

ARC 2491c. Integrated Building Technology I
SYLLABUS

GENERAL COURSE INFORMATION:

Total Credits: 3
Prerequisites: Completion of: ARC2490c Introduction to Building Technology
Class Meetings: Tues – [Lecture] CSE A101 periods 6-7 (12:50 PM - 2:45 PM)
Thurs – [Labs] ARC 216, 218, 220, periods 4-5 (10:40 AM - 12:35 PM) or
6-7 (12:50 PM - 2:45 PM)

Instructors:

Environmental Design Module: Weeks 1-5

Ryan Sharston
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Office Hours: Tuesdays, 3 PM – 5 PM

Digital Media Module: Weeks 6-9

Mani Karami
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Office Hours: T, 10 AM - 12 PM

Materials and Methods Module: Weeks 11-15

Yohan Kim
Office: 244
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Office Hours: F 3pm-5pm and by appt.

GTAs: ARC 216 – Colby Todd – colby.todd@ufl.edu, availability outside class TBA
ARC 218 – Sarah Spayd – sarahspayd@ufl.edu, availability outside class TBA
ARC 220 – Noelle Smith – noelle.smith@ufl.edu, availability outside class TBA

COURSE DESCRIPTION:

As the second course in a multi-year integrated building technology sequence, there will be an emphasis on further developing components of materials and methods and digital design through two, 5-week modules. Further, a third 5- week module will introduce fundamental aspects of environmental design, with the overarching intent to increase the students' understanding of the impact and/or relationships between context, building technologies, and design decisions.

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 METHODOLOGY:

This course will cover a range of topics and will be delivered in focused, topical modules.

Environmental Technology Module (weeks 1-5)

Taught in conjunction with the Design 4 studio, Integrated Technology I provides a general introduction to climatology, and passive thermal response with particular emphasis on the context differing climates and locations. The topics of solar geometry, shading devices, and building orientation are covered. The topics of indoor air quality

and natural ventilation, and the principles of heat flow and characteristics of thermal mass are introduced.

Digital Media Module (weeks 6-9)

This module is a focused five-week segment designed to complement and enhance your studio work by developing your skills in architectural representation using both Lumion and Grasshopper. The first three weeks will cover the basics of 3D architectural visualization with Lumion, focusing on creating visualizations that communicate core design ideas, spatial qualities, and conceptual depth. The final two weeks will introduce Grasshopper in Rhino, a parametric design tool that enables dynamic exploration of architectural forms and systems. Together, these tools bridge the gap between digital representation and design intent, guiding you to produce thoughtful and compelling representations of your projects.

Materials and Methods Module (weeks 11-15)

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 offer an introduction to various material systems, with particular emphasis on mass-based systems, such as concrete and masonry, as well as an initial examination of lattice and/or frameworks.

Content Delivery: The modules will be composed of three different methods of content delivery.

- Lectures: Lectures will present the overarching content and issues to the class as a whole. These will be led by module instructors. Student attendance is expected.
- Labs: Lab sessions provide an opportunity to examine, discuss and understand content covered in each module in a more hands-on manner. Specific lab assignments will vary per module.
- Workshops: Workshops consist of brief intensive sessions to study specific topics within a module. Workshops will occur during lab sessions and may include group work, to better facilitate hands-on learning.

COURSE OBJECTIVES:

As the second course in a multi-course sequence, This course will build upon the skills and knowledge introduced in ARC 2490c Introduction to Building Technology, advancing the students understanding of fundamental aspects of building material systems and digital design tools, methodologies and means of representation. Further, this course will introduce the fundamental relationship of climate and context in the design process.

- Understand and advance fundamental aspects of building material systems
- Understand and advance the role and relationship of digital design tools to design projects
- Apply digital design methods to targeted design projects
- Understand the spatial and tectonic relationships of design in the digital realm
- Further Develop skills in digital representation methods and output
- Introduce the principles of context, solar orientation, heat gain and thermal comfort

COURSE TEXTS AND READINGS:

Environmental Technology Module:

Required Text:

[Heating, Cooling, Lighting: Sustainable Design Strategies Towards Net Zero Architecture](#), 5th Edition; Norbert M. Lechner, Patricia Andrasik, ISBN: 978-1-119-58574-9; Wiley; 2021

Recommended Texts:

