# Green Building Strategies
# LEED Lab

**Fall 2015**
**DCP 4930, section 14EA/ 6931, section 14EE**

**Tuesdays, Periods 5-7 (11:45 AM-2:45 PM)**
**ARCH 423**

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**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*
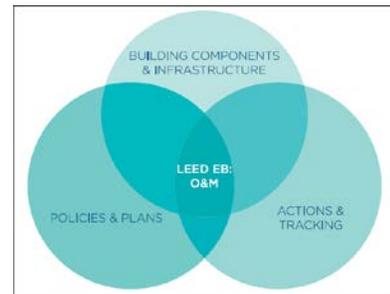
Green buildings help create healthy environment while saving energy, resources, and money.
LEED for Existing Buildings: O&M contains performance standards for the sustainable operation of existing buildings that are not undergoing major renovations. It covers building systems, infrastructure, practices, and policies.

## Course Description:

This is a multidisciplinary course that utilizes the built environment's performance, operations and maintenance to educate and prepare students to become green buildings leaders and sustainability-focused citizens. This course will equip students with the skills, knowledge and expertise needed to be effective communicators, project managers, critical thinkers, problem solvers, engaged leaders, and team players in the field of sustainability.

Campus buildings will be used to improve performance of the building through measurement and verification, operation, and maintenance with the application of green building rating systems focused on LEED V4 for Existing Buildings Operations and Maintenance. Successful course completion can prepare the student for LEED™ V4 Green Associate and O+M specialty exams credentials.

## Course prerequisite:
Junior standing

## Learning Objectives
This course is designed to produce the following outcomes:
- Students' ability to assess the performance of existing buildings and facilitate the LEED for Existing Buildings: Operations and Maintenance (LEED EB: O+M) process with the goal of certifying the facility.
- Equip students with the skills, knowledge needed to be effective communicators, project managers, critical thinkers, problem solvers, engaged leaders, and team players to meet the needs of today's industry.
- Assess and explore techniques to improve building exterior, site, water and energy consumptions, remodeling, waste management, and purchasing.
- Understand LEED-EB: O+M pre-requisites and credits and the tools needed for implementation, and recognize synergies between multiple credits.
- Learn LEED project administration, registration, submission, and LEED online utilization.
- Recognize how improving building operation and maintenance lead to higher performing buildings.
- At the end of the semester the students can be prepared for LEED Green Associate (GA) and LEED EB: O+M professional credential exam.

## Philosophy Statement:

- Never doubt that you as an individual and as a member of a small group of thoughtful citizens can change the world for better, the reality that is the only way things get changed. Your learning, knowledge, inspiration, and innovation in finding solutions for the built environment ca n make a difference not only in your life but in your community, city, and the world.

## Course Format:

**Approach:** The course will be approached as a project while working on an actual UF building, this semester Lacrosse Locker Room Facility is selected for LEED Lab and LEED EB; O+M certification.

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

**Course Website:** https://lss.at.ufl.edu/:   This course's e-learning in Canvas site will contain all course materials, including readings, lecture slides, assignment instructions, quizzes, announcements, and grades. All course material will be posted before class starts.

**Communication:** Outside of class, barmagh@ufl.edu email is the best and preferred method of communication. Do not email me through e-Learning on Canvas.

## Project Management Role:
- Graduate students will play project manager's role in the class to accomplish tasks related to the green strategies implementation on campus building throughout the semester
- The project manager/graduate student is responsible for the complete submission of the product related to each task at the end of the semester.

## Field Trips and Guest Speakers:
- Multiple field trips will be scheduled to the campus building that is selected for implantation of green strategies and LEED-EB; O+M certification.
- Field trips are required.
- Guest speakers on topics related to greening existing buildings.

**Required Reading Materials:**
**LEED V4 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

This is a team oriented course emulating a real life project. Active student engagement with the reading material and associated class discussions will be an important component of your grade. Being a team player will contribute to your team's success.

