University of Florida, College of Design Construction and Planning, School of Architecture

ARC 3492C. Integrated Building Technology 2

Syllabus

GENERAL COURSE INFORMATION:

Course times:	Lecture:	T/H periods 4-5 10:40am-12:35pm)
	Lab. 1:	T/H periods 7-8 (1:55pm-3:50pm)
	Lab. 2:	T/H periods 9-10 (4:05pm-6:00pm)
Total Credits:	6	
Prerequisites:	Completion of: ARC2491C Integrated Building Technology 1	
Class Room:	Lecture: FAB 105 / Lab: In Design Studio Spaces - Varies by Section	

Modules and Instructors:

Materials & Methods of Construction Module (weeks 1-4):

Peter Sprowls
Office: AH 232
Contact: peter26@ufl.edu
Office Hours: Tues/Thurs 1pm-2pm and by appointment

Environmental Technology Module (weeks 4-9):

Martin Gold
Office: AH 260
Contact: mgold@ufl.edu
Office Hours: Tuesday 1pm-2pm and by appointment.

Structural Technology Module (weeks 10-16):

Mark McGlothlin
Office: AH 266
Contact: mmcgloth@ufl.edu
Office Hours: Tues/Thurs 11-2pm or by appointment

COURSE DESCRIPTION:

As the third course in a multi-year integrated building technology sequence, there will be an emphasis on further developing components of environmental design, materials and methods, and building structures, in addition to a digital design module that will concurrently develop student abilities to problem solve and represent ideas.

Students will meet for course lectures on Tuesday and Thursday mornings led by the faculty. During the afternoons on Tuesdays and Thursdays, students will meet with graduate teaching assistants to complete lab assignments and discuss issues present in the morning lectures.

COURSE RATIONALE AND PLACEMENT:

By teaching these topics as a series of inter-related modules with hands-on learning laboratory assignments, students are expected to learn the important technological information associated with each topic, to see sustainable design connections across modules, and to develop a facility in integrating these ideas into their design studio projects.

COURSE OBJECTIVES:

This course will introduce students to the fundamental aspects and principles of structural systems in buildings, reinforce and advance the material and method systems that correspond to building structures, advance the understanding and relationships between design principles and environmental context, and examine more advanced digital design tools, methodologies and means of representation.

- Understand the fundamental aspects of building structural systems

- Examine the material relationship of building structure and tectonic and spatial systems
- Reinforce the relationship between design thinking and environmental factors
- Understand at an intermediate level the role and relationship of digital design tools to design projects
- Introduce the principles of parametric design operations and their application as a design method to targeted design projects

NAAB Student Performance Criteria

Primary Location for Student Performance Criteria

- None

Secondary Location for Student Performance Criteria

- B.5 Structural Systems
- B.6 Environmental Systems

Materials and Methods Module (weeks 1-4)
This module continues the hands-on investigations with materials at a 1:1 scale and the implications of material decisions on design work. This module will expand Materials/Methods module from the preceding Building Technology course more carefully examining the framed-based material systems, such as wood, timber and steel construction, as well introducing the principles of roof systems and water shedding/intrusion.

Environmental Technology Module (weeks 4-9)
Taught in conjunction with the Design 5 studio and building on the conceptual foundations of environmental technology content taught in Integrated Building Technology 1, this module expands environmental technology topics to include the architectural integration of heat gain and loss through building envelope, and further develops natural ventilation and passive heating and cooling strategies within the context of different climatic environments. Additionally, the relationship of building to site is introduced with the following topics: site analysis and microclimate, storm water and hydrology, local and regional ecosystems. Finally, the principles of daylight and its integration with architectural design through objective analyses and design guides are discussed.

Structural Technology Module (weeks 10-16)
Taught in conjunction with Design Studio 5, this module introduces the foundational concepts and basic calculations of structural mechanics, and the way these principles ties to material systems. The module will be taught over 5 weeks and covers the deployment of common structural elements including: foundations, columns, bearing walls and beams, roof and floor structures (1-way and 2-way spanning systems), and long-span structures. It also introduces the role of different structural forces, how they are diagrammed, and how they are calculated. As such, this module aims to develop preliminary skills for assessing and designing appropriate structural strategies that complement design intent.