[The Green Studio Handbook: Environmental Strategies for Schematic Design](#); 3rd Edition; Alison G Kwok, Walter Grondzik; ISBN 9781138652293; Routledge; 2018

[Mechanical and Electrical Equipment for Buildings](#), 13th Edition; Grondzik & Kwok; Wiley; 2019; ISBN 978-1-119-49263-4 (Available online at [UF Library Systems](#))

American Building: The Environmental Forces That Shape It, by James Marston Fitch, William

Bobenhausen, Oxford University Press; Revised and Updated edition; 1999

Digital Media Module:

Required Text: None; Computer Requirements: Lumion, Please refer to SoA Computing Requirements on Canvas

Materials and Methods Module:

Required Text:

Fundamentals of Building Construction: Materials and Methods; Seventh Edition; Edward Allen and Joseph Iano; Wiley; 2019; ISBN 978-1-119-45025-2 (Available **online** at UF George A. Smathers Libraries)

Recommended Texts:

Building Construction Illustrated, 5th Edition; Ching, Francis D. K. J. Wiley and Sons; 2014; ISBN: 978-1-118-45834-1 (Available **online** at UF George A. Smathers Libraries)

The Architecture Reference & Specification Book, Julia McMorrough; Rockport; 2018 ISBN 9781631593796 (Available **online** at UF George A. Smathers Libraries)

COURSE SCHEDULE & TOPICS (subject to shift):

	Week	Date	Readings	Class Topic
Environmental Technology Module	01 ENV	01/13+15	N. M. Lechner, Ch.1	Syllabus + Intro to ET + Passive Principles
	02 ENV	01/20+22	N. M. Lechner, Ch.5	Psychrometrics + Thermal Comfort
	03 ENV	01/27+29	N. M. Lechner, Ch.3 & 5	Thermal Comfort + Heat Flow
	04 ENV	02/03+05	N. M. Lechner, Ch.4 & 6	Climate + Solar Geometry
	05 ENV	02/10+12	N. M. Lechner, Ch. 6	Solar Shading
	Due	02/18		Sun Shading Project

	Week	Date	Readings	Class Topic
Digital Media Module	01 DIG	2/17+19	Refer to Schedule PDF	Rendering Fundamentals, Lumion Part 1
	02 DIG	2/24+26	Refer to Schedule PDF	Lumion Part 2
	03 DIG	3/3+5	Refer to Schedule PDF	Rhino Surface Modeling / GH Intro.
	04 DIG	3/10+12	Refer to Schedule PDF	Rhino Surface Modeling / Grasshopper

Spring Break

	Week	Date	Readings	Class Topic
Materials/ Methods Module	11 MM	3/24+26	Allen/Iano Ch.1+13	Overview, Issues of Mass, Stereotomic Const.
	12 MM	3/31+4/2	Allen/Iano Ch.14+15	Concrete
	13 MM	4/07+09	Allen/Iano Ch.8	Masonry
	14 MM	4/14+16	Allen/Iano Ch.9	Masonry
	15 MM	4/21	Allen/Iano Ch.11+12	Framework, Space, and Hierarchy
	16	TBD		MM Exam

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, and synchronous assignments that complement concurrent, studio-based design projects.

Environmental Technology Module (weeks 1-5):

Environmental Technology assignments will examine how fundamental relationships between of climate, context and design thinking/response through targeted assignments and/or workshops. These assignments include a small project through which the students design and build a mock-up of a shading device and assess its performance using heliodon method. This module will include a summary exam, in addition to assignments. This exam will include terminology, strategies for heat and indoor air quality, and other content covered during this module.

Digital Media Module (weeks 6-9):

By the end of this module, you will produce a final representation that balances rendering and linework, showcasing the layered complexity of your design. This representation will highlight key spatial moments and relationships, demonstrating your ability to use digital tools critically and creatively. Final representations will take the form of collages, balancing rendered elements (approximately 40%) with linework and other techniques (60%). The emphasis will be on storytelling through speculative renderings that represent the spatial, tectonic, and conceptual qualities of your design, avoiding static or overly polished visuals.

