School of Architecture | Georgia Tech | Fall 2026

ARCH 7105 – Integrated Building Systems III – 4 credits

Fall 2026 -- CRN 95186
Tuesday, Thursday 12:30 to 2:50 p.m. -- Instructional Center 115

Instructor Information

Instructors: Russell Gentry and Hugo Sheward

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Office Hours: by appointment

TA Name: Maryam Almaian

TA Email: malmaian3@gatech.edu

General Course Information

Course Description

Catalog Description: Approaches building design and systems integration via the design and detailing of a concrete frame building, including engineering of the concrete frame and the mechanical systems.

Integrated Building Systems III (IBS III) is the third in the series of three courses which examines approaches to building design and systems integration via the design and detailing of a small infill structural concrete building, including basic engineering of the structural system and the mechanical, electrical, and plumbing (MEP) systems. In IBS III students synthesize a wide range of variables that contribute to an integrated design solution.

While the prerequisite course IBS II considers the technical aspects of significant completed works of architecture through the analysis, "reading" and making of construction drawings, IBS III focuses on the ability to apply that knowledge to the design of a mid-scale commercial building, including passive design, material selections, construction assemblies, structural systems and MEP systems.

It is not uncommon in contemporary practice for a medium sized project to have a dozen consultants in addition to the architect. It is the architect's responsibility to assure design integrity across disciplines, manage these consultants and integrate their work into digital models and workflows to produce a set of coordinated drawings. These disciplines might include structure, mechanical, electrical, plumbing, fire protection, environmental (LEED), civil, geotechnical, landscape, audio visual, IT, acoustic, lighting, façade & waterproofing plus any number of additional specialty consultants. Having a general knowledge of how these disciplines interface with architecture is essential to high-quality design.

The course extends a conceptual and practical understanding of how building details and performance requirements are developed as an integral part of an overall design concept through application. The working premise of the course is that the technical aspects of drawing, modeling, organizing and integrating building systems within a set of contract documents are essential to achieving high-quality design and effective building processes in professional practice.

Course Learning Outcomes

Those students who successfully complete the course will be able to:

- Understand reinforced concrete structural systems and select, proportion and detail these systems.
- design with an emphasis on integration of structure, building envelopes, and other construction and environmental control systems.
- understand of life safety regulatory requirements and how to integrate these into architectural design;
- design for healthy environments including passive environmental systems supplemented by active systems as required, incorporate healthy materials into buildings
- Learn how to participate in team-based practices.

Required Course Materials

IBS3 does not require a textbook. As a building integration course, the course covers a wide range of topics and pulls from key references in each of the disciplines covered. This is the list you need when you start your first firm.

Fundamentals

- Edward Allen, and Joseph Iano, Fundamentals of Building Construction: Materials and Methods, 7th Edition (2019).
- Francis D. K. Ching, Building Construction Illustrated, 6th Edition (2020).
- Bell, Victoria Ballard (with Patrick Rand). Materials for Design, Princeton Architectural Press, NY, 2006
- Manual of Construction series by Birkhauser Publishers: Concrete, Masonry, Steel, Glass, Wood.

Structures and Structural Materials

- Design and Control of Concrete Mixtures, Portland Cement Association.
- Design Guide for Economical Reinforced Concrete Structures, Concrete Reinforcing Steel Institute.
- Schodek, Daniel and Bechtold, Martin (2015) Structures, 7th Edition, Chapter 15: Constructional Approaches.
- Ambrose, James and Tripeny, Patrick (2011) Building Structures, 3rd Edition.
- An Engineers Guide to Economical Concrete Floor Systems, Portland Cement Association, 2005

Building Energy and Mechanical Systems

- Mechanical and Electrical Systems in Architecture, Engineering and Construction (5th Edition) Frank R. Dagostino and Joseph B. Wujek.
- Lechner, Norbert, and C. Wallace. Heating, Cooling, Lighting: Sustainable Design Methods for Architects. 4th Ed. (Georgia Tech library online access)
- Mazria, Edward. The Passive Solar Energy Book. Expanded Professional ed. Emmaus, Pa.:

Rodale, 1979.
- Reinhart, Christoph. Daylighting Handbook I. Building Technology Press. 2014.

