UNIVERSITY OF FLORIDA – College of Design Construction and Planning
School of Architecture- Fall 2025

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:

Structural Technology Module (weeks 1-6):
Nawari Nawari
Office: AH 254
Contact: nnawari@ufl.edu
Phone: (352) 392-4836
Office Hours: Tues/Thurs 1pm-2pm or by appointment

Environmental Technology Module (weeks 6-11):
Hassan Azad
Office: AH 230
Contact: h.azad@ufl.edu
Phone: (352) 392-4836
Office Hours: Tuesday 1pm-2pm and by appointment.
Tuesday 9:30pam-10:30am

Materials & Methods of Construction Module (weeks 11-16):
Peter Sprowls
Office: AH 232
Contact: peter26@ufl.edu
Phone: (352) 392-4836
Office Hours: Tues 10:30 pm - 12:30 pm and by appointment

Graduate Teaching Assistants:
Sections 20197; 20194 – Alexandra Yudow (ayudow@ufl.edu)
Sections 20196; 20193 – Eric Rykard (erykard@ufl.edu)
Sections 20199; 20195 – Sarah Spayd (sarahspayd@ufl.edu)

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

Structural Technology Module (weeks 1-6)

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.

Environmental Technology Module (weeks 6-11)

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, 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.

Materials and Methods Module (weeks 11-16)
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.

COURSE TEXTS AND READINGS:

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
Shaping Structures: Statics Waclaw Zalewski and Edward Allen , ISBN: 0-471-16968
Building Structures: Nawari O. Nawari & M. Kuenstle, University Readers, Inc. & Cognella Academic Publishing, ISBN: 978-1-60927-673-7.
Building Construction Illustrated: Ching, Francis D. K.. Fourth or fifth edition, 2014. Print.
Fundamentals of Building Construction: Materials and Methods.: Allen, Edward, and Joseph Iano. Sixth edition, Wiley, 2014. ISBN 978-1-118-13891-5

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

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

WEEKLY COURSE SCHEDULE: (tentative – dates and/or content may be subject to change)

	Week	Date	Readings	Class topic
Structural Technology	1	8/21	Lecture notes + Schodek Ch. 1	Introduction; and Forces and Systems and Equilibrium
	2	8/26	Lecture notes + Schodek Ch. 2	Introduction; and Forces and Force Systems and Equilibrium
		8/28	Lecture notes + Schodek Ch. 2 and 16	Soils and Foundations; Load Path: Vertical Forces
	3	9/2	Lecture notes + Schodek Ch. 3, 8 and 9	Lateral Forces and Stability;
		9/4	Lecture notes + Schodek Ch. 5 and 8	Long span structures (Cables, Arches, Trusses, shells, ..etc.);
	4	9/9	Lecture notes + Schodek Ch. 5 and 8	Long span structures (Cables, Arches, Trusses, shells, ..etc.);
		9/11	Lecture notes	Strength of Materials
	5	9/16	Lecture notes	Beams
		9/18	Lecture notes	Columns
	6	9/23	Lecture notes	Final Project

	Week	Date	Readings	Class topic
Environmental Technology	6	9/25	Lecture notes	Course Intro Solar Geometry & Radiation
	7	9/30	Lecture Notes	Psychrometry & Thermal Comfort Thermal Comfort Digital Tools
		10/2	Lecture notes	Heat Flow Principles Indoor Air Quality
	8	10/7	Lecture notes	Building Envelope Heat Loss & Gain
		10/9	-	Class trip to Charleston
	9	10/14	Lecture notes	Passive Heating Strategies
		10/16	Lecture notes	Passive Cooling Strategies
	10	10/21	Lecture notes	Active Heating & Cooling Fundamentals
		10/23	Lecture Notes	Active Heating & Cooling Design I
	11	10/28	Lecture Notes	Active Heating & Cooling Design II

	Week	Date	Readings	Class topic
Materials & Methods	11	10/30	Junk Space	Encountering Materials 1:1
	12	11/4	Lecture Notes	Frames & Lattice Intro
		11/6	Lecture Notes	Introduction to Building Envelopes
	13	11/11	Veterans Day	No Classes
		11/13	Lecture Notes	Foundations
	14	11/18	Lecture Notes	Roofs
		11/20	Lecture Notes	Reading Drawings: Construction Logics
	15	Thanksgiving Holiday Week – No Classes		

	16	12/02	Design Reviews	No Classes
		12/04	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.

Structural Technology Module (weeks 1-6):

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 this 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 case studies that aim at integrating different principles learned throughout the module.

Environmental Technology Module: (weeks 6-11):

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 a project. The Environmental Technology module will include four homework assignments as part of a project and four individual labs as in-class activities as part of the graded materials. The project will be an exercise for students to evaluate 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.

Materials/Methods Module (weeks 11-16):

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.

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 60% or better.

Summary Breakdown for Course Subject Weighting

Structural Tech Module:	36%
Environmental Tech Module:	36%
Materials/Methods Module:	20%
Attendance	08%
Total:	100%

Structural Technology Module (weeks 1-6): 36% of course grade

Lab & Class Exercises: 70% (350 pts)

Lab 01:: 10% (50 pts); CW 01 (10pts)
Lab 02:: - 10% (50 pts); CW 02(10 pts), CW03(10 pts)
Lab 03: – 10% (50 pts); CW04 (10 pts), CW05(10 pts)
Lab 04: – 10% (50 pts); CW06 (10 pts), CW07(10 pts)
Lab 05: – 10% (50 pts); CW08(10 pts), CW09(20pt)

Final Project: 30% (150 pts)

Environmental Technology Module (weeks 6-11): 36% of course grade

Lab Exercises: 40% (200 pts)

Lab 01: Solar Radiation & Sun Shading – 10% (50 pts)
Lab 02: Thermal Comfort Tools – 10% (50 pts)
Lab 03: Heat Loss – 10% (50 pts)
Lab 04: Heat Gain – 10% (50 pts)

Project: 60% (300 pts)

HW 01: Passive Design – 15% (75 pts)
HW 02: Thermal Zoning – 15% (75 pts)
HW 03: Whole Building Energy Modeling – 15% (75 pts)
HW 04: HVAC design – 15% (75 pts)

Materials/Methods Module (weeks 11-16): 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

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. 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. To pass the course, all modules must be completed at a passing level (60% or better) AS WELL AS the cumulative course grade.

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:	Percentage Range:		Grade Points:
A	100 %	to 94.0%	4.0
A-	< 94.0 %	to 90.0%	3.67
B+	< 90.0 %	to 87.0%	3.33
B	< 87.0 %	to 84.0%	3.0
B-	< 84.0 %	to 80.0%	2.67
C+	< 80.0 %	to 77.0%	2.33
C	< 77.0 %	to 74.0%	2.0
C-	< 74.0 %	to 70.0%	1.67
D+	< 70.0 %	to 67.0%	1.33
D	< 67.0 %	to 64.0%	1.0
D-	< 64.0 %	to 61.0%	0.67
F	< 61.0 %	to 0.0%	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 accommodation 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

The Office of Accreditation, Assessment, and Curriculum has created a go-link that should be included in the UF syllabi. This link will directs students to a separate webpage that will provide all required academic policies, such as attendance, grading, DRC, and evaluation verbiage, as well as campus academic, health, and wellness resources. Please see below for the link: https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/