**Tools and Resources:**
- **Building Green**, **www.buildinggreen.com** ; is an excellent resource in the latest in sustainable built environment, cases studies, articles, materials, and more. This is a membership based site, where University is a member of. That means 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 the site using VPN.
    o To access some campus resources when you are physically off campus, you may need to install UF's 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://www2.buildinggreen.com/campus

- **LEEDuser**, http://www.leeduser.com ; this is another resource with tools and examples on each LEED credit. UF has a membership to this resource, you can access on campus. If you need to access off campus through UF VPN Service, follow above steps.
- **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, 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 must be turned in electronically through e-learning on Canvas.
- Final paper should be in single spaces and 12 font.

**Participation, Attendance and other Policies:**

- Students attend class prepared for active participation and discussion. A quality learning experience in this course rests heavily on interaction and exchange ideas related to sustainable built environment.
- You are encouraged to take notes electronically, but in this case student must e-mail the instructor his/her notes at the end of the class. Also, using cell phones and texting during class is highly discouraged.
- Reading material and discussion; **Students must complete the reading before each class.** Each topic discussion will be assigned to a team of two-three students. See schedule.
- 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.
- The policy for attendance is as follows:

| Unexcused Absences | Grade point deduction |
|---|---|
| 4-5 | 5% |
| 6-7 | 10% |
| 8-9 | 15% |
| 10-11 | 20% |
| Each addition 2 absences | Additional 2% |
| **Final presentations** | **Additional 5%** |

- Weekly leading discussion, reports, final project and presentation can **only** be made up for **excused** absences. Excused absences include illness, religious holidays, a death in the family, or participation as an athlete in official UF athletic events; to be excused, absences must be properly documented, for example with a doctor's note.

- All projects, presentations, quizzes, 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.

- Students attend class prepared for active participation and discussion. A quality learning experience in this course rests heavily on interaction and exchange ideas related to sustainable built environment.
- Students should be prepared to experience learning through many different venues including case studies, guest speakers, campus projects, team projects, field trips, and research.

## Grading:

| Assignment | Instruction | points of grade | Due date |
|---|---|---|---|
| Exam 1&2 | Individual; 15 points each | 30 | On Canvas Exam 1; 10/6/15 Exam 2; 11/17/15 |
| Assignments, | Individual; complete assignment | 20 | On Canvas. See schedule |
| Attendance & participation | Individual; Read assigned reading, attend class, field trips, and participate in discussions | 20 | Last week of classes, submit on Canvas |
| Final project report and presentation or -------------------------- 5-7 minutes Video & report Or 5-7 minutes Video and presentation | Team project on a sustainable solution for the built environment. In 1500-2000 words describe the case, the challenge, the outcome of the solution and your recommendations. This must be in a report format. | 30 | Final week, submit on Canvas 12/15/15 |

## 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

**Final Project Topic: *Each team's final topic must be related to an identified/known/anticipated challenge in the built environment, and propose a solution to address the challenge. This is due the week of 9/15/2015.***

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

**Final Presentations and Reports:**
Final reports and presentations will be assigned to each team related to sustainability in the built environment.
***You can submit a 5-7 minutes video recording related to sustainability and the built environment.***

**UNIVERSITY OF FLORIDA POLICIES**

**Accommodating Students with Disabilities**:
Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/ ). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

**Student Honor Code and Academic Honesty**
Under the Student Honor Code see http://www.dso.ufl.edu/students.php, "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'" (6C1-4.040(a)).
*Papers will be screened for plagiarism using the text-matching Tools Turnitin (http://turnitin.com/static/index.html ).*
Students must submit work that is original to this course, i.e., not the student's work from another course (unless it is used as a reference and properly cited).

**Need Help? Don't hesitate to ask**

**PROBLEMS WITH e-learning in Canvas**
For issues with technical difficulties for E-learning in 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

For any other helps contact your instructor.

Other resources are available at http://www.distance.ufl.edu/getting-help  for:
-   Counseling and Wellness resources
-   Disability resources
-   Resources for handling student concerns and complaints
-   Library Help Desk support

*Disclaimer*
*This syllabus represents our current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.*

