

Green Building Strategies

LEED Lab

Fall 2019

DCP 4214, section 323G

Tuesdays & Thursdays, Periods 6-8 (12:50 - 3:50 PM)

ARCH, Room 411

Course prerequisite

Minimum junior standing

DCP 3210, Sustainable Solutions for the Built Environment

Bahar Armaghani, LEED™ Fellow

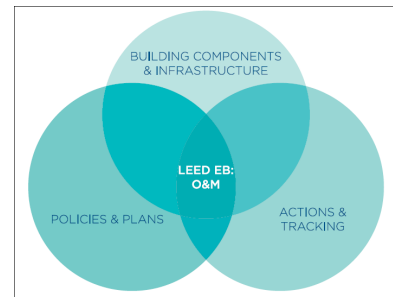
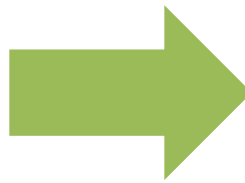
ARCH 446 (east end of Architecture Building)

barmagh@ufl.edu, 352-294-1428

Office Hours: Ts & THs 11:45-12:35 pm, or by appointment

Strategies to Build Green And Transforming Existing Buildings into High Performance Sustainable Buildings

While the environmental performance of new commercial buildings in the United States has been improving dramatically in recent years, most existing buildings were constructed when energy was less expensive, technologies were less advanced, and environmental performance rarely a priority. Older, existing buildings generally use significantly more energy and water than new buildings of the same size and function. According to the Institute for Building Efficiency, existing buildings that are 20 years and older make up more than 70 percent of the built environment by square footage. Thus, existing buildings offer tremendous opportunities to conserve energy and water as well as provide healthier, more productive work environments. *EPA*



Green buildings help create healthy environments while saving energy, resources, and money.

Course Description

This is an interactive multidisciplinary course, in which students will be introduced to strategies for the design, construction and operation of high performance buildings. The course is designed to equip students with the skills and knowledge needed to be effective communicators, critical thinkers, project managers, problem solvers, and team players. Students learn the strategies for greening facilities with green building rating systems in mind and a focus on the principles of LEED. An on-campus building/project will be used for hands-on learning. In addition, successful course completion can prepare the student for LEED™ V4 Accredited Professional exams.

Course Objectives

This course is designed to produce the following outcomes:

- An understanding of planning, design, build, and operate green building.
- Ability to assess the performance of existing buildings. Learn the tools needed for energy, water, IAQ, and lighting audits.
- Calculate ROI for energy, lighting and water fixtures retrofit.
- Assess and develop polices and techniques to improve building exteriors, site, water and energy consumption, remodeling, waste management, and purchasing.
- Facilitate LEED™ V4 for Existing Buildings: Operations and Maintenance (EB: O+M) process with the goal of certifying a facility. Compare to LEED v4.1 for Existing Building.
- Appreciate of the value of team work, and each team member's contribution to the success of a project.
- Learn skills and knowledge needed in today's green industry including Energy Star Portfolio Manager, Energy Star Target Finder, ARC, LEED online, Ecomedes, utility data analysis, report and proposal development, and project organization and management.
- Prepare students for LEED™ V4 Green Associate (GA) and LEED™ V4 professional credential exams, should they be motivated to take them.

Course Format

Approach: The course will be approached as one would approach a real project, using an on-campus building. This semester the Lacrosse Locker Room Facility has been selected to evaluate its green features and propose strategies for optimizing its performance.

Delivery Method: Lectures, discussions, field trips on campus, hands on experience, guest speakers, work in teams, presentations, and quizzes.

Course Website: <http://elearning.ufl.edu/>: This course's e-learning on Canvas site will contain all course materials, including readings, lecture slides, assignment instructions, quizzes, and announcements. All course material will be posted before semester starts.

Communication: Outside of class, use Canvas e-mail (preferred) or barmagh@ufl.edu email is the best and preferred method of communication.

Field Trips Multiple field trips will be scheduled to the campus building/project selected for the semester. First trip will be to walk the building and see the building layout per the building drawings that reviewed in class. Second trip will be to conduct an energy, lighting and water audits at the building. A third trip is possible to verifying data collected on the second trip. All required field trips will be held during scheduled class times. Any field trips scheduled outside of normal class hours are optional.

