

Construction Management Program
School of Planning, Design and Construction

CMP (891) 491 - (Advanced) Green and Energy Efficient Construction

Spring 2018

Part 1: Course Information

Instructor Information

Instructor I: Sinem Mollaoglu, PhD, LEED AP, CGP

Office: 201D Human Ecology

Office Hours: Monday 12:15 - 2:15 PM or by appointment

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Instructor II: George H. Berghorn, PhD, LEED AP, BD+C, CGP

Office: 302E Human Ecology

Office Hours: Monday 3:00 - 5:00 PM or by appointment

Office Telephone: 517-353-8756

E-mail: berghorn@msu.edu – preferred way of contact

Meeting Time and Location

Lecture & Lab : M W 10:20 AM - 12:10 PM
106 Human Ecology

Lab (when noted in the schedule) : 117 Central Services (CM Lab)

Course Description

A study of the best building practices in building construction, based upon the Leadership in Energy and Environmental Design and National Green Building Standard, and other national programs. Course content includes partial fulfillment of the requirements for the Certified Green Professional designation (CGP) from the National Association of Home Builders. Specific content includes concepts and measures of sustainability and green building, energy and hygrothermal simulation, and energy efficient technologies, practices, and methods for building construction.

Prerequisites

1. Open to undergraduate and graduate SPDC students.
2. Students must be a member of the NAHB student chapter.

Textbook & Course Materials

1. LEED Green Associate Candidate Handbook to be downloaded at:
<http://www.usgbc.org/resources/leed-v4-green-associate-candidate-handbook>
2. Green Building for Building Professionals, NAHB Education.
3. Business Management for Building Professionals, NAHB Education.
** Books will be ordered through the NAHB Student Chapter.

To obtain the Certified Green Professional Designation from NAHB, you are required to pass the NAHB exams and either graduate from the SPDC / CM Program or provide documentation of two (2) years residential construction experience. The NAHB graduation fee is paid by HELP grant.

Additional Resources:

- LEED- v.4 – Building Design and Construction, Reference Guide.
- National Green Building Standards (NGBS) ICC 700-2008.
- Remodeling Magazine - www.remodeling.hw.net/
- Qualified Remodeler Magazine – www.qualifiedremodeler.com/
- Residential Design & Build Magazine – www.rdbmagazine.com/
- Ecological footprint <http://www.myfootprint.org/>
- Carbon footprint <http://www.carbonfootprint.com/>
- Whole Building Design Guide <http://www.wbdg.org/>
- National Institute of Building Sciences <http://www.nibs.org/>
- LEED <http://www.usgbc.org>
- Green Globes <http://www.greenglobes.org/>
- High Performance Green Building Database <http://www.eere.energy.gov/buildings/highperformance/>
- Environmental Building News <http://www.buildinggreen.com>
- MI Department of Environmental Quality <http://www.michigan.gov/deq>
- Additional printable resources will be identified in-class and/or provided on D2L.
- Freely-available life cycle assessment, energy simulation, and hygrothermal performance software and relevant instructional guides, as provided in class.

Course Requirements

- Internet connection (DSL, LAN, or cable connection desirable)
- Access to Desire 2 Learn
- D2L will be used to post documents throughout the semester. Students are responsible for keeping track of the announcements, course material, etc. on the D2L course website. Enable e-mail forwarding option on your D2L settings.

Course Structure

This is a 4 hour per week lecture and lab format course. In-class questions and discussion are encouraged and will add to your experience in the class. We make significant use of D2L for the class to communicate calendar/schedule adjustments, assignment information, additional readings, relevant and interesting news items, and supplemental learning resources; it is your responsibility to keep current with information posted to the site.

Written and Oral Communications Assistance

The School of Planning, Design and Construction Communication Center is available to SPDC students, and is located in Human Ecology Building, Room 102. The Communication Center can help with the following:

- Outlining, editing and proofreading papers;
- Resumes and cover letters;
- Thank you letters;
- Design concepts and descriptions;
- Writing research papers, literature reviews and thesis chapters;
- Memos, proposals and executive summaries; and

To take advantage of these opportunities, stop by the SPDC Student Services Office to make an appointment and request assistance with whatever you need. The Communication Center is open 9:30am-4:30pm Monday-Thursday, closed for lunch 12-1pm.