## Weekly Class Schedule

| Date | Topics | Teams | |
|------|--------|-------|---|
| | | | |
| | **Introduction** | | |
| **Week 1**<br><br>T,8/25 | - Welcome & Introduction<br>- Review syllabus<br>- Review use of Canvas, course files, material, and paperless approach<br>- Form teams<br>- UF campus sustainability overview and status<br><br>- Review green building rating systems with focus on LEED EB;O+M<br>- Green building/LEED goals, benefits, certification and recertification<br><br>**Video 2014,** The blueprint for a carbon-free and just built environment by 2050.<br>https://vimeo.com/101548831<br>*New Concepts in LEED V4;*<br>*https://www2.buildinggreen.com/article/new-concepts-leed-v4*<br>*Introduction to the following tools:*<br>   - *www.buildinggreen.com*<br>   - *www.Leeduser.com*<br>Assignment #1: Establish a USGBC account | | |
| | **Project Planning and Assessment** | | |
| **Week 2**<br><br>T, 9/1 | *Assessment*<br>- Minimum Program Requirements (reading)<br>- Rating system selection (reading)<br>- Campus and/or a single building approach (reading)<br><br>*Integrative Approach in LEED*<br>- LEED-EB; O+M V4 scorecard<br>- LEED Lab Timing Chart<br>- Credit structure; establishment and performance<br>- Identify pre-requisites and credits<br>- Assign pre-requisites and credits to project team members<br>- Identify policies needed<br>*- Performance period*<br>*- Performance credits or establishment credits*<br>*- LEED boundary*<br>*- LEED online demonstration and invitation*<br><br>*Teams*<br>- Identify project team managers, members & responsibilities<br><br>  *In class: Breakout session*<br>   - Each team develop a strategy approaching the project roles and<br>    responsibilities | All Teams | |
| **Week 3**<br>T,9/8 | *Review the Building*<br>- Learn about Lacrosse Locker Room Facility<br>- Building drawings, site, architecture, and Mechanical, Electrical, Plumbing(MEP) | All Teams | |

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| | - Utility data analysis<br>- Building green features, Review of prior LEED NC certification<br>- Building occupancy schedule and operation<br>- Occupancy, Full time equivalent (FTE), part time & transient<br>- Learn about the stakeholders that you need to know and work with including: building occupants, maintenance & operation, purchasing staff, PPD utilities, office of sustainability, building green team, student group, PPD energy, PPD grounds, Waste management.<br>- Assess LEED-EB; O+M V4 scorecard for Lacrosse<br><br>_**In class: Breakout session**_<br>- Think about a charrette for the project, identify your role in a project charrette<br>- Prepare for site visit, assign site visit tasks/teams<br><br>National Charrette Institute; http://www.charretteinstitute.org/resources.html<br><br>==Assignment #2, each team to assess LEED checklist for Lacrosse project and total credits can be attempted.== | | |
| **Sustainable Site and Transportation** | | | |
| **Week 4**<br><br>T, 9/15 | -In class mockup charrette using project data and information<br><br>Site overview | All Teams | |
| | -Site and transportation Overview<br>- Innovation in Operations | Team 1 | |
| | - Location & Transportation; Alternative transportation<br>- Site management policy<br>- Site development – protect and restore habitat<br>- Rainwater management | Team 2 | |
| | - Heat island reduction<br>- light pollution reduction<br>- Site management<br>- Site improvement plan<br>- Joint use of facilities<br><br># Check for resources; www.leeduser.com<br><br>_**In class: Breakout session**_<br>- Each team review their assigned credits and assess for meeting the requirement for Lacrosse project. Make a list of back up documentations needed. Confirm with LEED online credit Form too.<br>- Develop policies associated with this module<br>- Discuss and decide Campus or building approach<br><br>==**Lacrosse Locker Room visit**== | Team 3 | |
| **Water Conservation Measures and Efficiency** | | | |
| **Week 5**<br><br>T, 9/22 | -  Water efficiency and conservation strategies overview<br><br>- Indoor water use reduction | Overview<br><br>Team 4 | |

