University of Miami
School of Architecture

Environment | Building | System 02 Spring 2022

Course Number	**ARC 663, Graduate Architecture**
Instructor Name	**Christopher Meyer, AIA, LEED AP**
Course TAs	**Sarah Ercia, Mariel Lindsey**
Classroom	**Glasgow Lecture Hall room 110**
Class Schedule	**Tuesday / Thursday 4:20 - 5:35 p.m. EST** **Friday 10:30 - 11:20 a.m. EST Graduate Only Architecture Building 48 Room 320**
Lecture/Lab/Total Credits	**3/0/3**
Modality	**In-Person,** ***[first two weeks remote modality]***
Office Location	**La Gorce**
Appointments/Meetings	**Upon Request**
Office Number	**3rd Floor of La Gorce, LU_Lab**
Email Address	**cmeyer@miami.edu** **sne20@miami.edu** **mdl125@miami.edu**

COURSE DESCRIPTION:

'Do not fight forces, use them.'

Buckminster Fuller (American Architect 1895 - 1983)

The lecture courses, *Environment | Building | System [EBS– ARC 662 and ARC 663],* will stand as a means to examine the potentials of energy to guide design principles inclusive of thermal transfer, heating and cooling, natural and constructed lighting, plumbing networks, acoustics and general aspects of building enclosure. Fundamentally, the act of architecture defines interiority from exteriority, with the intention of reshaping harsh or inhospitable conditions into a comfortable environment of inhabitation: warmth, coolth, dry, wet, dark, light, and secure. The course posits, the methods and techniques used to shape interior environmental conditions should not be conceived of in isolation, but, instead as a collective of decisions. The *EBS* course content aims to broaden one's understanding of energy, specifically the agency of energy to act as a design directive for architectural form making, spatial configuration, material selection and the surrounding context– natural and constructed. An underlying agenda of the course will be to displace antiquated design practices in favor of an integrated approach investigating the flow of energy in, around and through architecture.

> *'...rather than merely survive, mankind needs more leisure than a barefisted, and barebacked single-handed struggle to exist could permit. A large part of that ease and leisure comes from the deployment of technical resources and social organisations, in order to control the immediate environment: to produce dryness in rainstorms, heat in winter, chill in summer, to enjoy acoustic and visual privacy, to have convenient surfaces on which to arrange one's belongings and sociable activities.'*
>
> The Architecture of the Well-tempered Environment, page 18, Reyner Banham (Architectural Critic and Writer 1922 - 1988)

The 662-663 course exercises will focus on energy, solar orientation, site characteristic and thermal flows between conditions of exteriority and interiority.

COURSE PREREQUISITES / COREQUISITES:

Completion of second year architecture curriculum, or by permission of the instructor. Any and all questions regarding prerequisites should be directed to U|SoA administration.

COURSE OVERVIEW:

It is critical that enrolled students acknowledge the curriculum associated with the *Environment | Building | System [EBS]* course sequence, ***ARC 662*** *and* ***ARC 663****,* is irrevocably bound to the core studios and will be delivered across the academic year as unified and continuous content delivery. Information will be sequential, building upon previously presented subject matter, culminating in the application of course content in the Integrated Studio Project *ARC 608*. Enrolled students should expect exercises in the *EBS* course sequence to be directly linked to studio projects in *ARC 607* and *ARC 608*.

EBS will originate from a conversation of *Energy,* moving across macro and micro scales requiring enrolled students' to engage systems thinking approaches. In particular, the course will address the abundance of energy arriving to the surface of earth and the subsequent decisions designers choose to engage with the available energy. The aim of *EBS* is to expose the importance of the perceived innocent and oft innocuous decisions architects encounter as part of the design process: inclusive of, but not limited to, geography, building orientation, material palettes, structural systems, glazing and apertures. Through this evaluation of the decision-making process, enrolled students will gain a greater understanding of building systems and their potentially significant ramifications to environment and ecological networks– both positively and negatively. The course will set forth an agenda for the future of architecture to formulate a more substantial and meaningful role for energy, both consumption and embodiment in the design of our constructed environment.

Course content and investigations conducted will parallel the Integrated Studio ARC 608 projects with the intent to put into action knowledge gleaned as part of the *Environment | Building | System* courses ARC 662 and ARC 663.

REQUIRED TEXTBOOK(S):

There are no required textbooks for ARC 663, all required readings will be provided by the instructor. Students should keep in mind access to published materials– journals, papers, books for example– may require additional planning and lead times for remote access.

RECOMMENDED LEARNING MATERIALS:

1. Mapping

Corner, James. ***Recovering Landscape: Essays in Contemporary Landscape Architecture***. 1st ed., Princeton Architectural Press, 1999.

2. Energy and Environment

Banham, Reyner. ***The Architecture of the Well-Tempered Environment.*** University of Chicago Press, 1969.

Fernández-Galiano, Luis. ***Fire and Memory: on Architecture and Energy.*** MIT Press, 2000.

Krautheim, Mareike, et al. ***City and Wind Climate as an Architectural Instrument***. Dom Publishers, 2014.

Miller, Char. ***Gifford Pinchot and the Making of Modern Environmentalism*** (Pioneers of Conservation). First Edition, Island Press, 2001.

Moe, Kiel. ***Convergence: an Architectural Agenda for Energy***. Routledge, Taylor & Francis Group., 2013.