Enclosure Systems

- Elliot, Cecil D. Technics and Architecture: The Development of Materials and Systems for Buildings MIT Press, Cambridge, MA., 1992.
- Christian Schittich, "Shell, Skin, Materials", Building Skins: Concepts, Layers, Materials (In Detail pub.2004)
- Christine Beall, Thermal and Moisture Protection Manual For Architects, Engineers and Contractors, McGraw Hill, NY, 1999
- Joseph S. Amstock, Handbook of Glass in Construction, McGraw Hill, NY, 1997

Drawings, Specifications, Workflows

- Ford, Edward. The Details of Modern Architecture, Cambridge, Volumes 1 and 2. MIT Press.
- "In Detail" series of Birkhauser Publications, edited by Christian Schittich.
- Mark Kalin, Robert S. Weygant, Harold J. Rosen and John R. Regener (2010) Specifications Writing: Principles and Procedures, 6th Edition, Wiley.
- Scott Marble, ed.," Digital Workflows in Architecture: Design, Assembly, Industry", Birkhauser, 2012.
- Rafael Sacks, Chuck Eastman, Ghang Lee and Paul Teicholz (2018) BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers, 3rd Edition Wiley.

Grading Policy

Students are required to attend all lectures and working sessions, participate in discussions, and complete the semester-long building design assignment – working in teams. The course is designed around a single comprehensive deliverable with four phases, each of which will be graded independently. The primary assignment for IBS3 is the design of a medium-scale building with a focus on the integration of architecture, structure and MEP systems. The architectural focus will be on designing to maximize passive environmental systems supplemented by active systems as necessary. The structural focus is on configuring, proportioning and detailing a structural concrete structural and foundation system for the building. The building systems focus will be on learning to design a basic mechanical, electrical and plumbing system including energy source selection and MEP distribution throughout the building.

Individual student grades will be calculated based on group project grades delivered in four phases, on peer review of each of these phases, and on individually completed quizzes, one quiz on concrete structures and one on MEP systems.

Faculty will hold counseling meetings during the semester for teams whose peer reviews indicate uneven contributions across the team. Our common goal is for all team members to contribute equally over the course of the semester.

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

Description of Graded Components

Phase 1 – Schematic Building and Energy	20%
Phase 2 – MEP Systems	20%
Phase 3 – Structural Systems	20%
Phase 4 – Building Integration	20%
Quiz 1 – Energy and MEP Systems	10%
Quiz 2 – Concrete Materials and Structures	10%

Peer review input will be solicited from all students after each major team submission and submission of peer reviews through Canvas is a mandatory part of the course. The peer review instrument asks team members to assess their own performance as a member of the team, during the relevant phase of the project, along with that of their teammates.

Peer reviews grades are applied at the end of the semester to the final project grade and are proportional to the mean performance of the members of the team. In a well-functioning team with equal contribution across the members, peer review scores neither add to nor subtract from the final project grade. A highly positive peer review relative to the mean peer review score will result in a maximum of 10 points added to the team score for that phase and that team member. Likewise, a highly negative peer review will result in a maximum of 10 points deducted from the team score.

Grading Scale

A 90–100%

B 80–89%

C 70–79%

D 60–69%

F Below 60%

Course Schedule

Please see the annotated class schedule on Canvas. This schedule is subject to periodic revisions; updated schedules will always be posted on Canvas