Technical Assistance

If you need technical assistance at any time during the course or to report a problem you can:

- Visit the [Distance Learning Services Support Site](https://www.lib.msu.edu/dls/) (<https://www.lib.msu.edu/dls/>)
- Visit the [Desire2Learn Help Site](http://help.d2l.msu.edu/) (Desire to learn help) (<http://help.d2l.msu.edu/>)
- Or call Distance Learning Services: (800) 500-1554 or (517) 355-2345

Resource Center for Persons with Disabilities (RCPD)

- To make an appointment with a specialist, contact: (517) 353-9642 or TTY: (517) 355-1293
- Web site for RCPD: [RCPD My Profile](http://myprofile.rcpd.msu.edu/) (<http://myprofile.rcpd.msu.edu/>)

Part 2 Learning Outcomes

The following learning outcomes are planned for this class and support our overall CM program learning outcomes. You will be assessed to see if you have accomplished them. At the end of this class you should be able to do the following:

Upon completion of the course, students will:

1. Create oral presentations appropriate to the construction discipline. (SLO-02)
2. Analysis of professional decisions based in ethical principles. (SLO-06)
3. Understanding different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process. (SLO-12)
4. Understand the basic principles of sustainable construction. (SLO-18)

You will meet the objectives listed above through a combination of the following activities in this course:

Attendance and participation

Course examinations

Lab assignments

Group projects

Part 3: Course Outline/Schedule

This is the tentative class schedule. It may be changed, but your instructor will try to keep on schedule, however, certain topics may require more or less time than allocated considering varying student backgrounds. Each student will be responsible for keeping abreast of all changes that will be announced during class periods on an as needed basis.

The table below describes the weekly activities including week, topic, readings, activities, and due date. The first two columns describe the week and date respectively. The third column describes the topic. The fourth column describes the readings. The fifth column describes the key dates and important notes. The sixth column lists the instructor for the week.

Week/Date		Topic	Reading	Important Notes	Instructor
Wk 1	1/8 (M)	What is sustainability anyways?	D2L	No class – Students are to complete reading assignments and quizzes in Week #1 folder by 1/10: Ecological Footprint	Mollaoglu
	1/10 (W)	What is sustainability anyways? / Introductions / LEED Overview	D2L	Homeland-Roberta Grossman Video	Mollaoglu
Wk 2	1/15 (M)	Martin Luther King Day – No class			
	1/17 (W)	Guest Speaker – Prof. Mrozowski – Experiences on LEED Project(s)	D2L		Mollaoglu
Wk 3	1/22 (M)	Making the case for green – Intro. to Sustainable Built Environment	D2L		Mollaoglu
	1/24 (W)	LEED Introduction / Water Efficiency	D2L		Mollaoglu
Wk 4	1/29 (M)	Location & Transportation/ Sustainable Sites	D2L	LEED Quiz #1 – Introduction & Water	Mollaoglu
	1/31 (W)	Energy & Atmosphere	D2L	LEED Quiz #2 – LT & SS	Mollaoglu
Wk 5	2/5 (M)	Materials & Resources	D2L	LEED Quiz #3 – EA	Mollaoglu
	2/7 (W)	Indoor Environmental Quality	D2L	LEED Quiz #4 – MR	Mollaoglu
Wk 6	2/12 (M)	ID / Regional Priority	D2L	LEED Quiz #5 – IEQ	Mollaoglu

