

EVST 495.02 Green Building - Sustainability and Architecture:
strategies for Design, Construction, and Operation.

Tu-Th 6:10-7:30 pm Rankin Hall, Rm 204

Instructor: Andy Lemann, **Email:** andrew.lemann@mso.umt.edu
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Office Hours: Tue 5:15-6:00 pm and Thu 5:15-6:00pm: Rankin Hall, Room 107.

Teaching Resources: Russ Hellem, Steve Loken, Brian Kerns.

Course Purpose: The course is a broad introduction to the field of Green Building. It is designed to introduce students to the fundamental principles of Green Building, Energy Efficiency, Passive Solar Design, and a variety of Green Building Certifications including the US Green Building Council's LEED® program. By utilizing LEED case studies, this course will analyze environmental impacts required for the built environment and methodology for reducing these impacts. (As much as possible it is intended for the course to be paperless. Assignments, reading materials, etc will be done online).

Texts:

No books will need to be purchased for the class. Required reading material will be available online. Reference may be made to the following publications:

Chiras, Daniel D. 2002. *The Solar House: Passive Heating and Cooling*. Chelsea Green Publishing Company, VT.

Lstiburek, Joseph. 2006. *Builder's Guide to Cold Climates: A systems approach to designing and building homes that are safe, healthy, durable, comfortable, energy efficient, and environmentally responsible*. Building Science Press.

Pearson, David. 1998. *The New Natural House Book: Creating a Healthy, Harmonious, and Ecologically Sound Home*. Fireside, NY.

Tentative Syllabus (subject to change at any time)

Week 1

Tue, Aug 31 **What is Green Building? Instructor to lead class discussion on the principles of Green Building. Class to prioritize a list of the most important concepts. (AL)**

HW: Read online material, answer short quiz, email answers to instructor by Wednesday, 5pm.

Week 1

Thu, Sept 2 **Pot luck at UM FLAT – Introduction to the UM FLAT and to the aims of the class plus student projects for the semester - instructor will explain the goals, timetable, and grading expectation for the semester and outline student project requirements with examples of previous work.**

Week 2

Tue, Sept 7 **Building Basics - introduction to common building terminologies and practices**

HW: Quiz, email answers to instructor by Sunday, 5pm

Week 2

Thu, Sept 9 **Site Visit - to home(s) under construction to see Building Basics in action**

HW: Quiz, email answers to instructor by Sunday, 5pm. Decide on project topic and email outline to instructor by Sunday, 5pm.

Week 3

Tue, Sept 14 **Introduction to Green Building Certifications – comparing some of the different national programs (AL)**

HW: Register with either USGBC or NAHBGreen and commence rating for a theoretical home

Week 3

Thu, Sept 16 **Computer Lab - continue working on green building rating - instructor will be available to answer questions**

HW: Complete green building rating - email report to instructor by 5pm Sunday

Week 4

Tue, Sept 21 **Simple techniques for creating a house model and placing it on a site using Google SketchUp® and Google Earth®. (AL)**

HW: Begin working through online lessons for using SketchUp® and Google Earth® as design tools.

Week 4

Thu, Sept 23 **Computer Lab - continue working through SketchUp® and Google Earth® lessons** - instructor will be available to answer questions

HW: Email completed .skp files to instructor by Sunday, 5pm

Week 5

Tue, Sept 28 **Energy Efficiency and Building Science in practice (RH)**
Introduction to concepts of Integrated Design and Performance Based Design

HW: HW: Read online material

Week 5

Thu, Sept 30 **Site Visit – Russ Hellem Duplex (RH)**

HW: For each item in the class' list of top ten green building principles describe one thing that the building does well and one thing that it could do better. Read online material and answer short quiz. Email answers to instructor by Sunday, 5pm.

Week 6

Tue, Oct 5 **Passive Solar Design Principles (AL)** Site Selection, Orientation, Windows, Eave Overhang, Room Layout

HW: Read online material

Week 6

Thu, Oct 7 **Passive Solar Design Principles (AL)** Insulation, Thermal Mass, Air sealing, Ventilation, Landscaping

HW: Read online material

Week 6

Sat, Oct 9 **Full-Day Field Trip to view Straw Bale, Earthship, and other Green Building projects in Bitterroot Valley** (Attendance optional due to weekend date)

Week 7

Tue, Oct 12 **Passive Solar Design summary and examples. (AL)**

HW: Read online material and answer quiz. Email answers to instructor by Sunday, 5pm

Week 7

Thu, Oct 14 **Site Visit – Tom Hellem House (RH)**

HW: For each of the ten passive solar design principles give the house a score between 0 and 10 and briefly describe why you give it that score. Email answers to instructor by Sunday, 5pm

Week 8

Tue, Oct 19 **Site Visit – Maumenee House (RH)**

HW: For each of the ten passive solar design principles give the house a score between 0 and 10 and briefly describe why you give it that score. Email answers to instructor by Sunday, 5pm