Guest Speakers

Professionals practicing the topic in the industry present to the class to reinforce the importance of the learning skills and give the students a networking opportunity with industry leaders.

Required Reading Materials

LEED™ V4 & V4.1 for Existing Building Operations and Maintenance Reference Guide, *short version* posted on Canvas along with other resources and readings.

- Power point slides and short selected publications posted on Canvas.

- Using www.LEEDuser.com as supplemental resource.

- LEED™ V4 EB; O+M Reference Guide web based access for one year for \$50 per student (this is an electronic book). This is a special offer from USGBC to LEED™ V4 Lab students. Instructions for payment directly to USGBC and access will be provided after drop/add week.

Attendance is required for the spring semester Green Building Learning Collaborative event. The event is scheduled for Wednesday, September 18, 2019 from 3:00-5:30. Additional information on the program and place will be distributed few weeks before the event.



Tools and Resources

- **Building Green**, www.buildinggreen.com ; is an excellent resource on the latest in sustainable built environment issues, cases studies, articles, materials, and more. This is a membership based site, and since the University is a member you have full access to all the site content.
 - o To access this site while on campus, you will automatically be logged in the site and can use it.
 - o To access the site while you are off campus, you can remotely access it using VPN. The [UF VPN Service](#) is designed to allow University Faculty, Staff, and Students to securely "tunnel" into campus over other networks, such as their home internet connection, and access services as if they were on campus. Basically, it lets your computer appear as if it were located physically on campus. To install, go to vpn.ufl.edu . To get more information about VPN, you can visit: <https://connect.ufl.edu/it/wiki/Pages/glvpn.aspx>.
- If you have problems accessing the site use the following; <https://www.buildinggreen.com/ufl>
- **LEEDuser**, <http://www.leeduser.com> ; this is another resource with tools and examples on each LEED™ V4 credit. UF has a membership to this resource, you can access on campus. If you need to access off campus go through the UF VPN Service, following above steps.
- If you have problems accessing the site use the following; <http://www.leeduser.com/ufl>
- **GSA**, <https://sftool.gov/>.

Paperless Activities and Assignments:

E-learning on Canvas will be the hub for the communication, discussion, announcements, turn in assignments, papers/projects/videos, take quizzes, and presentation material.

- Check e-learning on Canvas for the material and presentations that will be covered weekly.
- Set up and Check your e-mail to receive class announcements from e-learning on Canvas.
- All assignments/papers/presentations/videos must be turned in electronically through e-learning on Canvas.

Class Attendance and Make-Up Policy

- Reading material: **Students must complete the reading before each class.**
- Students attend class prepared for active participation and discussion. A quality learning experience in this course rests heavily on interaction and exchange of ideas related to the sustainable built environment.
- **You are required to bring your computer to every class for course work.**
- **Using the computer in class for non-class related work is not allowed.**
- **Using cell phones, texting, and surfing the web during class are not allowed except for class related search or an emergency. Phones must be put away during class.** Students who receive or make calls or text messages during class will be asked to leave and marked absent for the day.
- Attendance is required. Arriving late to class (5-10 minutes after start of the class, or falling asleep in the class) will be considered a ½ absence. Leaving early while the class is in session will be considered an unexcused absence.
- **Attendance for the all final presentations is required. 5% will be deducted from the final grade if absent and attend the final presentations late (5 minutes after starting the presentations).**
- Only excused absences can be made up. Excused absences include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, and professional conferences), military obligation, severe weather conditions, religious holidays, and participation in official university activities such as music performances, athletic competition or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) is excused. Absences must be properly documented, for example with a doctor's note.

- All presentations, quizzes, credit submission, and assignments must be turned in on time; projects or assignments may be turned in early. If you will not be in class to turn the assignment in, even if it is an excused absence (e.g. studio field trip), you must turn the assignment in early. Any assignment turned in after it is due will be marked late, and your grade will be penalized.
- Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at:
<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Exams

Exams will be on Canvas. Each exam will cover the material that has been covered in class. These are non-cumulative exams.