Week/Date	Topic	Reading	Important Notes	Instructor	
	2/14 (W)	Integrative Design / Synergistic Points	D2L	LEED Quiz #6 – ID&RP	Mollaoglu
Wk 7	2/19 (M)	Lab Assignment – Review of LEED Scorecards	D2L	Meet in 106 Human Ecology Building Lab #1 Due	Mollaoglu
	2/21 (W)	Integrated Approach to Project Delivery High Performance Green Buildings	D2L	LEED Quiz #7 – All Sections	Mollaoglu
Wk 8	2/26 (M)	Field Trip	D2L		Mollaoglu
	2/28 (W)	Exam #1	None	Alternative & Suggested Exam: LEED GA EXAM	Mollaoglu
SPRING BREAK 3/5 – 3/9					
Wk 9	3/12 (M)	Lecture: Life Cycle Assessment; Discuss Energy Modeling Project	D2L		Berghorn
	3/14 (W)	Lecture: Air Leakage	D2L	Complete NAHB Green Building Modules 1-5 by 3/17	Berghorn
Wk 10	3/19 (M)	Lecture: Thermal Transfer	D2L	Complete NAHB Green Building Modules 6-10 by 3/29	Berghorn
	3/21 (W)	Lab: Building Science Lab #1: Heat Flux Measurements	None	Meet in 117 Central Services Building	Berghorn
Wk 11	3/26 (M)	Lecture: Thermal Transfer and Water Transport	D2L		Berghorn
	3/28 (W)	Lab: Building Science Lab #2 – Layer Heat Flux Measurements	None	Meet in 117 Central Services Building Lab #2 Due	Berghorn
Wk 12	4/2 (M)	Lecture: Thermal Transfer and Water Vapor Transport	D2L		Berghorn

<u>Week/Date</u>	<u>Topic</u>	<u>Reading</u>	<u>Important Notes</u>	<u>Instructor</u>	
	4/4 (W)	Lab: Building Science Lab #3 – Blower Door Test	None	Location TBD Lab #3 Due Exam #2: NAHB Green Building Exam Results Due (4/6)	Berghorn
Wk 13	4/9 (M)	Lecture: Putting it all Together in an Energy Audit	D2L		Berghorn
	4/11 (W)	Lab: Building Science Lab #4 - Energy Audit Calculations	None	Location TBD Online Building Science Quiz Due Lab #4 Due	Berghorn
Wk 14	4/16 (M)	Lecture: Business Management for Building Professionals I	BMBP		Berghorn
	4/18 (W)	Lecture: Business Management for Building Professionals II	BMBP		Berghorn
Wk 15	4/23 (M)	Lecture: Business Management for Building Professionals III	BMBP		Berghorn
	4/25 (W)	Lecture: Course Wrap-up	None	Energy Audit Report Due	Berghorn/ Mollaoglu
FINAL EXAM (EXAM #3: NAHB BUSINESS MANAGEMENT AND ENERGY MODELING PRESENTATIONS) Thursday MAY 3, 2018 7:45AM-9:45AM 106 HUMAN ECOLOGY BLDG					

Part 4: Grading Policy

Assessment Methods:

Tests/Exams: There will be three (3) exams, two (2) of which are required by the NAHB for the Certified Green Professional Designation (Green Building for Business Professionals and Business Management for Building Professionals). One (1) exam will be given to assess student learning on Sustainability concepts, Leadership in Energy and Environmental Design Guidelines, and Integrative Project Delivery. Students will be able to opt out of this exam if they pass the LEED GA exam and provide their official report cards to the instructor.

Quizzes, Homeworks, and Lab Assignments: Seven (7) quizzes will be given to assess student learning on elements of Leadership in Energy and Environmental Design Building Assessment System. Four (4) lab assignments will focus on building science elements.

Building Science Quiz: One (1) online (D2L) quiz will be given to assess student learning on building science elements of the course.

Energy Modeling Assignment: Graduate students will use eQuest, BEopt, or WUFI to answer a building energy use question of their choosing. Individual consultations should be scheduled with Professor Berghorn no later than midterm.

Energy Audit Report: Working in groups of two, students will be required to submit a residential energy audit report based on parameters provided in class.

Grading: Grades will be based upon the total accumulation of points. Each assignment will be graded as objectively as possible, evaluating the student's knowledge of the material and the quality of the work performed.