COURSE TEXTS AND READINGS:

Materials and Methods Module:
Selected readings will be provided through library reserve and/or in download format from the course Canvas site
Required text: None
Recommended texts for further study:

Fundamentals of Building Construction: Materials and Methods; Sixth Edition; Edward Allen and Joseph Iano; Wiley; 2014; ISBN 978-1-118-13891-5
Building Construction Illustrated; Sixth edition; Hoboken, Francis Ching; John Wiley; 2020; ISBN 978-1119583080

Environmental Technology Module:
Selected readings will be provided in download format from the course Canvas site
Required text: None
Recommended texts for further study:

Mechanical and Electrical Equipment for Buildings 13th Edition. Walter T. Grondzik and Alison G. Kwok, Wiley, 2014.
Banham, Reyner. The Architecture of the Well-Tempered Environment, 2nd Edition. University of Chicago, Chicago: 1984.
Brown, G. Z. Sun, Wind, and Light. John Wiley and Sons, Inc., New York: 1985.

Fitch, James Marston and William Bobenhausen. American Building: The Environmental Forces That Shaped It. Oxford University Press; Subsequent edition (May 6, 1999).
Givoni, B. Man, Climate and Architecture. Second Edition, Van Nostrand Reinhold, New York. 1969 and 1976.
Heschong, Lisa, Thermal Delight in Architecture, MIT press. 1979. Lechner, Norbert, Heating Cooling Lighting: Design Methods for Architects, John Wiley and Sons, New York
Olgyay, Victor. Design With Climate. Van Norstrand Reinhold, New York: 1992.
McDonough, William and Braungart, Michael. Cradle to Cradle: Remaking the Way We Make Things. North Point Press, New York, 2002.
Bachelard, Gaston. The Psychoanalysis of Fire. Beacon Press. 1987
Ackerman, Diane. A Natural History of the Senses. Random House, LLC, 2011
Ramsey and Sleeper. Architectural Graphic Standards. American Institute of Architects, 12th Edition (any previous addition also good)
ASHRAE. 2017 ASHRAE Handbook – Fundamentals. Ashrae; Har/Cdr edition (June 5, 2017)
NFPA Fire Protection Handbook National Fire Protection Association.
Environmental Control Systems: Heating, Cooling, Lighting; Illustrated Edition; Fuller Moore; McGraw-Hill, Inc.; 1993; ISBN 978-0070428898
Heating Cooling Lighting: Sustainable Design Methods for Architects; Third Edition; Norbert Lechner; Wiley; 2008; ISBN 978-0470048092

Structural Technology Module

Selected readings will be provided via the course Canvas site.
Required Text: None
Recommended texts for further study:

Structures; Seventh Edition; Daniel L. Schodek and Martin Bechthold; Pearson; 2013; ISBN978-0132559133
Structures as Architecture: A Sourcebook for Architects and Structural Engineers; Second Edition; Andrew W. Charleson; Routledge; 2015; ISBN 978-415644594

WEEKLY SCHEDULE:

	Week	Date	Readings	Class topic
Materials & Methods	1	8/22	Junk Space	Encountering Materials 1:1
	2	8/27	Lecture Notes	Frames & Lattice Intro
		8/29	Lecture Notes	Introduction to Building Envelopes
	3	9/3	Lecture Notes	Foundations
		9/5	Lecture Notes	Roofs
	4	9/10	Lecture Notes	Reading Drawings: Construction Logics

	Week	Date	Readings	Class topic
Environmental Technology	4	9/12	Lecture notes	Introduction + Passive heating/cooling systems
	5	9/17	Module reading + Lecture Notes	Solar Radiation and Sun Shading
		9/19	Lecture notes	Passive Design Tools – Hot and Humid Climates
	6	9/24	Lecture notes	Passive Cooling Strategies Passive Heating Strategies
		9/26	Lecture notes	Intro to HVAC and Thermal Zoning Active Heating Systems

	7	10/01	Lecture notes	Refrigeration and Active Cooling Systems Heat Loss and Heat Gain
		10/03	Lecture notes	Schematic HVAC Design & Cooling Distribution Campus and District Cooling Systems
	8	10/08	Lecture notes	Life Safety – Famous Fires and NFPA Life Safety – Theory and Practice
		10/10	Lecture Notes	Fire Detection and Suppression Environmental Quality and Resource Stewardship
	9	10/15	Lecture Notes	Water Supply and Distribution (plumbing) Waste Water, reclamation, and discharge
		10/17	Lecture Notes	Review for Test.

