buildings and how they impact the design of the building and vice versa. The objective of this module is to equip you with an understanding of these systems sufficient for you to design a building in concert with its environmental systems.

Course Objectives

This course is a requirement for the professional degree in architecture and as such, focuses on the core knowledge of building technology. The prerequisite courses, ARCH 6015 (Structures 1) and ARCH 6531 (Environmental Systems 1) introduce the fundamentals of building physics that explain how buildings are organized and respond to environmental forces such as the following: gravity loads, lateral loads, solar radiation, changes in temperature, air flows, etc.

The specific objectives of IBS1 are as follows:

- Enable student application of basic electric lighting design using methodical calculation and simulation-based evaluation of existing and new space.
- Introduce concepts of thermal comfort and active mechanical systems for space cooling and heating.
- Demonstrate water delivery and sanitary procedures through plumbing systems integration.
- Introduce the physical concepts of lateral load events (wind and earthquake).
- Develop an understanding of the building code determining the physical principles of how wind and earthquake events are quantified as loads on buildings.
- Define load paths within the building structure for gravity and lateral loads.
- Develop an understanding of selecting and proportioning lateral systems based on building type, use and location.

Learning Objectives

Note: For all M. Arch courses, see also “Professional Standards Addressed”

Those students who complete the course will be able:

- Illustrate the role architects have in the design of sustainable visual and thermal environments.
- Evaluate existing and new spaces using rules-of-thumb and simulation for environmental performance.
- Develop and demonstrate comprehensive building electrical and plumbing systems integration.
- Understand building code loading requirements for lateral forces.
- Understand the function of structural systems for both gravity and lateral loading.
- Evaluate lateral force requirements for buildings from code prescribed, hazard-based wind & earthquake
- Integrate lateral force resisting systems into building design proposals.
- Comprehend structural drawings identifying structural systems and components

Required Texts/Readings/Special Materials

Instead of designating multiple resources as required textbooks, the course instructors assembled course readings and denoted them as weekly reading assignments. Digital copies of each of the references are available at the library.

Module 1 – Structural Systems

- Francis D. K. Ching, “Building Construction Illustrated, 5th Edition” (2014).
- ASCE 7-16 (2016) Minimum Design Loads and Associated Criteria for Buildings and Other Structures, American Society of Civil Engineers.
- Schodek, Daniel and Bechtold, Martin (2013) Structures, Pearson.

Module 2 – Environmental Systems

The readings are derived from the following:

- Lechner, N. (2015). Heating, cooling, lighting: Sustainable design methods for architects. John Wiley & sons. (https://ebookcentral.proquest.com/lib/gatech/reader.action?docID=7104106)
- Lechner, N. M. (2011). Plumbing, electricity, acoustics: sustainable design methods for architecture. John Wiley & Sons. (https://ebookcentral.proquest.com/lib/gatech/reader.action?docID=817346)

- Beausoleil-Morrison, I. (2020). Fundamentals of building performance simulation. Routledge. (https://galileo-gatech.primo.exlibrisgroup.com/permalink/01GALI_GIT/18jodvt/alma9915077485802947)

Course Schedule: See the annotated class schedule on Canvas. Please note: this schedule is subject to periodic revisions over the course of the term. Updated schedules will always be posted on Canvas.