Wk	Date	Day	Topic	Who	Deliverable
1	25Aug	T	Course Introduction, Structure and Aspirations. Grading methods and rubrics.	All	**Wednesday: Skills and Interests via Canvas**
	27-Aug	Th	Design Brief, Teaming	All	
2	01-Sep	T	MEP Lecture 1: The MEP Submission + Architecture MEP Integration	Hugo	**Team Memo due Wednesday**
	03-Sep	Th	ARCH/MEP Integration: Energy Design	Hugo	
3	08-Sep	T	ARCH/Structural Integration: The Structures Submission +	Russell	**Phase 1.1 due 08 Sep**
	10-Sep	Th	Architecture – Structure Integration	Russell	
4	15-Sep	T	ARCH/Structural Integration RC Structural Systems	Russell	
	17-Sep	Th	Architectural Design Expectations	Hugo	
5	22-Sep	T	Architectural Design	Hugo	**Phase 1.2 due 24 September**
	24-Sep	Th	Introduction to Concrete Materials	Russell	
6	29-Sep	T	Cast-In-Place Structural Systems	Russell	
	01-Oct	Th	RC Reinforcement Layout	Russell	
7	06-Oct	T	**NO CLASS FALL HOLIDAY**	Russell	
	08-Oct	Th	Prestressed Concrete	Russell	
8	13-Oct	T	Building Foundations + Soils Reports		
	15-Oct	Th	*No Lecture - Structural Reviews*	Russell	
9	20-Oct	T	**Structures Quiz Remote**		
	22-Oct	Th	MEP - Energy Code, Envelope Design	Hugo	**Phase 2 due Thursday 22 October**
10	27-Oct	T	Integrated design principles	Hugo	
	29-Oct	Th	Electrical systems	Hugo	
11	03-Nov	T	Heating Ventilating and Air Conditioning	Hugo	
	05-Nov	Th	Plumbing and Fire Protection	Hugo	
12	10-Nov	T	Recap and MEP Reviews	Hugo	
	12-Nov	Th	*MEP Reviews*	Hugo	
13	17-Nov	T	**STUDIO REVIEW – Class Canceled**	Hugo	
	19-Nov	Th	**STUDIO REVIEWS – Class Canceled**	Hugo	**Phase 3 due 13 November**
14	24-Nov	T	**MEP Quiz Remote**		
	26-Nov	Th	Thanksgiving break		
15	01-Dec	T	Phase 4 updates from faculty	ALL	
	03-Dec	Th	Phase 4 updates and desk crits		
16	07-Dec	T	Final Instructional Class Days	ALL	
	08-Dec	Th	No Class Final Exam Period		

17	**Final Projects Due @ GT Final Exam Time – Thursday December 17**

Supplemental Information *(required for all M. Arch courses)*

Professional Standards Addressed
NAAB Conditions for Accreditation, For Professional Degree Programs in Architecture (2026)

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.3 Regulatory Context**—How the program ensures that students understand the fundamental principles of life safety, land use, and current laws and regulations that apply to buildings and sites in the United States, and the evaluative process architects use to comply with those laws and regulations as part of a project. 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.5 Design Synthesis**—How the program ensures that students develop the ability to make design decisions within architectural projects while demonstrating synthesis of user requirements, regulatory requirements, site conditions, and accessible design, and consideration of the measurable environmental impacts of their design decisions. This content is **Practiced**, meaning students practice, understand, and are assessed on it.
- **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 **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.

Course Policies

Attendance and/or Participation

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.

Attendance of SoA lectures during studio time on Thursday from 12:30-1:30 p.m. is required for M. ARCH students and highly recommended for our BS ARCH, MS, and Ph.D. students.

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

SoA Attendance Policy

Active participation at all class meetings is mandatory. Absences will be excused only for medical or family emergencies, Institute-approved events, and religious holidays documented in writing. (Notify your instructor in writing during the first two weeks of the semester about any anticipated religious holiday absences.) Late arrivals will be counted as absences.

Attendance of SoA lectures during studio time on Monday or Wednesday from 12:30–1:30 p.m. is required for M. Arch students and highly recommended for B.S. Arch, M.S., and Ph.D. students.

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.

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

Students are highly encouraged to submit absence verification for documented illness, hospitalization, accidents, family emergencies, or lengthy illnesses to the Dean of Students: https://studentlife.gatech.edu/request-assistance

Academic Integrity

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.

Review Georgia Tech's Honor Code and the student Code of Conduct. Any student suspected of cheating or plagiarism will be reported to the Office of Student Integrity.

For expectations of student and instructor conduct, consult Code of Conduct (rules/19) and Student-Faculty Expectations (rules/22).

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body.

The Student-Faculty Expectations Agreement articulates some basic expectations that you can have of me and that I have of you. Simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek.

Core IMPACTS

Core IMPACTS is the University System of Georgia's General Education curriculum. If you are teaching a course that counts towards Core IMPACTS, you should include a syllabus statement about the Core area and associated career competencies. This resource from Georgia State University includes template syllabus statements for each Core IMPACTS area that you may adapt for your course.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment, obtain an accommodations letter, and discuss your special needs. Please also schedule an appointment with your instructor to discuss your learning needs.