Olgyay, Victor. ***Design with Climate***. Princeton Univ Press, 1963.

3. Natural and Constructed Light

Brandi, Ulrike, et al. ***Lightbook: the Practice of Lighting Design***. Birkhäuser, 2001.

Flynn, John E., and Samuel M. Mills. ***Architectural Lighting Graphics***. Reinhold Publishing Corporation, 1962.

Harrold, R., and D. Mennie. ***IESNA Lighting Ready Reference: a Compendium of Materials from the IESNA Lighting Handbook, 9th Edition: Lighting Fundamentals*** ... Illuminating Engineering Society of North America, 2003.

Russell, Sage. ***The Architecture of Light: Architectural Lighting Design Concepts and Techniques***. A Textbook of Procedures and Practices for the Architect, Interior Designer and Lighting Designer. Conceptnine, 2012.

Schittich, Christian. ***In Detail: Solar Architecture: Strategies, Visions, Concepts***. Birkhäuser, 2003.

Tanizaki, Junichiro, et al. ***In Praise of Shadows***. Leete's Island Books, 1977.

4. Thermal and HVAC

Addington, Michelle. ***Contingent Behaviours.*** Architectural Design, volume 79, issue 3, pages 12-17, 2009.

Barber, Daniel. ***Modern Architecture and Climate: Design before Air Conditioning***. Princeton University Press, 2020.

Heschong, Lisa. ***Thermal Delight in Architecture***. M.I.T. Press, 2002.

Kennedy, Heather E., and Mark S. Owen. ***2009 ASHRAE Handbook: Fundamentals. American Society of Heating, Refrigeration, and Air-Conditioning Engineers***, 2009.

Lechner, Norbert. ***Heating, Cooling, Lighting: Sustainable Design Methods for Architects***. Fourth ed., J. Wiley & Sons, 2015.

Moe, Kiel. ***Insulating Modernism Isolated and Non-Isolated Thermodynamics in Architecture***. Birkhäuser Verlag GmbH, 2014.

Moe, Kiel. ***Thermally Active Surfaces in Architecture***. New York: Princeton Architectural Press, 2010.

Schittich, Christian. ***In Detail: Solar Architecture: Strategies, Visions, Concepts***. Birkhäuser, 2003.

Nfpa 72: ***National Fire Alarm and Signaling Code***. Natl Fire Protection Asso, 2016.

Oosthuizen, P. H. ***Introduction to Compressible Fluid Flow.*** CRC Press/Taylor & Francis Group, 2014.

5. Power Systems

Grondzik, Walter T., et al. ***Mechanical and Electrical Equipment for Buildings***, 11th Edition. John Wiley & Sons, 2010.

Harrold, R., and D. Mennie. ***IESNA Lighting Ready Reference: a Compendium of Materials from the IESNA***

Lighting Handbook, 9th Edition: Lighting Fundamentals ... Illuminating Engineering Society of North America, 2003.

Hughes, S. David***. Electrical Systems in Buildings***. PWS-Kent Pub. Co., 1988.

New York City Electrical Code 2011: ***Based on the 2008 National Electric Code***. National Fire Protection Agency, 2009.

6. Materials and Tectonics

McLeod, Virginia. ***Detail in Contemporary Landscape Architecture***. Pap/Chrt, Laurence King Publishing, 2012.

McLeod, Virginia. ***Detail in Contemporary Residential Architecture***: Includes CD-ROM. First, Laurence King, 2007.

McLeod, Virginia. ***Detail in Contemporary Timber Architecture***. Reprint, Laurence King Publishing, 2015.

Moe, Kiel, and Ryan E. Smith. ***Building Systems: Design, Technology, and Society***. Routledge, 2012.

Moe, Kiel. ***Integrated Design in Contemporary Architecture***. New York: Princeton Architectural Press, 2008.

Ripple, Jeana. ***The Type V City: Encoding Material Inequity***. Journal of Architectural Education, volume 70, pages 13-16, 2016.

Zahner, William. ***Aluminum Surfaces: A Guide to Alloys, Finishes, Fabrication and Maintenance in Architecture and Art (Architectural Metals Series)***. 1st ed., Wiley, 2019.

Zahner, William. ***Architectural Metal Surfaces***. 1st ed., Wiley, 2004.

Zahner, William. ***Architectural Metals: A Guide to Selection, Specification, and Performance***. 1st ed., Wiley, 1995.

Zahner, William. ***Copper, Brass, and Bronze Surfaces: A Guide to Alloys, Finishes, Fabrication, and Maintenance in Architecture and Art (Architectural Metals Series)***. 1st ed., Wiley, 2020.

Zahner, William. ***Stainless Steel Surfaces: A Guide to Alloys, Finishes, Fabrication and Maintenance in Architecture and Art (Architectural Metals Series)***. 1st ed., Wiley, 2019.

Zahner, William. ***Steel Surfaces: A Guide to Alloys, Finishes, Fabrication and Maintenance in Architecture and Art (Architectural Metals Series)***. 1st ed., Wiley, 2020.

7. Miscellaneous and Other

Bateson, Gregory. ***Form, Substance, and Difference.*** ETC: A Review of General Semantics,, 2015.

Marx, Leo, and Merritt Roe Smith. ***Does Technology Drive History?: The Dilemma of Technological Determinism***. MIT Press, 2011.

Pollio, Vitruvius, and M .H. Morgan. ***The Ten Books on Architecture***. Harvard University Press, 1914.