Final Projects/Presentations: Team Delivery

- **Energy team; develop ASHRAE Level 1 energy audit report including return on investment (ROI). Also, complete Energy & Atmosphere credits submission with backup documentations. Prepare final presentation to the client and include comparing to LEED v4.1.**
- **Indoor Environmental Quality and Site team; Report on the ASHRAE 62.1, air ventilation including return on investment (ROI). Also, complete IEQ and Site credits submission with backup documentations. Prepare final presentation to the client and include comparing to LEED v4.1.**
- **Water Efficiency and Transportation team; Report on procedures for water audit including return on investment (ROI). Also, complete Water Efficiency and Transportation submission with backup documentations. Prepare final presentation to the client and include comparing to LEED v4.1.**
- **Lighting and Material & Resources team; Report lighting audit including return on investment (ROI). Also, complete Material and Resources credits submission with backup documentations. Prepare final presentation to the client and include comparing to LEED v4.1.**

Grading

Assignment	Instruction	points	Due date
Exam 1&2	Individual; 15 points each	30	On Canvas Exam 1; 10/10/2019 Exam 2; 11/20/2019
Assignments,	Individual; complete assignment; 4 points each	20	On Canvas. See schedule
Attendance & participation	Individual; Read assigned reading, attend class, field trips, and participate in discussions	10	5 points discussion & participation 5 points field trips
Final project; see above specifics	Team's presentation to Building Owner	30	12/3/2019
	Complete LEED submission	10	

Grade 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

See the following link to UF's grade policy:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Online course evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>

Accommodating Students with Disabilities

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. 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.

Student Honor Code and Academic Honesty

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions.

Campus Resources

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department, 392-1111 (or 9-1-1 for emergencies). <http://www.police.ufl.edu/>

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu

<https://lss.at.ufl.edu/help.shtml>

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <http://www.crc.ufl.edu/>

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <http://teachingcenter.ufl.edu/>

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.

<http://writing.ufl.edu/writing-studio/>

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>

"Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students

will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.”

Need Help? Don't hesitate to ask

Problems with e-learning on Canvas

For issues with technical difficulties for e-learning on Canvas, contact the UF Help Desk at:

Learning-support@ufl.edu

(352) 392-HELP (4357) - select option 2

<https://lss.at.ufl.edu/help.shtml>

Disclaimer

This syllabus represents our current plans and objectives. As we go through the semester, those plans may need to change depending on the building schedule. Such changes, communicated clearly, are not unusual and should be expected.

Weekly Class Schedule

Date	Topics
Module 1: Introduction to Green Building, Benefits, and Goals	
T, 8/20	<ul style="list-style-type: none"> - Welcome & Introduction - Review syllabus - Review use of Canvas, course files, material, and paperless approach - UF campus sustainability overview and status - Review green building rating systems including: <ul style="list-style-type: none"> o Green Globes o BREAM o ASHRAE 189 o Living Building Challenge o IGCC o with focus on LEED™ V4 and V4.1 - Green building/LEED™ V4 goals, benefits, certification and recertification - Why green? <p><u>Teams</u></p> <ul style="list-style-type: none"> - Identify project team managers, members & roles and responsibilities <p><u>Introduction to the following tools:</u></p> <ul style="list-style-type: none"> - www.buildinggreen.com - www.Leeduser.com - ARC; https://arcskoru.com/ <p>- Video, Watch Ed Mazria; The Next Built Environment https://www.architectmagazine.com/videos/ed-mazria-francesca-desmarais-the-next-built-environment</p> <p>Net zero carbon; http://carbonsmartbuilding.org/ed-mazria-video</p>