	Week	Date	Readings	Class topic
Structural Technology	10	10/22	Schodek Ch. 1	Fundamentals: Forces and Shapes
		10/24	Ch. 2	Fundamentals: Forces and Behavior
	11	10/29	Ch. 2, 16	Fundamentals: Loads and distribution
		10/31	-	Fundamentals: Review
	12	11/05	-	Fundamentals Exam (no lecture)
		11/07	Ch. 13	Structural Systems: logics and geometries
	13	11/12	Ch. 15	Structural Systems: Frames
		11/14	Ch. 6-7	Structural Systems: Spans
	14	11/19	Ch. 5, 9 ,14	Structural Systems: Heavy + Porous
		11/21	Ch. 5, 9 ,14	Structural Systems: the exceptional
	15	Thanksgiving Holiday Week – No Classes		
	16	12/03	-	Review
		12/06	Reading Day	No Classes
	17	FINALS WEEK		December 12 (via Canvas)

COURSE EVALUATION/GRADING

Students will be responsible for the material in the reading assignments as well as the course lectures and laboratory sessions. There will be a range of project assignments and may include both individual and group work. Assignments will ask students to apply knowledge of class material in two potential forms; topic-specific lab assignments relative to direct coursework which will correspond with module topics, and synchronous assignments that complement concurrent, studio-based design projects.

Materials/Methods Module (weeks 1-4):

Material/Methods assignments will focus on an overview of primary material systems with specific emphasis on steel, foundations and questions of how material systems engage ground, primary questions of enclosure including roofs, and an investigation of details, and other content relative to the Materials/Methods Module.

Environmental Technology Module: (weeks 4-9):

Environmental Technology assignments will expand the fundamentals of environmental systems and corresponding impacts to preliminary design and construction logics. Students will be expected to complete specific assignments, labs, and quizzes. The Environmental Technology will include one exam, quizzes, and labs as part of the graded materials. The exam will be scheduled for the laboratory period of week 10, and will include terminology, processes, general knowledge, and the ability to make correct judgments for particular scenarios that have been presented in the labs and lectures relative to the Environmental Technology Module.

Structural Technology Module (weeks 10-16):

Structural Technology assignments will provide students the opportunity to understand the fundamental structural concepts, how they inform and are informed by material and design parameters, and how these concepts are integrated within the design process. Lab sessions will explore the concepts in lecture and develop these idea in a hands-on manner. Lab assignments will extend for a week, with final submission to be completed via Canvas. Some lab work may be done in groups. There will be two exams in Structures module. The first exam is scheduled for Tuesday, November 5 and will be held during lab hours (no lecture). This exam will focus on structural terminology, free body diagrams, and the calculation of forces and reactions. The second exam will be held during finals week (available via Canvas on December 12) and will revisit structural principles as applied through the case studies discussed during lecture and within lab.

Each module will be graded individually. The semester grade will be based on the following breakdown relative to content modules and final project. To pass the course, the cumulative course grade must be a 60% or better.

Summary Breakdown for Course Subject Weighting

Materials/Methods Module:	20%
Environmental Tech Module:	40%
Structural Tech Module:	40%
Total:	100%

Materials/Methods Module (weeks 1-4): 20% of course grade

Lab 1: Found Precedent – 10% of module grade
Lab 2a: Frames and Modeling – 25% of module grade
Lab 3a: Case Study 1 – 25% of module grade
Lab 4a: Case Study 2 – 25% of module grade
Summary Exam – 15% of module grade

Environmental Technology Module (weeks 1-10): 40% of course grade

Climate Passive Thermal Systems – 10% of module grade
Active heating/cooling fundamentals lab – 10% of module grade
Active heating/cooling sizing Assignment – 20% of module grade
Life Safety modules – 5% of module grade
Water and Waste – 5% of module grade
Quizzes – 10% of module grade
Exam (week 10) – 40% of module grade

Structural Technology Module (weeks 5-15): 40% of course grade

Exams: 30% (150 pts)
Exam 1: Fundamentals – 15% (75 pts)
Exam 2: Concepts and Applications – 15% (75 pts)
Lab Exercises: 50% (250 pts)
Lab 01: Elements, Joints, systems and loads – 10% (50 pts)
Lab 02: Calculating Loads (forces, reactions, distributions) – 10% (50 pts)
Lab 03: System selection and design – 10% (50 pts)
Lab 04: Trusses – 10% (50 pts)
Lab 05: Trusses (testing)…and revisited system selection – 10% (50 pts)
Case Study Reflections: 10% (50 pts)
Lab Attendance: 10% (50 pts)

Missing/Late Work

Specific expectations and assessment criteria will be included as part of each individual assignment in separate handouts. Missing or late work will be graded down at 10% of final assessed grade per day. Work submitted later than 5 days will not be graded. If an assessment is missing or late due to an excused absence (see Attendance section of syllabus), it needs to be completed in a timely manner. Specific submission deadlines will be coordinated by the module instructor.

