

Cover Sheet: Request 14552

ARC3XXX Integrated Building Technology 2

Info

Process	Course New Ugrad/Pro
Status	Pending at PV - University Curriculum Committee (UCC)
Submitter	Mark Mcglothlin mmcglath@ufl.edu
Created	12/15/2019 2:10:44 PM
Updated	1/13/2020 9:54:16 PM
Description of request	ARC3XXX Integrated Building Technology 2 is the third of a multiple course sequence. This course will replace two existing 3-credit courses; ARC3505 Introduction to Structures and ARC3610 Environmental Technology 1.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	DCP - Architecture 011502000	Mark Mcglothlin		12/15/2019
No document changes					
College	Approved	DCP - College of Design, Construction and Planning	Abdol Chini		12/19/2019
No document changes					
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			12/19/2019
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

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Submitter: Mark Mcglothlin mmcglath@ufl.edu

Created: 1/14/2020 11:45:57 AM

Form version: 5

Responses

Recommended Prefix ARC

Course Level 3

Course Number XXX

Category of Instruction Intermediate

Lab Code C

Course Title Integrated Building Tech 2

Transcript Title Integrated Tech 2

Degree Type Baccalaureate

Delivery Method(s) On-Campus

Co-Listing No

Effective Term Earliest Available

Effective Year Earliest Available

Rotating Topic? No

Repeatable Credit? No

Amount of Credit 6

S/U Only? No

Contact Type Regularly Scheduled

Weekly Contact Hours 6

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.

Prerequisites ARC2XXX Integrated Building Technology 1

Co-requisites ARC3320 Architectural Design 5

Rationale and Placement in Curriculum By teaching these topics as a series of interrelated 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

Course Textbook(s) and/or Other Assigned Reading Digital Media Module:

Required Text:

None

Environmental Technology Module 1-2:

Selected readings will be provided in the form of a course reader from:

Environmental Control Systems: Heating, Cooling, Lighting; Illustrated Edition; Fuller Moore; McGraw-Hill, Inc.; 1993; ISBN 978-0070428898

Required Text:

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

Fundamentals of Building Construction: Materials and Methods; Sixth Edition; Edward Allen and Joseph Iano; Wiley; 2014; ISBN 978-1-118-13891-5

Weekly Schedule of Topics Digital Media Module

Weeks 1-5

Week 1 Rhino Advanced: Paneling Tools, Sweep

Week 2 GH: Attractor Field Logics and Bitmap Mapping

Week 3 V-Ray for Rhino Advanced: Materials and Textures, Lighting, Proxy Objects

Week 4 V-Ray for Rhino Advanced: Environment and Camera, Render Elements and Compositing

Week 5 GH: Ladybug Environmental Analysis

Environmental Technology Module

Weeks 1-10

Week 1 Climates of the World

Week 2 Ecosystems

Week 3 Microclimates

Week 4 Tropical and Subtropical Building Concerns

Week 5 Site Analysis

Week 6

Active heating and cooling fundamentals

Week 7

Active heating and cooling system design

Week 8

Mechanical equipment and duct sizing

Week 9

Plumbing: Water and waste systems

Week 10

Building Energy Use

Structural Technologies Module

Weeks 6-15

Week 6

Structural Concepts

Week 7

Mechanics: Forces

Week 8

Mechanics: Stress and Deformation

Week 9

Structural Materials: Wood and Steel

Week 10

Structural Materials: Reinforced Concrete

Week 11

Soils and Foundations

Week 12

Column Design

Week 13

Beam Design

Week 14

Slab Systems: One-Way and Two-Way

Week 15

Long Span Structures

Materials/Methods Module

Weeks 11-15

Week 11

Ground and Materials

Week 12

Wood/Timber Systems

Week 13

Steel Systems 1 – Primary Frames

Week 14

Moving water: Water Tightness and Intrusion

Week 15

Roofing systems

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

Summary Breakdown for Course

Digital Media Module: 17%

Environmental Tech Module: 33%

Structural Tech Module: 33%

Materials/Methods Module: 17%

Total: 100%

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

Grasshopper 2D Panelling Assignment: 30% of module grade
Advanced VRay/Rhino Materials Assignment: 20% of module grade
Advanced VRay/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 Principles and Variations Assignment: 15% of module grade
Site Analysis Assignment: 10% of module grade
Daylight Analysis and Assignment: 15% of module grade
Exam 1 (week 5): 10% of module grade
Active heating/cooling fundamentals Assignment: 15% of module grade
Active heating/cooling sizing Assignment: 15% of module grade
Building Energy Use Assignment: 10% of module grade
Exam 2 (week 10): 10% of module grade

Structural Technology Module (weeks 5-15): 33% of course grade

Fundamental Structural Concepts Assignment: 5% of module grade
Mechanics/Forces Assignment: 10% of module grade
Stress and Deformation Assignment: 10% of module grade
Structure: Wood and Steel: 5% of module grade
Structure: Concrete: 5% of module grade
Exam 1: 15% of module grade
Soils/Structure Assignment: 5% of module grade
Structure: Column Design Assignment: 10% of module grade
Structure: Beam Design Assignment: 10% of module grade
Structure: Slab Design Assignment: 5% of module grade
Structure: Long Span Design Assignment: 5% of module grade
Exam 2: 15% of module grade

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

Ground/Foundation Assignment: 20% of module grade
Wood/Timber Design Assignment: 20% of module grade
Primary Steel Framing Assignment: 20% of module grade
Primary Enclosures Assignment: 20% of module grade
Summary Exam: 20% of module grade