TH, 8/22	<p>Reading:</p> <ul style="list-style-type: none"> - <i>Getting Started</i> - <i>Minimum Program Requirements</i> - <i>Rating system selection</i>
	<ul style="list-style-type: none"> - LEED™ O+M V4.0 & v4.1 scorecard - Credit structure; establishment and performance credits - Identify pre-requisites and credits - Identify policies needed - Performance period - Project boundary - LEED™ V4 online demonstration and invitation - Leading sustainability charrette - Integrative Approach <p>Database of State Incentives, www.dsireusa.org</p> <ul style="list-style-type: none"> - Identify teams and team managers (Site & Transportation, Energy, Water, Lighting & Material, and IAQ) - Review team managers' and team members' role and responsibilities - Introduce the building: Lacrosse Locker Room Facility
Assignment #1: Establish a USGBC account, students' access	
Module 2: Project Administration	
T, 8/27	<p>Reading and Understanding Building's Drawings</p> <ul style="list-style-type: none"> - Learn about Lacrosse Locker Room Facility. - Building drawings, site, architecture, and Mechanical, Electrical, Plumbing (MEP). - Building green features, Review of prior LEED™ NC certification. - Building occupancy schedule and operation. - Occupancy, Full time equivalent (FTE), part time & transient. - Calculate FTE for the project. - Learn about the stakeholders that you need to know and work with including: building occupants, maintenance & operation, purchasing staff, utilities, energy, grounds, facilities management, and Waste management department. - How to assess LEED™ V4.0 scorecard for Lacrosse and compare to LEED V4.1. - Access and how to manage LEED™ V4.0 and V4.1 online. - How to run a project charrette. <p>Check for resources; www.leaduser.com</p>
TH, 8/29	<ul style="list-style-type: none"> - Review Project Administration - Each team to present their information and calculation - Each team to develop a power point presentation on this module - Each team to save the data, calculations, maps to Team's Canvas page
LEED questions review, in class quiz	

Module 3: Utility Consumption and Analysis

T, 9/3

In class: breakout session;

- Utility data analysis for the last 5 years
- Plot and identify utility consumption trends.
- Each project manager oversees the activities of his/her team.
- Each team to present their progress at the end of class.
- Each team to manage the information and results of work produced on Canvas.
- *Introduction to instrumentation needed for building auditing.*
- *Invite students to join LEED online.*

Reading LEED V4.0; Energy and Atmosphere (EA) category to Building Commissioning credit

https://www.buildinggreen.com/sites/default/files/ebn/TBGR_26-08.pdf

- *Review ARC use; <https://arcskoru.com/>*
- **Prepare for the site visit, review audit forms, building drawings, and review the building information and data.**
- **See site visit instruction under this module on Canvas.**

TH, 9/5

Meet at the building, The south east gate and follow the site visit instruction.

- Distribute instrumentation to each team.
- Conduct ASHRAE Level 1 audit.
- Conduct water audit.
- Conduct lighting audit.
- Use building drawings to walk the building.
- Take photos of the systems that are being audited, the building cleanliness, and any O&M related issues.
- Use the forms introduces in class to record data during walk through.
 - Record all the readings, note any Facility Improvement Measures (FIMs) and Energy Conservation Measures (ECMs) with photos.

Module 4: Energy Audit and Energy Star Rating

T, 9/10

Energy Conservation Strategies and Measures

- Energy efficiency and conservation strategies overview
- Review building MEP drawings.
- Review energy modeling, ASHRAE 90.1 its benefits, and development strategies to optimize building.
- Introduce Energy Star Portfolio Manager.
- Review strategies used for ventilation, filtration and thermal comfort.
- ASHRAE Level 1, energy audit process, approach, equipment/tools, data needed Prepare for site energy audit
- Existing building Commissioning (Cx) analysis, implementation, and ongoing, approach, tools, analysis, and reporting