	Week	Tue	08:00 – 09:15 AM	Thu	08:00 – 09:15 AM	Assignment	Readings
Module 1	01	08/19	Course and Faculty Intro + Structures Review	08/21	Lateral Forces – Wind Forces		Schodek Chapter 14
	02	08/26	Lateral Force – Calculating Wind Forces	08/28	Lateral Forces – Seismic	Assignment 4: Lateral Wind Calculation	ASCE 7
	03	09/02	Lateral Forces – Calculating Seismic Forces	09/04	Lateral Force Resisting Systems and Introduction to Tower Project – Teams Assigned	Assignment 5: Lateral – Seismic Base Shear Calculations + LRFS	
	04	09/09	LFRS – Lateral Force Resisting Systems	09/11	LRFS Lecture + Design Review for Design Build Destruct	LAB Assignment: Design-Build-Destruct	
	05	09/16	DFL Work Day on LFRS Project	09/18	Design Build Destruct Testing Day		
	06	09/23	Final Project Assignment	09/25	Structures Exam REMOTE (15%)	Lab Assignment: Kendeda Re-Design in Structural Steel	
	07	09/30	Final Project Work in Class	10/02	Lateral Force Resisting System Project Due		
Module 2	08	10/07	Fall break	10/09	Basics of Equilibrium (Heat + Pressure)		Lechner ('14) Ch.3
	09	10/14	The Building Envelope I (Heat)	10/16	The Building Envelope II (Heat)	Assignment 1: Envelope (10%)	Lechner ('14) Ch.15
	10	10/21	The Building Envelope III (Moisture)	10/23	The Building Envelope IV (Glazing & Facades)		Lechner ('14) Ch. 4
	11	10/28	HVAC I (Intro & Psychrometrics)	10/30	HVAC II (Calculations)		Lechner ('14) Ch.16
	12	11/04	HVAC III (Calculations)	11/06	Natural Ventilation	Assignment 2: HVAC (10%)	Lechner ('14) Ch.13&14
	13	11/11	Lighting I (Daylighting)	11/13	Lighting II (Electric Lighting)	Assignment 3: Lighting (10%)	Lechner ('14) Ch. 3
	14	11/18	Break – Studio Finals	11/20	Break - Studio Finals		
	15	11/25	MEP Exam REMOTE (15%)	11/27	Thanksgiving Break		
	16	12/02	Exam Q&A	12/04	Reading Period		
	17	12/08	Recap & Closing				

Course Requirements and Deliverables

Each student is required to work individually on a standard given space in a set of assignments. The structural assignments (1 and 2) focus on whole-building design and will include the construction and testing of a structural model of a building lateral force-resisting system in the DFL and the notional re-design of the Kendeda Building as a structural steel frame. Assignment 3 will provide a medium for exploring basic physics with the Building Envelope. Assignment 4 will investigate HVAC systems. Assignment 5 will explore Lighting Systems. All deliverables will be submitted in a professional format and should not be presented as hand-written student homework unless noted in the assignment. A combination of professionally formatted materials and neat, well-organized hand-written calculations is acceptable. All assignments are to be submitted on Canvas only.

Assignments are weighted as follows:

Grading	Total	Assign / Exam				
		1	2	3	4	5
Assignments	50%	10%	10%	10%	10%	10%
Structures Lab	15%					
(2) Exams	30%	15%	15%			
Participation	5%					
Total	**100%**					

Final grades will be assigned as follows:

Final Grades	**Letter**
100% to 90%	A
89.9% to 80%	B
79.9% to 70%	C
69.9% to 60%	D
Below 60%	F

COURSE POLICIES

Academic Integrity and Conduct

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. All Georgia Tech students should familiarize themselves with and abide by the Georgia Tech Honor Code: http://www.catalog.gatech.edu/rules/18/. Faculty shall report instances of academic dishonesty to the Office of the Dean of Students.

For expectations of student and instructor conduct more generally, consult section 19 of the catalog listed above, entitled "Code of Conduct," http://www.catalog.gatech.edu/rules/19/, and section 22, entitled "Student-Faculty Expectations," at http://www.catalog.gatech.edu/rules/22/.

All persons in the classroom are expected to behave with courtesy towards others and in a way that does not interfere with the regular conduct of the class. Cell phones are to be turned off when students enter the classroom and should remain off for the duration of the class; laptop computers are to be used only for taking notes; and students should not engage in private conversations while the instructor or other students are speaking. Anyone not adhering to these basic courtesies will be asked to leave.

AI Policy

We treat AI-based assistance, such as ChatGPT and Copilot, the same way we treat collaboration with other people: you are welcome to talk about your ideas and work with other people, both inside and outside of class, as well as with AI-based assistants.

However, all work you submit must be your own. You should never include anything in your assignment that you did not write directly without proper citation. You need to use quotation marks for exact phrasing; both direct quotes and paraphrasing require citations (e.g., in-line citations or footnotes/endnotes, as specified by the instructor).
It's important to understand that including anything you did not write in your assignment without proper citation will be treated as a serious academic misconduct case. If you are unsure where the line is between collaborating with AI and copying AI, we recommend the following heuristics:

Heuristic 1: **Never hit "Copy" within your conversation with an AI assistant**. You can copy your own work into your original composition but do not copy anything from the AI conversation directly back into your assignment. Instead, use your interaction with the AI assistant as a learning experience, then let your assignment reflect your improved understanding.

Heuristic 2: **Do not have your assignment and the AI agent open at the same time.** Like above, use your conversation with the AI as a learning experience, then close the interaction, open your assignment, and let your assignment reflect your revised knowledge.
This heuristic avoids directly integrating AI into your composition environment: just as you should not let a classmate write content or code directly in your submission, you should also avoid using tools that directly add content to your submission.