Material and Methods Module (weeks 11-15):

Assignments will expand the fundamentals of material systems and corresponding impacts to preliminary design and construction logics. Students will be expected to complete specific assignments and/or workshops. This module will include a summary exam as part of the graded materials. This exam will include terminology, construction/material identification, and other content covered during this 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 a 60% or better.**

Summary Breakdown for Course:

Attendance + Participation	10% of course grade
Materials/Methods Module:	30% of course grade
Environmental Tech Module:	30% of course grade
<u>Digital Media Module:</u>	<u>30% of course grade</u>
Total:	100%

Environmental Technology Module (weeks 1-5): 30% of course grade

Lab assignments

Psychrometry Lab Assignment – 6%

Environmental Design Lab Assignment – 6%

Solar Geometry Lab Assignment – 6%

Solar Shading Project – 12%

Digital Media Module (weeks 6-9): 30% of course grade

Weekly Lab assignments/Homework – 14%

Module Project Weekly Updates – 6%

Module Project – 10%

Materials/Methods Module (weeks 11-15): 30% of course grade

Lab assignments – 10%

Assignments/Precedent Analysis – 10%

Summary Exam – 10%

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

Note: grades will be rounded down to the nearest whole percentage.

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.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:

UF Academic Policies and Resources

For additional UF "Academic Policies & Resources," go to: <https://go.ufl.edu/syllabuspolicies>. These resources include information about:

- Requirements for class attendance, make-up exams, and assignments
- Processes for students with disabilities who may require accommodations
- Current UF grading policies
- Expectations for course evaluations and constructive feedback
- The University's Honesty Policy regarding cheating, plagiarism, etc.
- In-class recording of class lectures for personal use
- Academic resources, including contact information
- Campus health and wellness resources, including contact information

Discussing difficult topics objectively and without endorsement

People learn best when they are encouraged to ask questions and express their diverse opinions on course content which may include images, texts, data, or theories from many fields. This is especially true in courses that deal with provocative or contemporary issues. UF offers many such courses, in which students encounter concepts of race, color, sex, and/or national origin. We teach these important issues because understanding them is essential for anyone who seeks to make economic, cultural, and societal contributions to today's complex world.

With this in mind, we do not limit access to, or classroom discussion of, ideas and opinions-including those that some may find uncomfortable, unwelcome, disagreeable, or even offensive. In response to challenging material, students and instructors are encouraged to ask honest questions and thoughtfully engage one another's ideas. But hostility, disruptive and disrespectful behavior, and provocation for provocation's sake have no place in a classroom; reasonable people disagree reasonably.

These guidelines can help instructors and students as they work together to fulfill the mission of the University of Florida, which includes the exploration of intellectual boundaries, the creation of new knowledge and the pursuit of new ideas.

The following summary of Florida HB7 (2022) is provided for additional information and context:

HB 7 – Individual freedom

“(4)(a) It shall constitute discrimination on the basis of race, color, national origin, or sex under this section to subject any student or employee to training or instruction that espouses, promotes, advances, inculcates, or compels such student or employee to believe any of the following concepts:

- 1. Members of one race, color, national origin, or sex are morally superior to members of another race, color, national origin, or sex.*
- 2. A person, by virtue of his or her race, color, national origin, or sex is inherently racist, sexist, or oppressive, whether consciously or unconsciously.*
- 3. A person's moral character or status as either privileged or oppressed is necessarily determined by his or her race, color, national origin, or sex.*
- 4. Members of one race, color, national origin, or sex cannot and should not attempt to treat others without respect to race, color, national origin, or sex.*
- 5. A person, by virtue of his or her race, color, national origin, or sex bears responsibility for, or should be discriminated against or receive adverse treatment because of, actions committed in the past by other members of the same race, color, national origin, or sex.*
- 6. A person, by virtue of his or her race, color, national origin, or sex should be discriminated against or receive adverse treatment to achieve diversity, equity, or inclusion.*
- 7. A person, by virtue of his or her race, color, sex, or national origin, bears personal responsibility for and must feel guilt, anguish, or other forms of psychological distress because of actions, in which the person played no part, committed in the past by other members of the same race, color, national origin, or sex.*
- 8. Such virtues as merit, excellence, hard work, fairness, neutrality, objectivity, and racial colorblindness are racist or sexist, or were created by members of a particular race, color, national origin, or sex to oppress members of another race, color, national origin, or sex.*

(b) Paragraph (a) may not be construed to prohibit discussion of the concepts listed therein as part of a larger course of training or instruction, provided such training or instruction is given in an objective manner without endorsement of the concepts.”