Check for resources; www.leaduser.com

	<p>Reading: Energy and Atmosphere (EA) category, LEED V4.0 from existing building commissioning credit to the end of Energy and Atmosphere category.</p> <p>Reading: Energy and Atmosphere (EA) category LEED V4.1</p> <p>Energy Star target finder and Portfolio Manager, perform for Lacrosse and the Green Bank https://portfoliomanager.energystar.gov/pm/targetFinder;jsessionid=604A5298165C35755993E38D12CB0816?execution=e1s1</p>
TH, 9/12	<p>In class: Breakout session</p> <ul style="list-style-type: none"> - Each team to utilize building drawings to review what was discussed on Tuesday - Perform Energy Star rating for Lacrosse - Perform Energy Star rating for the Green Bank (data provided on Canvas) - Review utility data consumption with focus on electric, steam, chill water, gas, and water - Review and get familiar with all the forms needed for ASHRAE Level I audit - Each team to present their information and calculation - Each team to develop a power point presentation on this module - Each team to save the data, calculations, maps to Team's Canvas page <p><i>Guest speaker; Robert Chronic, Energy audit forms and methodology</i></p> <p>LEED questions review, in class quiz</p>
<p>Module 5: Renewable Energy, assessment, sizing, installation, and cost</p>	
T, 9/17	<ul style="list-style-type: none"> - Renewable energy sources - Regional assessment, tools, cost and ROI - Specifying and sizing a system - How to calculate the annual solar energy output of a photovoltaic system? - Contracting <p>Guest speaker; Michael Collins, Power Production Management, Inc.</p> <ul style="list-style-type: none"> - Complete requirements for EA category to Commissioning credits for V4.0 & V4.1 <p>Check for resources; www.leaduser.com</p> <p>Helioscope for renewable assessment https://help.helioscope.com/article/152-academic-use-of-helioscope</p>
TH, 9/19	<p>Commissioning? What? Why? When? How? And Who?</p> <ul style="list-style-type: none"> - Commissioning during design and construction - Existing building commissioning analysis - Existing building commissioning implementation - Ongoing commissioning - Building level energy metering - Fundamental refrigerant management

Energy service company (ESCO or ESCO)

An **energy service company** or **energy savings company** (ESCO or ESCO) is a commercial or non-profit business providing a broad range of energy solutions including designs and implementation of [energy savings](#) projects, [retrofitting](#), [energy conservation](#), energy infrastructure outsourcing, [power generation](#) and [energy supply](#), and risk management.

ESCO focuses more on innovative [financing](#) methods. The ESCO starts by performing an analysis of the property, designs an energy efficient solution, installs the required elements, and maintains the system to ensure energy savings during the [payback period](#).

Check for resources; www.leaduser.com

Assignment #2, individual team members, submit a preliminary assessment of LEED™ V4.0 & V4.1 checklist for Lacrosse project.

Module 6: Lighting Audit, Cost Benefits and ROI And (Cont.) Energy Conservation Strategies

T, 9/24

Lighting audit

- Review Building electrical/lighting drawings and discuss strategies used for lighting design
- Energy efficiency best management practices
- Optimize energy performance and energy modeling with lighting retrofit and efficiency.
- Advanced energy metering or sub-metering strategies
- understanding Demand Response
- Renewable energy and carbon offsets
- Enhanced refrigerant management
- *Complete requirements for EA category credits for V4.0 & V4.1*
- *Develop final slides for the category*
- *Enter data to ARC; <https://arcskoru.com/>*
- *Each team to update LEED V4.0 & V4.1 checklist for EA credits pursuing.*
- Use Ecomedes; <https://uf.ecomedesstaging.com/>

Check for resources; www.leaduser.com

Guest speaker: Sheila Noel, ESCO

TH, 9/26

In class: Breakout session

- Each team to review electrical consumption for the last five years.
- Each team to update LEED checklist based on the credits that are pursuing.
- Each team member to calculate ROI for lighting retrofit to LED.
- Project Manager to review the team’s work and upload to team’s Canvas page.

Guest Speaker; Lighting audit, John Lawson

- Review Energy and water consumption data
- Finalize charts and graphs
- Identify trends and discuss
- Each team to present their findings and calculations, interpret the graphs
- Each team to develop a PowerPoint presentation related to this module

	<ul style="list-style-type: none"> - Each team to save data, findings and presentation to Team’s Canvas page <p><i>Complete requirements for EA category credits for V4.0 & V4.1</i></p>
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Module 7: Building Visit Measurement and Verification

T, 10/1	<p>In class: Breakout session</p> <ul style="list-style-type: none"> - Review and complete requirements for EA category credits for V4.0 & V4.1 - Work on assignment #3: Energy Star rating for Lacrosse Locker Room Facility and the Green Bank. - Each team to update LEED checklist for EA credits. <p><i>- Introduction to ARC for LEED V4.1 building performance</i> ARC; https://arcskoru.com/</p>
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TH, 10/3	<p>In class demonstration by all:</p> <ul style="list-style-type: none"> - Register a project on LEED online - Access credit, complete a credit on LEED online with completing credit Form, upload backup information, and determine Exemplary performance and upload. <p>Review and test and practice all the tools leaned including: Energy Star Portfolio, LEED User, Building Green, Ecomedes, and Helioscope.</p>
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Assignment #3, Energy star rating for Lacrosse and the Green Bank due