Thompson, D'arcy Wentworth. ***On Growth and Form***. Cambridge University Press, 1968.

8. Journals

Journal of Architectural Education, *Detail*, *El Croquis*, *C3 Magazine, A+U, and Harvard Design Magazine*, *The Architectural Review, arc Lighting in Architecture* (Mondo) and *Praxis* should be considered resources to your research and investigations, many of them accessible through our on campus library system.

9. Links to Resources

ProQuest Dissertations & Theses Global

10. Meters and Sensors

All metering and measuring devices offered through the EBS course must be returned in the same working condition as when checked out. The student requesting for and ultimately checking out the device(s) will be responsible for the replacement of or the cost to replace any device damaged or lost. Device Sign Out Sheet

COURSE OBJECTIVES:

Students will be responsible for:

- Recalling knowledge gained in the architectural core studio + seminars
- Identifying fundamental concepts of energy as architectural directives
- Applying the knowledge and principles of energy to studio projects.
- Analyze knowledge gained from studio projects to question the role of energy in architecture and examine architectural proposals through performative measures.
- Formulating architectural methods and techniques that implement energy principles as a design directive.

COURSE LEARNING OUTCOMES:

At the completion of this course sequence [ARC 662 and ARC 663], the enrolled and passing student should have the ability to independently display the following skills.
Communication:

- Communicate fundamental ideas graphically in a range of representational media.
- Cite images, references and sources in Chicago Manual of Style format.

Investigative Skills:

- Decipher credible project information applicable to building performance
- Understand fundamental theories, methods, and strategies of energy in architecture relating to heating and cooling, natural and constructed lighting, acoustics and building enclosure.
- Understand fundamental principles of light and lighting design (natural and constructed) and acoustics.

Applied Research:

- Strategies of lighting (natural and constructed, thermal strategies (passive and active) and building enclosure aligned with the Integrated Studio project paralleling ARC 662 and ARC 663.
- The ability to site the integrated studio project based on solar orientation, prevailing wind patterns and topography strategies.
- The ability to quantify thermal modification of space [heating + cooling], with the Studio project paralleling ARC 662 and ARC 663.

Process and Workflow Methodologies:

- Effectively use multiple digital platforms to create architectural drawings, diagrams and presentation materials.

NAAB CRITERIA:

The National Architectural Accrediting Board is responsible for reviewing and accrediting the University of Miami's architecture program. The NAAB 2020 Conditions for Accreditation has six Student Criteria [SC]: Student Learning Objectives and Outcomes which identify values and core principles held in common throughout the profession and the academy relative to both the practice and discipline of architecture. This course addresses a portion of one or more of these six defining perspectives: SC.1 Health, Safety, and Welfare in the Built Environment, SC.3 Regulatory Context, SC.4 Technical Knowledge, SC.5 Design Synthesis, and SC.6 Building Integration.

Student Criteria

Primary Focus Criteria

SC.1 Health, Safety, and Welfare in the Built Environment: Questions and discussion regarding the impact of the built environment are fundamental to the course. The review of environmental system design related to geographic region will be covered through active and passive heating and cooling, solar geometry, daylighting, natural ventilation, indoor air quality, solar systems, lighting systems, and acoustics. *[To be evaluated at the level of understanding]*

SC.4 Technical Knowledge: The EBS course will make technically clear drawings, assess building performance and construct models illustrating and identifying the assembly of materials, systems, and components appropriate for a building design. *[To be evaluated at the level of understanding]*

SC.6 Building Integration: The EBS course will parallel the Integrated Design Studio in which the presentation, discussion and investigation of information will be applied through the design of 'architecture'. *[To be evaluated at the level of understanding and at the level of ability]*

Secondary Focus Criteria:

SC.3 Regulatory Context: The course will discuss policies and building codes related to architecture, impacting decisions on lighting strategies, envelope design, materials, building assemblies and HVAC systems. *[To be evaluated at the level of understanding]*

SC.5 Design Synthesis: The course will play a supportive role to the integrated design studios, providing fundamental knowledge integral to making design decisions ranging from site analysis, passive and active thermal strategies, envelope design and fundamental performative analysis building enclosure. *[To be evaluated at the level of ability]*

Self-Assessment

The EBS course will undertake the *Self-Assessment* process in the following manner:

- The course offers a volunteer course evaluation at the end of each semester to all enrolled students. All constructive feedback provided by the participating students will be compiled and incorporated in the development of course content and course delivery methods.
- The course structure and student outcomes will be reviewed by immediate course faculty, teaching assistants and Integrated Studio Faculty. All constructive feedback provided by the participating faculty and teaching assistants will be compiled and incorporated in the development of course content and course delivery methods.
- The course premise, structure, modality and selected student outcomes will be presented to the general U|SoA faculty for review. All constructed feedback provided by the participating faculty will be compiled and incorporated in the development of course content and course delivery methods.
- All course documents inclusive of syllabi, workshop briefs, project briefs, and course structure diagrams/charts will be sent to leading architectural faculty in peer institutions for review and feedback. All constructed feedback provided by the participating faculty will be compiled and incorporated in the development of course content and course delivery methods.

- The EBS course partners with industry leaders and practitioners from respected consulting firms to conduct workshops for enrolled students. These individuals will be asked to review the content associated with their specific field of study and all feedback will be compiled and integrated to adapt course content and the development and delivery of future workshops.