<u>Assignment</u>	<u>Pts</u>
Exam #1: Sustainability, LEED, and Integrative Project Delivery	125
Exam #2: NAHB Green Building Exam	75
Exam #3: NAHB Business Management Exam	75
Quizzes, Homeworks, and Lab Assignments	100
Building Science Quiz	100
Energy Audit Report	75
Energy Modeling Assignment (Grad Students Only)	75
Total	550 / 625 (for graduate students)

Grading Scale (Cutoffs)	
4.0	≥92%
3.5	86%
3.0	80%
2.5	77.5%
2.0	75%
1.5	72.5%
1.0	70%
0.0	< 70%

Late Work Policy

Late assignments will be discounted by 25% per each day late.

Viewing Grades

Exams, assignments, lab assignments, and final project elements will generally be returned within one week. You may see all of your grades at any time by meeting with me; all grades will also be posted in D2L. Grade appeals should be addressed by making an appointment to see me in my office – all appeals must be initiated within one week of the returned exam or assignment. I encourage you to visit with me, at any time, to ask questions regarding grades or any other topic.

Part 5: Course Policies

Complete Assignments

Assignments for this course will be submitted in hard copy unless otherwise instructed. Assignments must be submitted by the beginning of the class period for a given due date, unless another deadline is specified; otherwise, special permission must be requested from instructor before the due date. Extensions will generally not be given, unless under extreme circumstances.

Inform Your Instructor of Any Accommodations Needed

From the Resource Center for Persons with Disabilities (RCPD): Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at rcpd.msu.edu. Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form. Please present this form to me at the start of the term and/or two weeks prior to the accommodation date (test, project, etc.). Requests received after this date may not be honored.

Commit to Integrity: Academic Honesty

Article 2.3.3 of the [Academic Freedom Report](#) states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the (insert name of unit offering course) adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See [Spartan Life: Student Handbook and Resource Guide](#) and/or the MSU Web site: [MSU Home Page](#).)

Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the www.allmsu.com Web site to complete any course work in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also the [Academic Integrity](#) webpage.)

Attendance

1. Students whose names do not appear on the official class list for this course may not attend this class.
2. Punctual arrival to class is a must. Arriving late to class is disrupting to your classmates and to the instructor. In general, if you expect to be delayed in coming

to class, you must inform the instructor beforehand of your particular need and situation.

3. Attendance of all classes and lab sections is necessary to master the material in this course and perform successfully on examinations and term project assignments. You are responsible for learning any material covered while you were absent. In cases of excused absence, you must present appropriate university- approved substantiation to the instructor.
4. No make-up assignments will be given.
5. All students are expected to take exams when scheduled. There will be no make-up exams.
6. Missing class to participate in a required activity. To be excused from this class to participate in a required activity for another course or university-sanctioned event, you must provide the instructor with adequate advanced notice (a minimum of one week) and a written authorization from the faculty member of the other course or from a university administrator.
7. You are encouraged to participate in the class discussion and ask questions.
8. An attendance sheet will be circulated at each class meeting per NAHB requirements.
9. The NAHB-specific PowerPoint slides will not be posted to D2L.

Participation

Students are expected to participate in all activities as listed on the course calendar. Regular attendance is an expectation of this class. Students are expected to attend all classes and be prepared ahead of class to discuss the material. For the final project and labs you will be working in teams. Each member is responsible for his/her part so as to not delay the team's progress. You are expected to act in a professional and courteous manner with your fellow team members at all times. If you have an issue with a team member please see me.

Build Rapport

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the semester so that we can help you find a solution.

Understand When You May Drop This Course - Drops and Adds

It is the student's responsibility to understand when they need to consider un-enrolling from a course. Refer to the [Michigan State University Office of the Registrar](#) for important dates and deadlines.

The last day to add this course is the end of the 5th day of classes. The last day to drop this course with a 100 percent refund and no grade reported is 1/4th through the semester. The last day to drop this course with no refund and no grade reported is the middle of the semester. You should immediately make a copy of your amended schedule to verify you have added or dropped this course.

Limits to Confidentiality

Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that

University employees, including instructors, may not be able to maintain confidentiality when it conflicts with their responsibility to report certain issues to protect the health and safety of MSU community members and others. As the instructors, we must report the following information to other University offices (including the Department of Police and Public Safety) if you share it with us:

- Suspected child abuse/neglect, even if this maltreatment happened when you were a child,
- Allegations of sexual assault or sexual harassment when they involve MSU students, faculty, or staff, and
- Credible threats of harm to oneself or to others.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual. If you would like to talk about these events in a more confidential setting you are encouraged to make an appointment with the MSU Counseling Center.