Module 8: Water Audit, Conservation and Strategies

T, 10/8	<p>Water efficiency (WE)</p> <p>Water efficiency and conservation strategies overview</p> <ul style="list-style-type: none"> - Review indoor and outdoor water strategies used for design and construction of this building and the benefit gained from these strategies for the operation and maintenance of the building. - Discuss indoor water use reduction, review latest strategies, WaterSense, and tools for calculation. - Demonstrate indoor water use reduction calculator. - Building level water metering, discuss master and sub-meter relationship. - Outdoor water use reduction strategies and EPA tools. - Demonstrate outdoor water use reduction calculator. - Cooling tower water use strategies and chemical use. - Review water meter data for at least past five years - Review WaterSense at http://www.epa.gov/watersense/our_water/start_saving.html
	<p>Reading; Water Efficiency (WE), LEED V4.0 and V4.1 category</p> <p>Check for resources; www.leaduser.com EPA interactive water budget tool; outdoor water http://www.epa.gov/watersense/water_budget/application.html</p> <p>water budget data finder; http://www.epa.gov/WaterSense/new_homes/wb_data_finder.html</p> <p>WaterSense® Water Budget Approach; http://www.epa.gov/watersense/docs/home_final_waterbudget508.pdf</p> <p>Calculate your personal water saving;</p>

	<p>http://www.epa.gov/watersense/our_water/start_saving.html#tabs-3</p> <p>Check for resources; www.leeduser.com</p> <p><u>LEED questions review, in class quiz</u></p>
TH, 10/10	<p>In class breakout session</p> <ul style="list-style-type: none"> - Review data collection from site visit. - Share the data in class. - Work on the water saving calculations for the project with baseline and design base for both indoors and outdoors. - Each team member to calculate indoor and outdoor water use reduction using the appropriate calculators. - Each team to review and update the policies in the module. - Each team review credits pursuing in this module. - Each team member to calculate ROI for plumbing retrofit. - <i>Each team to update LEED checklist for WE credits pursuing.</i> - <i>Review and complete requirements for WE category credits for V4.0 & V4.1</i> - <i>Develop final slides for the category</i> - <i>Enter data to ARC; https://arcskoru.com/</i> - Use Ecomedes; https://uf.ecomedesstaging.com/ <p>Check for resources; www.leeduser.com</p>

Exam 1 on Canvas

Module 9: Data review, and QA/QC

T, 10/15	<ul style="list-style-type: none"> - In class review energy, water, and lighting data collection, forms and calculations completion. - <i>Continue review and complete requirements for WE category credits for V4.0 & V4.1</i> - <i>Develop final slides for the category</i> - <i>Enter data to ARC</i> - <i>Each team to update LEED V4.0 & V4.1 checklist for WE credits pursuing.</i> <p>Reading; LEED V4.0 & V4.1, Transportation and site categories to Rainwater management credit</p>
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Module 10: Site and Transportation Survey and Assessment

TH, 10/17	<p>Site and Transportation strategies overview</p> <ul style="list-style-type: none"> - Develop a transportation survey and distribute to the building occupants. - Review the strategies implemented during design and construction of the project including public transportation, bicycle storage, fuel efficient vehicles. - Review strategies used for site protection and open space, material used for roof and non-roof, managing rain water, and site light pollution. - Discuss strategies used to develop site management policy and protect habitat. - How heat island reduction material being managed and maintained. - Light pollution reduction. - <i>Review and complete requirements for Transportation category credits for V4.0 & V4.1</i> - <i>Develop final slides for the category</i>
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	<ul style="list-style-type: none"> - Enter data to ARC - Each team to update LEED V4.0 & V4.1 checklist for Transportation credits pursuing. <p>Check for resources; www.leaduser.com</p> <p>Reading; LEED V4.0 & V4.1, Site category from Rainwater management to the end of site category</p> <p>LEED questions review, in class quiz</p>
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Assignment #4: Calculate water saving and be prepared to share with the class. This includes indoor and outdoor water calculations