LEXICON:

A:

Albedo _ the fraction of incident radiation (such as light) that is reflected by a surface or body.
Altitude _ the angle of the sun's vertical coordinate position.
Amplitude _ perception of loudness in regards to sound. The maximum extent of a vibration or oscillation, measured from the position of equilibrium.
Analysis _ detailed examination of the elements or structure of something, typically as a basis for discussion or interpretation.
Aperture _ an opening, hole, or gap. A space through which light passes in an optical or photographic instrument.
Assemble _ fit together the separate component parts.
Asymmetry _ lack of equality or equivalence between parts or aspects of something; lack of symmetry.
Azimuth _ the angle of the sun's horizontal coordinate position (North is 0˚, East is 90˚, South is 180˚ and West is 270˚)

B:

Beam _ a cone of light emitted by a Luminaire.
Beam Angle _ the beam angle of a lamp is defined as the angle at which light is emitted from a given light source– defined technically as the angle between those points on either side of the beam axis where intensity decreases to approximately half of its maximum illumination.
Brightness _ the attribute of light-source colors by which emitted light is ordered continuously from light to dark in correlation with its intensity.

C:

Candlepower _ luminous intensity expressed in candelas, the intensity of the beam in any direction
Candelas _ the SI unit of luminous intensity. One candela is the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency 540 x 10^{12} Hz and has a radiant intensity in that direction of 1/683 watt per steradian.
Circadian Rhythm _ physical, mental and behavioral changes that follow a daily cycle; twenty-four hour internal clock cycling between sleepiness and alertness at regular intervals; the human sleep/wake cycle.
Color Rendering Index (CRI) _ the measurement of how color looks under a light source as compared with sunlight. The index is measured from 0-100, with a perfect 100 indicating that colors under the light source appear the same as they would under natural sunlight.
Color Temperature _ provides a rough indication of the color balance of various sources of white-light: typically used to describe the warmness or coolness of a light source.
Contrast _ the difference in brightness between a detail and its immediate background.
Current _ the flow of electrons in a conductor. The unit of current is ampere or amp.

D:

Decibel (dB) _ the amount of change in pressure constitutes the amplitude expressed using a logarithmic decibel scale.
Diffuse Reflection _ the reflection of a light ray by a rough surface in which the angle of reflection is not equal to the angle of incidence. the effect that is created when light is reflected at many different angles and there is no clear image.
Disability Glare _ the reduction in visibility caused by intense light sources in the field of view.
Discomfort Glare _ the sensation of annoyance or even pain induced by overly bright sources.
Dissipate _ squander or fritter away; cause (energy) to be lost [entropy], typically by converting it to heat [heat is the lowest form of energy].

E:

Ecology _ the branch of biology that deals with the relations of organisms to one another and to their physical surroundings. the totality or pattern of relations between organisms and their environment; an often delicate or intricate system or complex.

Emittance_the energy radiated by the surface of a body per second per unit area.
Energy _ a fundamental entity of nature that is transferred between parts of a system in the production of physical change within the system and usually regarded as the capacity for doing work. usable power (such as heat or electricity); *also* : the resources for producing such power.
Enclosure _ an area that is sealed off with an artificial or natural barrier, the state of being enclosed.
Entropy _ thermodynamics : a measure of the unavailable energy in a closed thermodynamic system that is also usually considered to be a measure of the system's disorder, that is a property of the system's state, and that varies directly with any reversible change in heat in the system and inversely with the temperature of the system; broadly : the degree of disorder or uncertainty in a system. the degradation of the matter and energy in the universe to an ultimate state of inert uniformity. a process of degradation or running down or a trend to disorder.
Environment _ the circumstances, objects, or conditions by which one is surrounded. the complex of physical, chemical, and biotic factors (such as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival. The aggregate of social and cultural conditions that influence the life of an individual or community.
Emergy _ the quantification of qualities of energy captured in matter. A measure of the actual resource and energy costs embedded in matter or in a process; the memory of energy.
Emjoule _ The unit of emergy is the emjoule or emergy joule. *see emergy and joule for reference.
Equinox _ the time or date (twice each year) at which the sun crosses the celestial equator, when day and night are of equal length– september 22nd and March 20th.
Exergy _ the maximum amount of useful work that can be obtained from a system.

F:

Footcandle _ unit of illuminance or illumination; equivalent to the illumination produced by a source of one candle at a distance of one foot and equal to one lumen incident per square foot; one foot candle is equal to approximately ten lux. Footcandle = fc
Flood Lamp _ a light source of artificial illumination having a broad beam
Fluorescent _ a usually tubular electric lamp having a coating of fluorescent material on its inner surface and containing mercury vapor whose bombardment by electrons from the cathode provides ultraviolet light which causes the material to emit visible light
Frequency _ the number of sine wave cycles in a second– the number of cycles per second is called Hertz

G:

Glare _ a visual sensation caused by excessive and uncontrolled brightness; with the potential to be disabling or simply uncomfortable. It is subjective, and sensitivity to glare can vary widely.

H:

Heat _added energy that causes substances to rise in temperature, fuse, evaporate, expand, or undergo any of various other related changes, that flows to a body by contact with or radiation from bodies at higher temperatures, and that can be produced in a body.
Hertz (Hz) _ the rate of the change in pressure in one second constitutes the frequency.
High Pressure Sodium (HPS) _ The HPS lamp consists of a narrow arc tube supported by a frame in a bulb. The arc tube has a high pressure inside for higher efficiency. Sodium, mercury and xenon are usually inside the arc tube. The arc tube is made of aluminum oxide ceramic which is resistant to the corrosive effects of alkalis like sodium.