Collaboration, Group Work, and Use of Generative AI

Limited Generative AI Use Permitted

Use of Generative AI (insert appropriate AI tool(s) here) is permitted but only within instructor-approved boundaries. Its use must be transparent and documented in a required AI Usage Statement with each submission, including: tool used and date of access, the input (prompt) provided, a copy of the output, and a description of how you used or edited the AI-generated content. Failure to disclose its use may be considered a violation of Georgia Tech's academic integrity policies.

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.

Inclement Weather and Digital Learning Days

If a weather-related event seems likely to affect campus operations, instructors of record will be notified as soon as possible via email by the Office of the Provost. Once a decision to pivot is made, broader campus will be notified via email, GTENS, and Canvas notifications.

Instructors have discretion to cancel class or pivot to digital instruction during a weather-related event. Students may not be asked to attend in person or required to participate in a class session outside of the regularly scheduled time if campus has shifted to a digital learning day.

Student Use of Mobile Devices in the Classroom

This class requires the use of mobile devices in the form of laptops and tables as they can enrich the educational experience unless they are used for non-class related activities. ,it is recommended for students not to use their cellphones during class since research

demonstrates that this can be distracting to their students and most of the time their use is not related to academic activities

Digital Proctoring

This class does not consider or requires the use of digital proctoring tools.

CIOS — Course Evaluations

At the end of the term, students are asked to complete the online course evaluation for all courses at Georgia Tech (https://gatech.smartevals.com). CIOS scores and comments have different degrees of visibility based on roles:

Campus Resources for Students

Undergraduate Student Academic Success Resources

A list of resources for undergraduate students' academic success and advising can be found at Success at Tech. Academic Support (a unit in the Office of Undergraduate Education & Student Success) provides free tutoring: success.gatech.edu/tutoring.

Graduate Student Academic and Professional Success Resources

A list of resources for graduate students is available on the Office of Graduate and Postdoctoral Education website.

Student Well-Being

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness-related resources has been compiled by the Office of the Vice President for Student Engagement and Well-being.

Library & Archives

Contact your Architecture Library subject specialist, Catherine Manci (catherine.manci@library.gatech.edu), for research help and information on available resources.

Contact your Architecture Archives liaison, Jody Thompson (jody.thompson@library.gatech.edu), for assistance with archival research and collections.

Georgia Tech Library: https://library.gatech.edu/ Georgia Tech Archives: http://library.gatech.edu/archives

Approved Communication Platforms

Georgia Tech Approved Communication Platforms

Georgia Tech Values Statement

At Georgia Tech, we see different backgrounds and perspectives as essential to learning, discovery, and creation. We strive to remove barriers to student success and to build a welcoming community where everyone has the opportunity to contribute to our mission. As outlined in our strategic plan, we want to create an environment of holistic learning where all individuals can grow and learn to lead healthy, purposeful, impactful lives.

SoA & College of Design Policies

Archiving

At the end of the semester, all students are required to submit physical and/or digital examples of their work to their instructors or administration for archiving no later than one week after the end of term. By enrolling, each student grants a license to reproduce and display their work online, in forthcoming print publications, and in public exhibitions.

Ownership

For the purposes of continuous improvement efforts, such as accreditations and periodic program reviews, the School will select samples of student work submitted to satisfy course requirements. This includes digital files, papers, drawings, models, etc. Collected samples may be returned to students upon request.

College of Design Facility Rules and Guidelines

Please consult the Georgia Tech Student Handbook regarding the use of facilities and all Institute policies. Aerosol sprays of any kind are strictly banned from the studio and surrounding areas. A spray painting booth is available in the College of Design shop on the ground floor of the East Architecture Building.

Course Expectations & Guidelines

Per the GT Catalog, all work produced in the College of Design as part of a degree program becomes the property of the College; it may be retained or returned at the discretion of the faculty. The faculty of the School of Architecture reserves the right to refuse credit for any project executed outside the precincts of the College or produced without proper coordination with the faculty.

Emergencies

In case of emergency (e.g., fire, accident, or criminal act), please call the Georgia Tech Police at 404-894-2500. Perry Minyard, IT Support Administrator for the College of Design, is also a firefighter and EMT certified in performing CPR.