<p>T, 10/22</p>	<p>In class: Breakout session</p> <ul style="list-style-type: none"> - Each team to review the policies in the module. - Each team review credits pursuing in this module. - Discuss and decide Campus or building approach. - Each team to update LEED V4.0 & V4.1 checklist for Site credits pursuing. - Review and complete requirements for Site category credits for V4.0 & V4.1 - Develop final slides for the category - Enter data to ARC; https://arcskoru.com/ - Siemens and sustainability, ESCO, Smart Cities - Siemens Green Jobs and Hiring <p>Guest speaker; Steve Moore, Siemens Industry</p>
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Module 11: Building Operations, Material Use

<p>TH, 10/24</p>	<p>Building operations and material consumption overview</p> <ul style="list-style-type: none"> - Review the strategies used in the building construction material selection with its recycled content, its origin, and chemical content including VOC and Formaldehyde. - Review the strategies used for waste diversion from construction and renovation. - Ongoing purchasing and waste policy - Facility maintenance and renovation policy - Purchasing-lamps directive. - Purchasing- facility maintenance and renovation guidelines. - Solid waste management-ongoing and facility maintenance and renovation. - Demonstrate the use of the material purchasing calculator. - Review and complete requirements for Material category credits for V4.0 & V4.1 <p>Check for resources; www.leaduser.com</p> <p>Reading; LEED V4.0 & V4.1, Material category</p>
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T, 10/29	<p>Building Waste Audit</p> <ul style="list-style-type: none"> - Follow the given procedures - Material team must be part of conducting the audit - The audit maybe outside class time due to the building accessibility <p>In class: Breakout session</p> <ul style="list-style-type: none"> - Each team to review the policies related to this module posted on the policies module on Canvas. - Each team member to utilize the purchasing and material calculator tool. - Each team review credits pursuing in this module - Discuss and decide Campus or building approach - <i>Each team to update LEED V4.0 & V4.1 checklist for Material credits pursuing.</i> - <i>Continue review and complete requirements for Material category credits for V4.0 & V4.1</i> - <i>Develop final slides for the category</i> - <i>Enter data to ARC; https://arcskoru.com/</i> <p>LEED questions review, in class quiz</p>
<p>Module 12: Indoor Environmental Quality (IEQ), Health and Wellbeing</p>	
TH, 10/31	<p>Building indoor environmental quality and health/wellbeing overview</p> <ul style="list-style-type: none"> - ASHRAE 62.1-2010, Minimum Indoor Air quality Performance, process, calculations, tools, reporting. - Review strategies used during the design and construction for indoor environmental quality including ventilation, filtration, and material use. - Demonstrate ASHRAE 62.1 calculation. - Environmental tobacco smoke control. - Indoor air quality management program during construction and before occupancy. - Thermal comfort and interior lighting strategies. - Daylight and quality views. <p>Check for resources; www.leaduser.com</p> <p>Reading; LEED V4.0 & V4.1 Indoor Environmental Quality (IEQ) category</p> <p>Harvard Study Shows Elevated CO2 Levels Directly Affect Human Cognitive function, 10/26/2015 http://www.hsph.harvard.edu/news/press-releases/green-office-environments-linked-with-higher-cognitive-function-scores/</p>
T, 11/5	<p>In class: Breakout session</p> <ul style="list-style-type: none"> - Each team to review the policies in the module - Each team review credits pursuing in this module - Discuss and decide Campus or building approach - Each team member to complete ASHRE 62.1 calculation - <i>Each team to update LEED V4.0 & V4.1 checklist for IAQ credits pursuing.</i> - <i>Review and complete requirements for IEQ category credits for V4.0 & V4.1</i>