I:

Illuminance _ the amount of luminous flux per unit area; illuminance is equal to the number of lumens falling on each square foot of a surface. The unit of illumination is the footcandle. Footcandles (fc) = Lumens (lm) / Square Feet of area (ft^2)
Incandescent _ a light bulb whose light is produced by the glow of a wire heated by an electric current.
Inert _ lacking the ability or strength to move
Inertia _ a property of matter by which it continues in its existing state of rest or uniform motion in a straight line, unless that state is changed by an external force; a tendency to do nothing or to remain unchanged.

J:

Joule _ the SI unit of work or energy, equal to the work done by a force of one newton when its point of application moves one meter in the direction of action of the force, equivalent to one 3600th of a watt-hour.

K:

Kilowatt (kW) _ Electricity equivalent to 1,000 watts: thus a 10kW light = 10,000 watts.
Kelvin (K) _ the color temperatures of lamps are stated in the unit 'Kelvin' as indication of the colors of light.

L:

Light _ defined as the portion of the electromagnetic spectrum to which our eyes are visually sensitive; electromagnetic radiation of any wavelength that travels in a vacuum with a speed of 299,792,458 meters (approximately 186,000 miles) per second.
Light Emitting Diode LED _ a semiconductor device that emits visible light when an electric current passes through it. The output from an LED can range from red (at a wavelength of approximately 700 nanometers) to blue-violet (about 400 nanometers).
Lumen _ the SI unit of luminous flux, equal to the amount of light emitted per second in a unit solid angle of one steradian from a uniform source of one candela.
Lux _ a unit of illumination, equivalent to 0.0929 foot-candle and equal to the illumination produced by luminous flux of one lumen falling perpendicularly on a surface one meter square.

M:

Mechanical Wave _ a mechanical wave is a wave that is not capable of transmitting its energy through a vacuum. Sound waves are mechanical waves propagated through a medium (solid, liquid or gas)
Mixed Reflection _ reflecting light in both specular and diffuse manners; see specular reflection and diffuse reflection.

N:

Network _ a group or system of interconnected people or things.
Normal _ a line or a vector perpendicular to a given object or surface

O:

Observe _ notice or perceive (something) and register it as being significant.

P:

Path _ the medium through which sound transmits– air, water, buildings, etc...
Physiological _ characteristic of or appropriate to an organism's healthy or normal functioning.

Q:

R:

Rarefaction _ diminution in the density of something, especially air or a gas- the opposite of compression.
Receiver _ the *'thing'* accepting sound transmittance– a listener or microphone.
Reflectance Factor (RF) _ indicating how much of the light falling on a surface is reflected.
Reflection _ the throwing back by a body or surface of light, heat, or sound without absorbing it.
R-Value _ a measure of resistance to the flow of heat through a given thickness of a material; higher numbers indicating better insulating properties.

S:

Source _ (regarding acoustics) the element responsible for creating the sound.
Spot Lamp _ a light source of artificial illumination designed to direct a narrow intense beam of light on a small area.
Spectrum _ a continuum of color formed when a beam of white light is dispersed (as by passage through a prism) so that its component wavelengths are arrange in order; an of various continua that resemble a color spectrum in consisting of an ordered arrangement by a particular characteristic (such as frequency or energy)
Specular Reflection _ reflection at a surface having irregularities small as compared with the wavelength of the incident radiation; a mirror-like reflection of light from the surface. In specular reflection, the incident light is reflected into a single outgoing direction.
Summer Solstice _ the solstice that marks the onset of summer, at the time of the longest day– June 21st in the Northern hemisphere and December 22nd in the Southern Hemisphere.
System _ a set of connected things or parts forming a complex whole, in particular. A set of things working together as parts of a mechanism or an interconnecting network. A set of organs in the body with a common structure or function.
Systems Thinking _ exploring both the inter-relationships between the components and the components that make up a network, a holistic view.

T:

Transmittance _ the fraction of radiant energy that having entered a layer of absorbing matter reaches its farther boundary

U:

Ultraviolet _ the ultraviolet part of the spectrum; ultraviolet radiation. Situated beyond the visible spectrum at its violet end, (of electromagnetic radiation) having a wavelength shorter than that of the violet end of the visible spectrum but longer than that of X-rays.
*U-Value*_ a measure of the heat transmission through a building elem*ent or a g*iven thickness of a material; lower numbers indicating better insulating properties.
V:
Voltage _ is the potential energy source in an electrical circuit to make things happen. Voltage does nothing by itself but has the potential to do work, a push or a force which pushes or pulls electron through wires. The unit of voltage is the volt.
W:
Wave Diffraction _ involves a change in direction of waves as they pass through an opening or around a barrier in their path.
Wave Refraction _ a change in the direction of waves as they pass from one medium to another. Refraction, or the bending of the path of the new waves, is accompanied by a change in speed and wavelength of the waves.
Wavelength _ a wave is made of traveling energy; light waves are made of traveling energy composed of electric and magnetic fields. Visible wavelengths of light are between 400 to 700 billionths of a meter.
Winter Solstice _ the solstice that marks the onset of winter, at the time of the shortest day– December 22nd in the Northern hemisphere and June 21st in the Southern hemisphere.
White Light _ light containing all the colors of the visible spectrum in roughly equal amounts.
X:
Y:
Z:
Zenith _ an angular measurement from straight up to a point in the sky.