Commercialized Lecture Notes

Commercialization of lecture notes and university-provided course materials is not permitted in this course.*

*Note: The Code of Teaching Responsibility requires instructors who permit students to commercialize their class lecture notes to include a statement in their course syllabi that gives such permission. Absent such permission, students may not do so.

Disruptive Behavior

Article 2.III.B.4 of the [Academic Freedom Report \(AFR\)](#) for students at Michigan State University states: "The student's behavior in the classroom shall be conducive to the teaching and learning process for all concerned." Article 2.III.B.10 of the [AFR](#) states that "The student has a right to scholarly relationships with faculty based on mutual trust and civility." [General Student Regulation 5.02](#) states: "No student shall . . . interfere with the functions and services of the University (for example, but not limited to, classes . . .) such that the function or service is obstructed or disrupted. Students whose conduct adversely affects the learning environment in this classroom may be subject to disciplinary action through the Student Judicial Affairs office.

SIRS FORMS

Michigan State University takes seriously the opinion of students in the evaluation of the effectiveness of instruction, and has implemented the SIRS (Student Instructional Rating System) process to gather student feedback. This course utilizes the online SIRS system. You will receive an e-mail sometime during the last two weeks of class asking you to fill out the SIRS online form at your convenience.

Please note the final grade for this course will not be accessible on STUINFO for seven days following the University grade submission deadline published by the Office of the Registrar unless the SIRS online form has been filled out. You will have the option in the online SIRS form to decline to participate in the evaluation of the course we hope, however, that you will be willing to give us your frank and constructive feedback so that we may instruct students even better in the future.

Religious Observance

If a student wishes to be absent from class to observe a religious holiday, the student must make arrangements with the instructor at least one full week in advance of the class to be missed.

Social Media Policy

Any video or audio recording must be approved in advance.

Classroom Use of Technology

Cell phones should be put into the “silent” mode during class. If you receive a call or a text message that you must answer during class, quietly leave the room to do so, and return quietly upon completing your call.

Laptops are not allowed in lecture. If you have a legitimate need to use them during lectures, please see us during my office hours and we can discuss your needs.

We may periodically make use of smart phones/tablets in class for learning activities, so feel free to bring those devices and operate them when called to do so. Any non-learning use and/or disruption of the classroom environment resulting from misuse of technology will result in the loss of the entire class' ability to use such during class.

Approval to use Classroom Photographs

The School of Planning Design and Construction wishes to use classroom photos on the SPDC website. An approval form has been provided at the end of this syllabus, for you to indicate approval or lack of approval for SPDC to use or not use any photos taken in this class.

Part 6: Other Course Information

Enabling Learning Objectives:

1. Explain the goals of the Leadership for Energy and Environmental Design and National Association of Home Builders Green Building Guidelines, and the potential benefits of building green for both building professionals and residents.
2. Explain the relationship between building science and the disciplines of green building and remodeling, including:
 - Site/lot design and development
 - Resource efficiency
 - Heat, Air, and Moisture
 - Energy Efficiency
 - Energy Simulations
 - Energy Audits
 - Water efficiency
 - Indoor environmental quality
 - Homeowner education and maintenance
3. Describe how to incorporate green building and the National Green Building Standard™ into a company's products or services.
4. Apply the key measures of business performance to a residential construction business.
5. Explain the key aspects of energy audits and whole building energy simulations for energy efficient residential construction.
6. Explain key aspects of innovative envelope materials to improve energy efficiency in new construction and retrofit home projects.
7. Incorporate innovative technologies in decision making and construction for energy efficient homes.
8. Describe residential energy code in Michigan and how it relates to green and energy efficient construction practices.
9. Conduct whole building energy simulations on residential construction projects and be able to make decisions on technology, envelope material, and innovative solutions to make residential building projects more energy efficient.