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| | - Building level water metering<br>- Outdoor water use reduction<br>- Indoor water use reduction<br>- Cooling tower water use<br>- Water metering<br><br>-Review water meter data for at least past three years<br>- Review WaterSense at http://www.epa.gov/watersense/our_water/start_saving.html<br><br>**Check for resources; www.leeduser.com**<br><br>**EPA interactive water budget tool;**<br>**http://www.epa.gov/watersense/water_budget/application.html**<br><br>**water budget data finder;**<br>**http://www.epa.gov/WaterSense/new_homes/wb_data_finder.html**<br><br> **WaterSense® Water Budget Approach;**<br>**http://www.epa.gov/watersense/docs/home_final_waterbudget508.pdf**<br><br>**Calculate your personal water saving;**<br>**http://www.epa.gov/watersense/our_water/start_saving.html#tabs-3**<br><br>==**Guest Speaker, recycling policy and program at UF, Allen Masters**==<br><br>_**In class: Breakout session**_<br>- Each team review their assigned credits and assess for meeting the requirement for Lacrosse project. Make a list of back up documentations needed. Confirm with LEED online credit Form too.<br>- Develop policies associated with this module<br><br>==_**Assignment #3: use LEED online to calculate water saving and be prepared to share with the class**_== | | |
| **Energy Conservation Strategies and Measures** | | |
| **Week 6**<br><br>T, 9/29 | - Energy efficiency and conservation strategies overview<br><br><br>-ASHRAE Level 1, energy audit process, approach, equipment/tools, data collection, reporting. Prepare for site energy audit<br><br>- ASHRAE62.1-2010, Minimum Indoor Air quality Performance, process, calculations, tools, reporting. Prepare for site air performance audit.<br><br>-Existing building Commissioning (Cx)analysis, implementation, and ongoing, approach, tools, analysis, reporting<br><br>-Introduction to energy and air quality instrumentation<br><br>Energy Star target finder<br>https://portfoliomanager.energystar.gov/pm/targetFinder;jsessionid=604A5298165C35755993E38D12CB0816?execution=e1s1 | Lecture<br><br><br>Guest Speaker | |
| **Energy Conservation Strategies and Measures Implementation** | | |

| Week 7<br><br>T, 10/6 | -Energy efficiency best management practices<br>-Optimize energy performance<br>-Advanced energy metering<br>-Demand response<br>-Renewable energy and carbon offsets<br>-Enhanced refrigerant management | Team 5 | |
| | -Existing building commissioning analysis<br>-Existing building commissioning implementation<br>-Ongoing commissioning<br>-Building level energy metering<br>-Fundamental refrigerant management | Team 6 | |
| | ***In class: Breakout session***<br>- Each team review their assigned credits and assess for meeting the requirement for Lacrosse project. Make a list of back up documentations needed. Confirm with LEED online credit Form too.<br>- Each team review the documentations for each credit from last semester.<br>- Develop policies associated with this module<br>- Discuss and decide Campus or building approach<br><br>- Energy Star Portfolio Manager; demonstrate<br>-Review utility data consumption with focus on electric, steam, chill water, gas<br><br>==***Assignment #4: Energy Star rating for Lacrosse Locker Room Facility and another example building will be provided.***== | | |
| **Exam 1 on Canvas on material covered through week 7** | | | |
| **Building Visit** | | | |
| Week 8<br><br>T, 10/13 | - Meet at the building, back enhance<br>- Conduct ASHRAE Level 1 audit<br>- Conduct water audit<br>- Conduct lighting audit<br><br>==***Assignment: use the data collected to determine meeting the requirement of Energy credits. Confirm the requirement with LEED online Form for each energy credit.***== | Team 7 | |
| **Building Operations, Martial Consumption** | | | |
| Week 9<br><br>T, 10/20 | - Building operations and material consumption overview | Overview | |
| | - Ongoing purchasing and waste policy<br>- Facility maintenance and renovation policy<br>- Purchasing-ongoing<br>- Purchasing-lamps<br>- Purchasing- facility maintenance and renovation<br>- Solid waste management-ongoing<br>- Solid waste management-facility maintenance and renovation | Team 8 | |

| | *In class: Breakout session*<br>- Each team review their assigned credits and assess for meeting the requirement for Lacrosse project. Make a list of back up documentations needed. Confirm with LEED online credit Form too.<br>- Each team review the documentations for each credit from last semester.<br>- Develop policies associated with this module<br>- Discuss and decide Campus or building approach | | |
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| colspan=4 align=center | **Indoor Environmental Quality, Health and Wellbeing** |||