INSTRUCTIONAL METHODOLOGIES:

All citations and bibliographic references are required to conform to the "Notes-Bibliography" conventions of: The Chicago Manual of Style. 17th ed. Chicago: University of Chicago Press, 2017.

All work used in the seminar must be from a credible source, contain the correct citation and be organized in the seminar/studio project bibliography. Precedent images, projects or work which does not have a credible citation(s) or associated citation(s) information will be at risk of omission of the final studio submission. Work omitted due to missing or nonexistent citation will not contribute to course evaluation.

Seminar Modality

The seminar is slated to be conducted in a hybrid modality, meaning in-person and remote simultaneously, two days a week at the School of Architecture on the Coral Gables campus facility. All in-person meetings will strive to meet social distancing guidelines for the protection of the students and faculty. All in-person meetings will require facial covering or a protective mask worn by the students and faculty at all times. Course modality is at the discretion of the University of Miami and the School of Architecture and will be evaluated as COVID-19 guidelines are updated to reflect the evolving conditions.

Synchronous | Asynchronous Learning

Fundamentally, recording of classroom activities, lectures and/or gatherings by students or course guests is strictly prohibited.

Meetings of this course might be recorded by the University. Any recordings will be available to students registered for this class as they are intended to supplement the classroom experience. **Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures.** Recordings may not be reproduced, shared with those not in the class, or uploaded to other online environments. If the instructor or a University of Miami office plans

any other uses for the recordings, beyond this class, students identifiable in the recordings will be notified to request consent prior to such use.

When recording course material or lectures limited access to remote instruction will be reserved for enrolled students of the course and other officials as needed (teaching assistants, faculty supervisor, etc.). Access to recorded content will be password protected and remain accessible to enrolled students of this course and/or University of Miaimi Faculty with access to the course.

Using Remote Learning Platforms

Enrolled Students in a course implementing remote learning platforms should use their University of Miami name to allow faculty to ensure participating members are allowed in the course. Students are discouraged from using 'nicknames' or obscure aliases of online identification related to University of Miami course work.

Enrolled students should be prepared to screen share in order to help identify course participation and to expose remote course intruders. The University of Miami is operating under the expectation students will enable their computer camera while attending remote course meetings to visually engage with faculty and fellow students.

Academic Continuity Contingency Plan

In the event that the University of Miami campus is closed and this course is no longer able to meet in person, students should activate the Academic Continuity Contingency Plan for the course which can be found on Blackboard in the course folder. Please note courses that include practicum components may require makeup.

In the event that the University of Miami campus is closed and/or the course modality is through a remote learning environment students are responsible for the following:

- Check UM email for any announcements. Professors will communicate any updates to due dates on assignments or exams via UM email.
- Students are highly encouraged to upload assignments using a cloud-based data storage site designated by the course professor.
- Immediately log into Blackboard for alternative assignments as instructed by course faculty.
- Be prepared to download and/or print possible alternate written assignments based on readings or other non-web-based (offline) sources.
- Students are encouraged to continue the readings and other assignments as outlined on this syllabus or subsequent syllabi.
- In the event of a suspension of all face-to-face classes, course instruction will resume and be facilitated using the Blackboard learning management system.

LPT contact information (Blackboard Helpdesk):

- Email_ learningplatforms@miami.edu
- Create an incident_ https://lpt.it.miami.edu/wiki/form/
- Phone_ 305.284.3949
- FAQ_ https://lpt.it.miami.edu/

UMIT Helpdesk

- Website_ uservice.miami.edu
- Phone_ 305.284.6565

U|SoA IT Technical Support

- Website_ arc.miami.edu/itsupport

- Phone_ 305.284.3390

Social Distancing + Personal Protective Equipment

Studies have shown that proper use of face coverings, distance/air dilution, and hand sanitization each incrementally reduce the risk of spread, with face coverings the most effective preventative measure by far.

Teaching faculty reserve the right to dismiss enrolled students and persons from course meetings who are not wearing and/or refuse to wear a face mask or facial covering for in-person meetings. Everyone—including faculty, staff, and students—is required to wear facial coverings on campus.

Social distancing of at least six feet should be practiced by administration, faculty and students whenever possible inclusive of interior and exterior meetings and gatherings. Faculty and students are highly encouraged to wash and/or sanitize one's hands frequently. Students are encouraged to keep studio space clean and free of items no longer needed for coursework. Take home any items not needed for the execution of course work or project assignments from your workstation inclusive of personal items.

Any meters, sensors, or other equipment loaned to students for the purpose of completing assignments shall be sanitized with 70% Isopropyl Alcohol and exposed to Ultraviolet light for at least two hours. Only after this sanitation process has occurred can devices be re-loaned to students.

Course Evaluation

Written Examination	40%
Quizzes	20%
Semester Assignments + Final Project	40%

Student work will be evaluated to the degree to which *Course Learning Outcomes* have been satisfied, along with effort, seriousness and participation will all be factors into the determination of the seminar/lecture evaluation. Student work will be evaluated based on what is produced and presented on assigned review dates or when work is turned in on assigned due dates – no exceptions.