Deviating from these heuristics does not automatically qualify as academic misconduct; however, following these heuristics guarantees your collaboration will not cross the line into misconduct. Also, remember that overreliance on AI tools can significantly impact the development of fundamental skills. Additionally, AI environments contain mistakes and ingrained biases that can misrepresent your ideas, intentions, and the demonstration of learning objectives.
All graphic content created with AI tools should be labeled as AI-generated or AI-assisted. Experimentation with various AI tools is highly encouraged but needs to be clearly identified.

Accommodations for Students with Disabilities
Any student with a disability who may require accommodation should contact the Office of Disability Services at 404-894-2563 or visit http://disabilityservices.gatech.edu to make an appointment to discuss their special needs and obtain an accommodations letter. They should also schedule an appointment with the course instructor to discuss their learning needs.

Active Participation/Attendance
Active Participation at all class meetings is mandatory and crucial to the successful completion of the class. Absences will be excused only for medical or family emergencies, Institute-approved events, and religious holidays documented in writing. (According to a new policy, you must notify your instructor in writing during the first two weeks of the semester about any anticipated absences for religious holidays.) Late arrivals will be counted as absences.

The participation grade in the course will be calculated based on the completion of daily quizzes submitted through Canvas, usually during the class period, and through peer review of your participation on group assignments. Access to in-class quizzes will be available only to those attending the class and it Is considered an honor code violation to provide quiz access to students who are not in attendance.

NOTE: Absences due to special and/or unforeseen circumstances must be discussed with the instructor as early as practically possible.

Missing three classes without an approved excuse will result in a letter grade reduction. Missing more than three classes, excused or unexcused, might result in a meeting with your instructor and the Architecture Program Office to determine a course of action and can result in an incomplete grade (I) or a failing grade (F) of this course.

Approved Communication Platforms
IBS1 will primarily use the following Georgia Tech platforms for communication:

- Microsoft Teams: remote lectures, communications channel for class chat and communication with individual students.
- Canvas: announcements, quizzes, completion of individual surveys, peer reviews, course materials etc.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams
All assignments are due on the dates indicated on Canvas. Late assignments will be accepted but will be subject to a 10% grade penalty for each 24h overdue. Late penalties will be waived for permissible reasons or approved Institute activities, please communicate with the instructor as early as possible. Students who repeatedly arrive late to lecture or recitation and therefore do not participate in the class forum will not be eligible for the participation credit.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams
All phase deliverables are posted on the syllabus and will be confirmed as the semester progresses. Individual team extensions will not be granted. Individual exams will be given on posted dates and no make-up exams will be permitted without prior approval from the faculty.

Ownership
Physical copies of student work submitted to the school to satisfy course requirements—including, but not limited to, digital files, papers, drawings, and models—become the school's property. The School of Architecture has no obligation to safeguard such materials and may, at its discretion, retain them, return them to the student, or discard them.

NAAB Criteria Specific to Integrated Building Systems 1
Accredited architecture degree programs must demonstrate that each graduate possesses the knowledge and skills defined by the criteria below. The knowledge and skills defined here represent those required to prepare graduates for the path to internship, examination, and licensure and to engage with related disciplines and lead complex building projects. The criteria from our accrediting board are as follows:

PC.7 Learning and Teaching Culture—How the program fosters and ensures a positive and respectful environment that encourages optimism, respect, sharing, engagement, and innovation among its faculty, students, administration, and staff. *This content is **Practiced**, meaning students practice, understand, and are assessed on it.*

SC.1 Health, Safety, and Welfare in the Built Environment—How the program ensures that students understand the impact of the built environment on human health, safety, and welfare at multiple scales, from buildings to cities. *This content is **Practiced**, meaning students practice, understand, and are assessed on it.*

SC.4 Technical Knowledge—How the program ensures that students understand the established and emerging systems, technologies, and assemblies of building construction, and the methods and criteria architects use to assess those technologies against the design, economics, and performance objectives of projects. This content is ***Assessed***, meaning it is a critical component of the course, students are evaluated, and the program assesses the student performance for accreditation and/or annually.

SC.6 Building Integration—How the program ensures that students develop the ability to make design decisions within architectural projects while demonstrating integration of building envelope systems and assemblies, structural systems, environmental control systems, life safety systems, and the measurable outcomes of building performance. *This content is **Practiced**, meaning students practice, understand, and are assessed on it.*