Please note: Certain laboratory assignments or course experiences may not be able to be replicated and, if missed, will require specific arrangements to be coordinated with module Instructor.

UF Grading Policy

Information on UF's grading policy for assigning grade points can be found at the following location:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Grading Scale

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Numeric Grade	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	0-59
Quality Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0.0

ATTENDANCE

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: www.https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Additional details regarding attendance and accommodations are as follows. Attendance for all lectures, labs and/or workshops is mandatory and is recorded. Chronic absences and/or tardiness will have a negative impact on your grade. Tardiness of more than 20 minutes to any lab/lecture will be counted as an unexcused absence. Three or more unexcused absences may result in a full letter-grade reduction in the course. Four unexcused absences can result in failure of the course (see grade breakdown above). Materials covered in the lecture will be tested. If you must miss class, it is your responsibility to notify the instructors in a timely manner, as well as getting the assignments and notes from your classmates.

SHARED POLICIES

Course Evaluations:

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at gatorevals.aa.ufl.edu/public-results/ .

Regarding accommodations for students with disabilities

Students with disabilities requesting accommodations should first register with the University of Florida Disability Resource Center by providing appropriate documentation (352-392-8565, www.dso.ufl.edu/drc/). Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Academic Honesty

Students in the School of Architecture are expected to adhere to all University of Florida academic honesty policies. Failure to do so will result in lowered grades and/or referral to the University Honor Court. Since the University's policies are necessarily generalized, the School of Architecture further clarifies academic honesty within the specific setting of design education. The following acts are considered to be academic dishonesty:

1. Plagiarism/misrepresentation

There shall be no question of what your work is and what someone else's is. This applies to all aspects of student performance, including but not limited to

- CAD drawings and construction details
- design guidelines (written and graphic)
- design, planning, and management projects or portions of projects
- class reports and papers (again, both written and graphic information)

- any assignment where sole authorship is indicated, such as take-home tests, individual projects, etc.

Examples of inappropriate activities include:

- copying graphics for a report without crediting the original source
- representing someone else's work as your own (using existing CAD construction details, tracing drawings, etc.)
- allowing someone else to represent your work as his own

Given the collaborative nature of this course, interaction between students is desirable, but the intention and degree of assistance must be appropriate. For example, it is appropriate to discuss the assignment/method/software program/course materials—but it is not appropriate to solve or resolve a large portion of the project together, unless defined as such in the assignment.

The importance of precedent and learning from past works is a necessary part of most design processes. Again, it is the intent and degree of "borrowing" ideas that is at question.

Anything not original must be paraphrased and cited, or quoted; using accepted style formats such as APA, MLA, Chicago Manual of Style, etc. This includes information obtained from the Internet, public documents, graphics, and personal interviews as well as more traditional written sources. Proper crediting of all information that is not common knowledge is necessary for academic honesty as well as for professionalism. (For example, analysis drawings and/or text should cite the sources from which data was obtained so that if questions arise later, they can be quickly and accurately answered.)

2. Multiple submissions of the same or similar work without prior approval.
This course is intended to align with design studios toward concurrent lessons between both courses. In noting this, there will be moments when assignments and/or exercises for each class are expected to inform one another. In these instances, if course instructors understand and agree that you are doing an assignment associated with a specific topic, then doing similar work for two different classes is acceptable. It would be inappropriate to submit a single assignment for one class, then later submit the same assignment for another course if the instructors are expecting original work.

3. Falsifying information Examples include:

- misrepresenting reasons why work cannot be done as requested
- changing or leaving out data, such as manipulating statistics for a research project, or ignoring/hiding inconvenient but vital site information. (However, for educational purposes only, certain aspects of the "real world" may be jointly agreed upon as not being pertinent to the academic goals of the course, such as not dealing with specific project parameters or budget, changing the program, etc.)
- altering work after it has been submitted
- hiding, destroying, or otherwise making materials unavailable (hiding reference materials, not sharing materials with other students, etc.)

Counseling + Emergency Contacts

Police / Fire / Medical Emergency – 911
U Matter, We Care, 294-2273; http://www.umatter.ufl.edu
Sexual Violence: 392-5648 or 392-1111 after hours, confidential reporting
University Counseling Center, 301 Peabody Hall, 392-1575; https://counseling.ufl.edu
University of Florida Student Health Care Center, 392-11671; https://shcc.ufl.edu
University of Florida Dean of Students, 392-1261, after hours: 392-1111 (ask for on-call staff); https://dso.ufl.edu

Alachua County Victim Services and Rape Crisis Center (24hrs/day); 264-6760
Alachua County Crisis Center (24 hrs/day), 264-6789