Each student is required to upload/submit all final work. Materials should/could include research, writing, and design work, including important study models and sketches. Faculty will further define how this work should be organized and presented before the end of the semester. Failure to submit the required documentation in a usable format will result in a grade reduction in the final grade for the semester. Documentation of the work is essential for accreditation purposes and assessment of the architecture program.

ATTENDANCE POLICY:

The University of Miami School of Architecture has no provision for unexcused absences and expects attendance at all classes. **All excuses are to be submitted in writing for the instructor approval**. School policy establishes grounds for **dismissal from the course and/or a failing grade after three unexcused absences**.

Attendance is mandatory during scheduled seminar hours and for the duration of all formal reviews. Plan your extra-curricular activities accordingly, with the understanding that occasional reviews may extend beyond seminar hours. Each student must ensure that errands and social engagements are attended to outside of scheduled seminar hours. **Travel for the University of Miami coursework (studio travel), religious reasons, serious contagious, life-threatening illness, University or School of Architecture sanctioned events and medical emergencies accompanied by a doctor's note, or personal emergencies submitted to the office of the Dean of Students are the only acceptable excuses for missing seminar meetings – no exceptions.** For impending official absence related to University-sponsored events, it is the student's responsibility to provide concrete documentation to their instructor, if possible, prior to the date of such events. Athletes should present a schedule of

anticipated absences for athletic events (not practices) at the beginning of the semester. Valid documentation of all other excused absences must be provided immediately to your professor upon your return to seminar. Additional specific documentation based on the circumstances of the absence may be requested.

Please refer to the 2018-2019 Academic catalog:
http://bulletin.miami.edu/graduate-student-handbook-online-students/attendance/

GRADING POLICY:

A	*Excellent attainment.* Excellent work demonstrates that the student has excelled in satisfying all course assignments, objectives and work methods. Projects and assignments are completed on time and executed through a clear working process with a comprehensive development. The work also demonstrates a clear willingness to engage in the critical dialogue of architecture with the course content, faculty and peers. Strong evidence of habitual study is present, and work/assignments are completed by the scheduled submission deadline.
B	*Good attainment.* Above Average work demonstrates that the student has satisfied all course assignments, objectives and work methods, and has often exceeded those expectations for the course. The work is completed on time, and demonstrates a continuous engagement with the course content, assignments and projects developed clearly, intellectually and technically. The work also demonstrates a willingness to engage in the critical dialogue of architecture with course content, faculty and peers..
C	*Fair attainment.* Average work demonstrates that the student has adequately satisfied all course assignments, objectives and work methods. The work is completed on time and executed with competent technical achievement. The work or the projects and assignments demonstrates a fundamental knowledge of the course content.
D	*Poor attainment* (earns credit hour but may not fulfill requirements for a major, student will need to communicate with their advisor.) Below Average work demonstrates that the student has not satisfied all course assignments, objectives and work methods. The work is incomplete and/or executed with inconsistency, a lack of effort, lethargy, or inability to engage the course content. The work reflects an unwillingness to listen and respond to the critical feedback, course lectures or with their faculty or peers. Little to no evidence of habitual study.
F	*Failure*. Failing work demonstrates that the student has failed to satisfy many course assignments, objectives and work methods. The work is incomplete and executed with crude and rudimentary knowledge. Overall, the work reflects a lack of engagement with the course content and/or objectives, an unwillingness to listen and respond to the critical dialogue of architecture with faculty, and an undeveloped command of the basic skills necessary at this curriculum level, and provides no evidence of habitual study. Failure to attend course consistently.
W	Course dropped prior to the last day for withdrawing from classes as published in the official calendar of the University. Credit hour can be earned only by successful repetition of the course.
WL	Late Withdrawal-Administrative: Only used for Complete Withdrawal (Effective Summer 2017)
I	Incomplete work in passing status with the instructor's permission to complete the course. An 'I' will be assigned only if the instructor is satisfied that there are reasonable non-academic grounds for the student's incomplete work. An 'I' is not intended to be assigned in order to permit a student to repeat a course without registration or to permit a student to do additional work in order to improve upon grades earned during the semester. The student who receives an 'I' must complete the course with a passing grade within the time frame specified by the professor of the course but not longer than the end of one calendar year, or prior to graduation, whichever occurs first. An Academic Dean may approve an extension initiated by the course instructor An 'I' not completed prior to the student's graduation shall be changed to an 'IE' or 'IF" by action of the student's Academic Dean.
IP	Denotes in progress grade assigned upon satisfactory completion of the first semester of a two-semester sequence, with the final grade for both courses to be submitted at the end of the second semester of the sequence. Please note that all 'IP's must be converted to a letter grade or 'IF' at graduation. 'IP' will also be converted to 'IF' upon any departure for the University for a period in excess of one year.
IF	Symbol indicating that an 'I' grade was not appropriately completed. The symbol 'IF' is equivalent to an 'F' when computing a student's average.

* Students should review the University of Miami Grading System for further description of course evaluation.