	<ul style="list-style-type: none"> - Develop final slides for the category - Enter data to ARC; https://arcskoru.com/ <p>LEED questions review, in class quiz</p>
<p>Assignment #5: ASHRAE 62.1 calculation.</p>	
<p>Module 13: Indoor Environmental Quality, Health and Wellbeing, (Cont.)</p>	
<p>TH, 11/7</p>	<ul style="list-style-type: none"> - Green cleaning policy; developing, maintaining, and implementing - Green cleaning-custodial effectiveness assessment, introduction of industry standards - Green cleaning products and materials, green product certification - Green cleaning –equipment - Integrated pest management, development and implementing the plan - Occupant comfort survey, developing a survey and organization with research on this topic, such as University of California, Berkeley <p>Check for resources; www.leaduser.com</p> <p>Reading; LEED V4.0 & V4.1, Indoor Environmental Quality (IEQ) categories continue</p>
<p>T, 11/12</p>	<p>In class: Breakout session</p> <ul style="list-style-type: none"> - Each team to review the policies in the module - Review I-BEAM process and forms - Review APPA process and forms - Each team review credits pursuing in this module - Discuss and decide Campus or building approach - Each team to update LEED checklist based on the credits that are pursuing. - Review and complete requirements for IAQ category credits for V4.0 & V4.1 - Develop final slides for the category <p>LEED questions review, in class quiz</p>
<p>Module 14: Innovation and Regional Priority</p>	
<p>TH, 11/14</p>	<ul style="list-style-type: none"> - Discuss strategies for innovation in the project including: <ul style="list-style-type: none"> o Education and tours o Signage and graphics to describe green building and operation strategies o Using Pilot credit - Review LEED Online and how to develop documentation supporting the innovation credit's intent, requirements, and strategies. - Review Exemplary Performance strategies - On LEED Online, review and demonstrate credits completion and how RP credit and Innovation credits are completed and submitted. <p>Check for resources; www.leaduser.com</p> <p>Reading; LEED V4.0 & V4.1 ID and RP category</p>


Module 15: Progress Assessment and Reporting, Quality Control of the Documentations and final Review

T, 11/19	<p>Review;</p> <ul style="list-style-type: none"> - All the policies developed - ROI on water and lighting - Calculators used for water reduction inside and outside the building - ASHRAE 62.1, ventilation calculation - Review I-BEAM forms <p><i>Each team to update LEED V4.0 & V4.1 checklist for IAQ credits pursuing.</i></p> <ul style="list-style-type: none"> - Review and complete requirements for IEQ category credits for V4.0 & V4.1 - Develop final slides for the category - Enter data to ARC; https://arckoru.com/
TH, 11/21	<p>Review;</p> <ul style="list-style-type: none"> - Green Cleaning, - Purchasing Policy - Smoking Policy - Waste Management Policy- IEQ calculator - Indoor water calculator

Exam 2 on Canvas

Module 16: LEED™ V4 Green Associated (GA) exam review

T, 11/26	<ul style="list-style-type: none"> - Review LEED™ V4 accreditation exam hand book - Demonstrate registration for the exam - How to prepare for the exam <p>The LEED v4 exam is based on the following text specifications and references. The exam questions reflect Task Domains and Knowledge Domains.</p> <p>Task Domains: Task Domains reflect the tasks necessary to perform LEED safely and effectively. These include concepts such as LEED Project and Team Coordination, LEED Certification Process, Analyses Required for LEED Credits, and Advocacy and Education for Adoption for LEED Rating System.</p> <ul style="list-style-type: none"> • LEED Green Associate Tasks (100%) <p>Knowledge Domains: Knowledge Domains reflect the rating systems' credit categories and what one needs to know. These include concepts such as LEED Process, Integrative Strategies, LEED credit categories, and Project Surroundings and Public Outreach.</p> <ul style="list-style-type: none"> • LEED Process (16 questions) • Integrative Strategies (8 questions) • Location and Transportation (7 questions) • Sustainable Sites (7 questions) • Water Efficiency (9 questions)
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	<ul style="list-style-type: none"> • Energy and Atmosphere (10 questions) • Materials and Resources (9 questions) • Indoor Environmental Quality (8 questions) • Project Surroundings and Public Outreach (11 questions) <p>Review over 100 exam questions in real test format related to above knowledge in designing, building, and operating green building</p>
11/27-11/29	
Final Presentation & Deliverables	
T, 12/3	<ul style="list-style-type: none"> - One final presentation by the class to the Building Owner. - Each team to present their part of the PowerPoint presentation on the audit, findings and recommendations. - Each team to present within this final presentation on the LEED certification under V4.0 & V4.1. - Presentation is one hour - All credit submittals with their back up and a copy of LEED online Form to be completed and uploaded to Canvas. - Each team to present a video on learning experience to inform, motivate and convince the viewer to consider auditing building system and how it pays.