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| Week 10<br><br>T, 10/27 | - Building indoor environmental quality and health and wellbeing overview | Lecture | |
| | - Minimum indoor air quality performance<br>- Environmental tobacco smoke control<br>- Indoor air quality management program<br>- Enhanced indoor air quality strategies<br>- Thermal comfort<br>- Interior lighting<br>- Daylight and quality views | Team 9 | |
| | *In class: Breakout session*<br>- Each team review their assigned credits and assess for meeting the requirement for Lacrosse project. Make a list of back up documentations needed. Confirm with LEED online credit Form too.<br>- Each team review the documentations for each credit from last semester.<br>- Develop policies associated with this module<br>- Discuss and decide Campus or building approach<br><mark>Guest Speaker, Commissioning, Sanjyot Bhusari</mark> | All Teams | |
| **Indoor Environmental Quality, Health and Wellbeing** |||
| Week 11<br><br>T, 11/3 | - Green cleaning policy<br>-Green cleaning-custodial effectiveness assessment<br>-Green cleaning products and materials<br>-Green cleaning –equipment<br>-Integrated pest management<br>-Occupant comfort survey | Team 10 | |
| | *In class: Breakout session*<br>- Each team review their assigned credits and assess for meeting the requirement for Lacrosse project. Make a list of back up documentations needed. Confirm with LEED online credit Form too.<br>- Each team review the documentations for each credit from last semester.<br>- Develop policies associated with this module<br>- Discuss and decide Campus or building approach | All Teams | |
| **Quality Control of the Documentations** |||
| Week 12<br><br>T, 11/10 | - Each team to review the documentations and all backup information for each credit<br>- Each team to upload information into Canvas on the team's page<br>- Review all policies and pre-requisites including:<br>    &#10148; Site management policy<br>    &#10148; Indoor water use reduction<br>    &#10148; Building level water metering<br>    &#10148; Energy efficiency best management practices | All Teams | |

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|---|---|---|---|
| | ➢ Minimum energy performance<br>➢ Building level energy metering<br><br>- Review Energy Star Rating<br><span style="background:lightgreen">**Field trip to LEED building**</span> | In Class | |
| Week 13<br>T, 11/17 | - Review all policies and pre-requisites including:<br><br>➢ Fundamental refrigerant management<br>➢ Ongoing Purchasing & Waste Policy<br>➢ Facility maintenance and Renovation Policy<br>➢ Minimum Indoor Air Quality Performance<br>➢ Environmental Tobacco Smoke Control<br>➢ Green Cleaning Policy<br>- Review LEED certification process<br><br>- Each project team member to upload his/her credit docs to LEED online<br>- Share the documentation for three policies with peer review.<br><span style="background:yellow">**Group review for policies and credits**</span> | | |
| <td colspan="3" align="center" style="background:#6699cc">**Exam 2, none cumulative, covers material from week 8 to end**</td> |
| <td colspan="3" align="center" style="background:#8cc63f">**Develop the Final Presentation and Report for the Stakeholders**</td> |
| Week 14<br><br>T, 11/24 | - Final report discussion, all teams to work together for one combined final report<br>- Final PowerPoint presentations & discussion<br>- Each team develop a PowerPoint for stakeholder (what to be presented? Questions/concerns)<br>- Review of the course, strategies, now/other approaches, challenges, and lessons learned<br><br><span style="background:yellow">**-Submit the completed credits on LEED online for certification**</span> | All Teams<br><br>In Class | |
| <td colspan="3" align="center" style="background:#8cc63f">**LEED Green Associated (GA) exam review**</td> |
| Week 15<br><br>T, 12/1 | - Review LEED accreditation exam<br> - Registration for the exam<br> - Preparation for the exam<br> - Review sample exam questions | All Teams<br><br>In Class | |
| <td colspan="3" align="center" style="background:#8cc63f">**Final Presentations and Submission**</td> |
| Week 16<br>T, 12/8 | - Final report and /or presentation due by noon<br><br>- <span style="background:yellow">***Presenting Video for the team that decided to develop a video for The final. This is highly recommended.***</span> | All Teams<br><br>In Class | |
| <td colspan="3" align="center" style="background:#8cc63f">**Final Presentations and Submission (Cont.)**</td> |
| Week 17<br><br>T, 12/15 | - Final report and /or presentation due by noon<br><br>- <span style="background:yellow">***Presenting Video for the team that decided to develop a video for The final. This is highly recommended.***</span> | All<br><br>In Class | |