Instructor(s) Digital Media Module: to be determined

Environmental Technology Module: to be determined

Structural Module: to be determined

Materials/Methods Module: to be determined

Attendance & Make-up Yes

Accommodations Yes

UF Grading Policies for assigning Grade Points Yes

Course Evaluation Policy Yes

ARC 3XXX. Integrated Building Technology 2
SYLLABUS

GENERAL COURSE INFORMATION:

Course times: TBD
Total Credits: 6
Prerequisites: Completion of: ARC2XXX Integrated Building Technology I
Class Room: TBD
Instructors: Digital Media Module (weeks 1-5):

Faculty Member 1
Office: XX
Contact: XX
Office Hours: XX

Environmental Technology Module (weeks 1-10):

Faculty Member 2
Office: XX
Contact: XX
Office Hours: XX

Structural Technology Module (weeks 6-15):

Faculty Member 3
Office: XX
Contact: XX
Office Hours: XX

Materials/Methods Module (weeks 10-15):

Faculty Member 4
Office: XX
Contact: XX
Office Hours: XX

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.

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

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 2XXX) and Integrated Building Technology I (Arch 2XXX), 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 2XXX), 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. Additionally, calculations and sizing procedures for soils and foundations and simple structural members in wood, steel and concrete are introduced.

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 the form of a course reader from:

Environmental Control Systems: Heating, Cooling, Lighting; Illustrated Edition; Fuller Moore; McGraw-Hill, Inc.; 1993; ISBN 978-0070428898

Required Text:

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

Fundamentals of Building Construction: Materials and Methods; Sixth Edition; Edward Allen and Joseph Iano; Wiley; 2014; ISBN 978-1-118-13891-5

COURSE SCHEDULE:

Digital Media + Environmental Technology	Week	Date	Readings	Class topic
	1 DIG	XX	XX	Rhino Advanced: Paneling Tools, Sweep
	1 ENV		XX	Building Envelope – Heat gain and heat loss
	2 DIG	XX	XX	GH: Attractor Field Logics and Bitmap Mapping 2D Fabrication
	2 ENV		XX	Passive heating/cooling systems
	3 DIG	XX	XX	GH: Ladybug Environmental Analysis
	3 ENV		XX	Site Analysis, microclimates and ecosystems
	4 DIG	XX	XX	V-Ray for Rhino Advanced: Environment and Camera, Render Elements and Compositing
	4 ENV		XX	Daylight – principles and design guides
	5 DIG	XX	XX	V-Ray for Rhino Advanced: Materials and Textures, Lighting, Proxy Objects
5 ENV	XX		Daylight – objective analysis	

Environmental Technology + Structural Technology	Week	Date	Readings	Class topic
	6 ENV	XX	XX	Active heating and cooling fundamentals
	6 STR		XX	Fundamental Structural Concepts
	7 ENV	XX	XX	Active heating and cooling system design
	7 STR		XX	Mechanics: Forces
	8 ENV	XX	XX	Mechanical equipment and duct sizing
	8 STR		XX	Mechanics: Stress and Deformation
	9 ENV	XX	XX	Plumbing: Water and waste systems
	9 STR		XX	Materials: Wood and Steel
	10 ENV	XX	XX	Building Energy Use
10 STR	XX		Materials: Reinforced Concrete	

Structural Technology + Materials/ Methods	Week	Date	Readings	Class topic
	11 STR	XX	XX	Soils and Foundations
	11 MM		XX	Ground and Materials
	12 STR	XX	XX	Column Design
	12 MM		XX	Wood/Timber Systems
	13 STR	XX	XX	Beam Design
	13 MM		XX	Steel Systems I – Primary Frames
	14 STR	XX	XX	Slab Systems: One-Way and Two-Way
	14 MM		XX	Moving water: Water Tightness and Intrusion
	15 STR	XX	XX	Long Span Structures
	15 MM		XX	Roofing systems
	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 and/or workshops. The Environmental Technology will include with two exams as part of the graded materials. These exams will be scheduled for the lecture period of week 5 and week 10, and will include terminology, construction/material identification, and other content 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 15. 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 examine how fundamental relationships between of climate, context and design thinking/response through targeted assignments and/or workshops. The Materials/Methods Module will include a summary exam, in addition to assignments. This exam will be scheduled for the lecture period of week 15 and will include terminology, passive strategies for heat and light, 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, all modules must be completed at a passing level (60% or better) AS WELL AS the cumulative course grade.**

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 VRay/Rhino Materials Assignment – 20% of module grade*
- Advanced VRay/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 Principles and Variations Assignment – 15% of module grade*
- Site Analysis Assignment – 10% of module grade*

Daylight Analysis and Assignment – 15% of module grade
Exam 1 (week 5) – 10% of module grade

Active heating/cooling fundamentals Assignment – 15% of module grade
Active heating/cooling sizing Assignment – 15% of module grade
Building Energy Use Assignment – 10% of module grade
Exam 2 (week 10) – 10% of module grade

Structural Technology Module (weeks 5-15): 33% of course grade

Fundamental Structural Concepts Assignment – 5% of module grade
Mechanics/Forces Assignment – 10% of module grade
Stress and Deformation Assignment – 10% of module grade
Structure: Wood and Steel – 5% of module grade
Structure: Concrete – 5% of module grade
Exam 1 – 15% of module grade

Soils/Structure Assignment – 5% of module grade
Structure: Column Design Assignment – 10% of module grade
Structure: Beam Design Assignment – 10% of module grade
Structure: Slab Design Assignment – 5% of module grade
Structure: Long Span Design Assignment – 5% of module grade
Exam 2 – 15% of module grade

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

Ground/Foundation Assignment – 20% of module grade
Wood/Timber Design Assignment – 20% of module grade
Primary Steel Framing Assignment – 20% of module grade
Primary Enclosures Assignment – 20% of module grade
Summary Exam – 25% 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