Week 8

Thu, Oct 21 **Guest Presenter – Green Building in Practice - Nationally recognized Green Building champion and Missoula resident, Steve Loken**

HW: Quiz, email answers to instructor by Sunday, 5pm

Week 9

Tue, Oct 26 **Introduction to Alternative Energy systems. (AL, BK)**

Week 9

Thu, Oct 28 **Site visit – Alternative Energy Projects. (BK)**

HW: Quiz, email answers to instructor by Sunday, 5pm

Week 10

Tue, Nov 2 **ELECTION DAY NO CLASS**

Week 10

Thu, Nov 4 **Computer Lab - Work on Student Projects (AL) instructor will be available to answer questions**

HW: Continue working on Student Projects

Week 11

Tue, Nov 9 Green Building Rating Systems - regional and national programs (AL)

HW: Essay topic - "Do Rating Systems make for Greener Buildings?" Read online material and email essays to instructor by Sunday, 5pm

Week 11

Thu, Nov 11 VETERAN'S DAY NO CLASS

Week 12

Tue, Nov 16 Site Visit – Native American Center, UM's first LEED certified building – tour and talk on UM's Green Building Program by campus architect, Jameel Chaudhry

Week 12

Thu, Nov 18 Site Visit – Missoula Federal Credit Union, Russell Street branch – Missoula's only LEED® rated Platinum building.

HW: HW: For each item in the class' list of top ten green building principles describe one thing that each of the buildings toured this week does well and one thing that it could do better. Email answers to instructor by Sunday, 5pm

Week 13

Tue, Nov 23 Computer Lab - Work on Student Projects (AL) instructor will be available to answer questions

HW: Continue working on Student Projects. Completed projects due Sunday, 5pm.

Week 13

Thu, Nov 25 THANKSGIVING VACATION NO CLASS

Week 14

Tue, Nov 30 Presentation of Student Projects (AL)

Week 14

Thu, Dec 2 Presentation of Student Projects (AL)

Week 15

Tue, Dec 4 Presentation of Student Projects (AL)

Week 15

Thu, Dec 6 Pot Luck - location TBA - concluding class discussion

Assignments and Grading

Weekly assignments: There will be short assignments, reports and quizzes due most weeks by Sunday, 5pm (unless otherwise noted). Each assignment will count for 2-10% of the final grade at the instructor's discretion. The total for all of these will account for 50% of the final grade.

Student project: Student project topics will be flexible. There will be a standard project as described below but students may elect to complete an alternate project if there is a topic in which they are particularly interested. **Standard Project:** Students will design a green home, create a 3D model of it using Google SketchUp®, select a site for it, place the model on the site using Google Earth®, perform a solar study on it, write a list of the Green Features of the design, and rate it using one of the national Green Building rating systems (the National Green Building Standard or LEED® for Homes). (**Graduate students** can choose to either perform an Energy Model on their design **or** rate their home using **both** the National Green Building Standard **and** LEED® for Homes and compare the two rating systems). **Alternate Project:** topic and methodology must be approved by instructor. Outline must be emailed to instructor by conclusion of Week 2. Changes to topic or methodology must be emailed to and approved by instructor.

Final project presentations will be given in class on the dates shown above. Each undergraduate student will have 10 minutes in which to present the results of their project. If a Standard Project is chosen they will show their 3D model, briefly describe their design and its Green Features, present the results of their Green Building rating, and explain what makes their home green according to the class' list of top ten Green Building principles. (Graduate students will have 15 minutes in which to present their projects as above plus describe their energy model and results, or give a comparison of the two Green Building rating systems used). **Grading of presentations** - The final presentations will be scored by each member of the class and the final grade will be compiled from these scores. Students will be expected to supply a justifiable set of grades for the rest of the class (not their own project) otherwise their own grade may be reduced accordingly. Presentations will account for 25% of the final grade.

Failure to complete an assignment will result in a zero for that assignment grade. The above assignments will account for 75% of the final grade.

Attendance:

The class is intended to be an interactive experience where students and instructors learn from each other. Therefore attendance and enthusiastic participation will account for a significant portion of the final grade. Make-ups may not be possible and only those arranged ahead of the class period will be permitted. This requires that you contact the lead instructor, Andy Lemann by e-mail or phone prior to class if you are sick or cannot otherwise attend. Any work missed due to an excused absence will be able to be made up by the end of the week following the student's return to class.

Attendance and participation will account for 25% of the final grade.

Learning Objectives

- 1 Understand the fundamental principles of Green Building.
- 2 Understand the principles of Energy Efficient Design, Passive Solar Design, Integrated Design, and Performance Based Design.
- 3 Understand and implement basic building design skills using Google SketchUp® and Google Earth®.
- 4 Understand general principles of alternative energy systems.
- 5 Understand the fundamentals of Green Building rating systems including the USGBC's LEED® Rating System.
- 6 Gain skills in researching and presenting Green Building concepts.
- 7 Develop written, visual, and oral communication skills.
- 8 Graduates to understand fundamentals of Energy Modelling or comparison of different Green Building rating systems.