

- 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

Digital Media Module (weeks 1-5)

Taught in conjunction with the Design 5 studio and building on foundational skills taught in Introduction to Building Technologies (Arch 2490C) and Integrated Building Technology I (Arch 2491C), this module introduces advanced digital modeling techniques, introductory parametric design methodologies, and basic environmental analysis software plugins for site and design evaluation. Additionally, the module covers advanced topics in 3D architectural visualization and rendering.

Environmental Technology Module (weeks 1-10)

Taught in conjunction with the Design 5 studio, and building on the conceptual foundations of environmental technology content taught in Integrated Building Technology I (Arch 2491C), 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 5-15)

Taught in conjunction with Design Studio 5, this module introduces the foundational concepts and basic calculations of structural mechanics and materials. The module will be taught over 10 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. This module aims to develop skills for assessing and designing appropriate structural solutions to support design intent.

Materials and Methods Module (weeks 10-15)

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 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:

Digital Media Module:

Required Text: None

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 Nostrand 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

Required Text:

Structures as Architecture: A Sourcebook for Architects and Structural Engineers; Second Edition; Andrew W. Charleson; Routledge; 2015; ISBN 978-415644594

Materials and Methods Module 3

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 978-1-119583080

COURSE SCHEDULE:

	Week	Date	Readings	Class topic
Digital Media + Environmental Technology	1 DIG	8/24	XX	Rhino Advanced: Paneling Tools, Sweep
	1 ENV		XX	Classes not started
	2 DIG	8/29	XX	GH: Attractor Field Logics and Bitmap Mapping 2D Fabrication
	2 ENV		XX	Introduction + Passive heating/cooling systems
	3 DIG	9/5	XX	GH: Ladybug Environmental Analysis
	3 ENV		XX	Holiday – no class meeting
	4 DIG	9/12	XX	V-Ray for Rhino Advanced: Environment and Camera, Render Elements and Compositing
	4 ENV		XX	Climate and passive responses hot humid Intro to HVAC, IAQ, and Thermal Zoning
	5 DIG	9/19	XX	V-Ray for Rhino Advanced: Materials and Textures, Lighting, Proxy Objects

	5 ENV		XX	Active Heating Systems Active Cooling and Refrigeration
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Environmental Technology + Structural Technology	Week	Date	Readings	Class topic
	6 ENV	9/26	XX	Heat Gain – Cooling Load Schematic HVAC Design & Cooling Distribution
	6 STR		Ch. 1	Fundamentals: Forces and Shapes
	7 ENV	10/3	XX	Campus and District Cooling Systems Life Safety – Famous Fires and NFPA
	7 STR		Ch. 2	Fundamentals: Forces and Behavior
	8 ENV	10/10	XX	Environmental Life Safety Systems Fire Detection and Suppression
	8 STR		Ch. 2, 16	Fundamentals: Elements & Joints
	9 ENV	10/17	XX	Environmental Quality and Resource Stewardship Water Supply and Distribution (plumbing)
	9 STR		Ch. 3	Fundamentals: Loads
	10 ENV	10/24	XX	Waste Water, reclamation, and discharge Review for Test.
	10 STR		N/A	Fundamentals Exam
	Week	Date	Readings	Class topic
Structural Technology + Materials/ Methods	11 STR	10/31	Ch. 13	Systems: The Building Assembly – Frames and Logic
	11 MM		TBD	Ground and Materials
	12 STR	11/7	Ch. 15	Systems: Foundation and Enclosure
	12 MM		TBD	Steel Systems I – Primary Frames
	13 STR	11/14	Ch. 6, 7	Spaces: Heavy vs. Porous
	13 MM		TBD	Moving water: Water Tightness and Intrusion
	14 STR	11/21	Ch. 5, 9, 14	Spaces: Tall
	14 MM		TBD	On Details
	15 STR	11/28	Ch. 4, 10	Spaces: Wide
	15 MM		TBD	Review
	16	READING WEEK		NO CLASSES
17	FINALS WEEK		FINAL	

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.

Digital Media Module: (weeks 1-5):

Digital Media assignments will expand on previous digital coursework and focus on further refinement of digital geometries, methodologies, and representational techniques through a series of lab assignments, incorporating parametric design methods, software and plugins. The module culminates in summery digital project consisting of targeted graphics and 3D visualization that applies the techniques covered in the course.

Environmental Technology Module: (weeks 1-10):

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 6-15):

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. Students are expected to complete specific assignments and workshops. There will be two exams in this module, scheduled for weeks 10 and 17. These exams will include terminology, structural assessment and calculations, and other content relative to the Structural Technology Module.

Materials/Methods Module (weeks 10-15):

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 a 60% or better.**

Summary Breakdown for Course

Digital Media Module:	17%
Environmental Tech Module:	33%
Structural Tech Module:	33%
<u>Materials/Methods Module:</u>	<u>17%</u>
Total:	100%

Digital Media Module (weeks 1-5): 17% of course grade

- Grasshopper 2D Panelling Assignment – 30% of module grade*
- Advanced V-Ray/Rhino Materials Assignment – 20% of module grade*
- Advanced V-Ray/Rhino Composite Image Assignment – 20% of module grade*
- Grasshopper Ladybug Assignment – 30% of module grade*

Environmental Technology Module (weeks 1-10): 33% 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): 33% of course grade

- Quizzes and In-Class Exercises – 10% of module grade*
- Exam 1: Fundamentals – 15%*
- Case Study Presentation – 15%*
- Lab: Elements & Joints – 5%*
- Lab: Calculating Loads – 5%*
- Lab: Column Grids – 5%*

Lab: System Selection/Design - 5%
 Lab: Foundation Design – 5%
 Lab: Material Speculation – 5%
 Lab: Roofing and Spans – 5%
 Lab: Truss Day – 5%
 Lab: Enclosure – 5%
 Exam 2: Comprehensive – 15%

Materials/Methods Module (weeks 10-15): 17% of course grade

Group Stair Assignment 1 – 20% of module grade
 Group Stair Assignment 2 – 20% of module grade
 Group Stair Assignment 3 – 20% of module grade
 Group Stair Assignment 4 – 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.

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:

I. 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 aligned with design studios with the intent of establishing 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