UNIVERSITY OF MIAMI GRADUATE GRADING SYSTEM:

Student work will be evaluated to the degree in which learning objectives have been satisfied, effort, participation, seriousness and attendance will all factor into the seminar evaluation. Grading will be determined based on engagement in seminar

discussions, constructive critique of your colleague's work and the development/craft of each project. The seminar professor will grade design work based solely on what is produced and presented on assigned review dates or when work is turned in on assigned due dates – no exceptions. The professor will abide by the University of Miami course evaluation standards; https://bulletin.miami.edu/graduate-student-handbook-online-students/graduate-grading/

ACADEMIC HONESTY STATEMENT:

The University of Miami expects all undergraduate students to adhere to the highest standards of ethics and academic integrity. All forms of academic fraud are strictly prohibited. These include, but are not limited to, plagiarism, cheating, collusion, falsification, violation of professional ethics, or misrepresentation of research data. Students certify that all work (whether an examination, dissertation, thesis, research paper, research project, form of creative expression, experimental data, or any other academic undertaking) submitted for evaluation, presentation, or publication meets these standards.

http://biomed.miami.edu/current-students/academic-policies/academic-integrity

SYLLABUS OUTLINE / SCHEDULE:

Week One _ ***Welcome Back*** _ ***Natural Lighting: The Space Between Thermal and Formal Characteristics***

Jan 18 _ *Course Introduction* _ Natural Light: An Abundance of Energy

Jan 20 _ An Abbreviated History of Natural Light and Architecture

Jan 21 _ Discussion of Michelle Addington, Contingent Behaviors

Week Two _ ***Natural Lighting: Color | UV Spectrum and Visual Characteristics***

Jan 25 _ Radiant Energy | Electromagnetic Spectrum

Jan 27 _ Color and UV Spectrum and Visual Characteristics

Introduction of PR04

Jan 28 _ Discussion of in DETAIL Solar Architecture, Christian Schittich nd Manfred Hegger (pages 8 - 25)

Week Three _ ***Natural Lighting: The Space Between Thermal and Formal Characteristics***

Jan 31 _ Integrated Studio Site Visit

Feb 1 _ Natural Lighting: Program, Performance and Architectural Precedent

Feb 3 _ Site, Building and Natural Light

Feb 4_ Open Discussion PR04

Week Four _ ***Introduction to Constructed Light***

Feb 8 _ An Abbreviated History of Constructed Light

Feb 10 _ Constructed Light: Lamp Families

Feb 11 _ Discussion of Dan Flavin, The Architecture of Light

Week Five _ ***Constructed Light: Lumen Outputs***

Feb 15 _ Lumens: From Fixture | In Space

Feb 17 _ Lighting Calculation

Feb 18 _ *Open Discussion*

Week Six _ ***Constructed Light: Lumen Outputs + Lighting Control Systems and Introduction to Power Systems***

Feb 22 _ Lighting Calculation | Control Systems _ Lutron Lecture

Lutron Workshop: Solar Exposure, Patterns and Strategies TBD

Feb 24 _ In Class Working Session

Feb 25 _ Discussion of Junichiro Tanizaki, In Praise of Shadows

Week Seven _ ***Passive | Active Heating and Cooling _ Integration into Studio Project***

Mar 1 _ Mechanical Systems

Mar 3 _ Mechanical Systems

Mar 5 _ Discussion of Transsolar Publication

Week Eight _ *Power Systems: Power Generation and Distribution Systems*

Mar 7 _ ***Integrated Studio Mid-Review + 50% Workbook submission***

Mar 8 _ Power Generation | Electrical Service TypesHeating + Cooling systems

Introduction of PR05

Mar 10 _ Power Generation | Electrical Service TypesHeating + Cooling systems

Mar 11 _ Discussion of Jeana Ripple, Type V City

Week Nine _ Spring Recess

Mar 15 _ *No Classes*

Mar 17 _ *No Classes*

Mar 18 _ *No Classes*

Week Ten _ *Heating | Cooling _ Integration into Studio Project + Power Systems*

Mar 22 _ Project Specific *Heating + Cooling* Mechanical Calculations

Mar 24 _ Collection, System Infrastructure and Distribution

Mar 25 _ Discussion of ITA on Biogenic Buildings with Salmaan Craig

Week Eleven _ *Plumbing and Fire Suppression + Water Management*

Mar 29 _ Fire Suppression Systems

Mar 31 _ Water Collection, Storage, Distribution and Usage

Introduction of PR06

Apr 1_Open discussion of PR04, PR05, and PR06

Week Twelve _ *Water Management _ Integration into Studio Project*

Apr 5_ Water Collection Strategies

Apr 7 _ Water Management Calculations

Apr 8_ Open discussion

Week Thirteen _ *Project Review*

Apr 12 _ Open Discussion + Integrations of Integrated Studio and Environment | Building | Systems

Final Draft of PR04, PR05, and PR06 Due

Apr 14 _ Open Discussion + Integrations of Integrated Studio and Environment | Building | Systems

Apr 15_ Discussion of Luis Fernadez-Galiano, Fire and Memory, On Architecture and Energy, Chapter One

Week Fourteen _ *Acoustics in Architecture*

Apr 19 _ Fundamental Principles + Acoustics in Space

Apr 21 _ Acoustics of Mechanical Systems and Sound Isolation

Apr 22_ Course Conclusion and Loose Ends

Week Fifteen _ *Acoustics in Architecture*

Apr 26 _ Acoustics in Building Assemblies

Apr 28 _ Course Review

Apr 29 _ Open Session

Week Sixteen _ Reading Days

May 2 _ Integrated Final Review

May 3 _ *No Classes*

Final Exam

May 5 _ ***Final Exam 2:00 - 4:30 p.m. EST***

Time of Final Exam Typically differs from scheduled course time; Final exam schedule is at the discretion of the University of Miami administration.