Cornell U. AAP CRP 3850/6593 Sp.Tp.: Intro to Green Real Estate:
Examining Elements of Environmental Sustainability in Buildings

Cornell University, AAP, Spring 2017, 3 credits, letter grade
Class meetings: Tue. & Thu. 1:25-2:40pm in 101 Sibley Hall

Instructor: Patrick P. Charles, pcharles@cornell.edu
Office Hours: Tue. & Thu. 2:45-4:00pm, Fri.9:00-9:55am and by appointment
            online booking at: pcharles.youcanbook.me
Office: East Sibley B54

I. Course Description
Environmentally sustainable practices and technologies are integral aspects of real estate
development in a green economy. “Introduction to Green Real Estate” introduces students to
what makes buildings environmentally sustainable, among which figures site- and climate-
responsiveness as well as intelligent resource allocation and management. Human comfort and
basics of building physics are similarly reviewed in the course. The course emphasizes how a
whole-system-oriented approach, life cycle analysis, and a collaborative design process are
essential pre-conditions to the delivery of superior sustainable real estate projects. While the
course promotes a “back to the basics” of physics, comfort, and climate approach as the basis
for innovation, LEED and other green certification programs as well as green codes, incentives
and regulations are also part of the discussion. “Introduction to Green Real Estate” qualifies as
one of the “Development and Sustainability” concentration electives courses of Cornell’s Baker
Program in Real Estate.

II. Rationale
Global warming is a momentous challenge. It is less an energy or resource depletion issue than
it is a material crisis: our societies produce CO2 and other greenhouse gases (GG) at
overwhelming levels for many of earth’s ecosystems. Throughout their lifetime, buildings,
especially the average kind ones, consume a lot of resources and energy, and are responsible
for sizable GG emissions as well as large quantities of landfill-bound by-products.

Better, more-sustainably-designed buildings are part of the solution, as do the retrofit of
outdated existing buildings in our already extensively built-up societies. Around the world, a
growing number of genuine attempts are made to design comfortable, healthy, aesthetically
pleasing, and easy to recycle buildings that also minimally adversely impact the environment.
However, all is not always perfect with these well-intentioned efforts, on many an occasion,
post-occupancy studies reveal that various sustainability goals have not been achieved. Sadly
but predictably, the societal demand for more environmentally green products and real estate
has attracted unscrupulous actors who advertise as green buildings what are essentially
“business-as-usual” constructions adorned with a few token gadget-like “green features.”
III. Course Aims and Objectives:

Aims
CRP 3850/6593 SpTp.: Intro to Green Real Estate aims to:
- Expose students to a corpus of contemporary compelling international environmentally sustainable buildings that share a common design attitude of going “back to the basics” of physics, comfort, and climate in order to innovate beyond green certifications and other codes and regulations.

- Equip students with such notions of building physics, climate, passive solar design strategies, and human comfort, etc, to enable them to better understand how buildings actually work in order to be in a better position to evaluate sustainability claims made about them.

- Acquaint student with the collaborative process within which good “concept-based”/whole-system sustainable design can flourish; Help students prepare for their future contribution to the multidisciplinary endeavor that is the design and development of green buildings/real estate, be it through a clearer vision or a better aptitude to ask questions from designers, engineers, consultants, or other participants and stakeholder to the building delivery process.

Specific Learning Objectives:
At the end of this course the student should have an introductory understanding of:
- basic building physics and their potentially innovative impact on design;
- the difference between radiative, convective and conductive modes of heat transfer as they relate to building interaction with the environment and occupant comfort;
- how to analyze a climate using a typical meteorological file;
- the impact of room orientation, and solar shading needs;
- human thermal comfort, the meaning of operative temperature and its impact on different ways of delivering thermal comfort;
- principles of daylighting and its importance to occupant comfort;
- the basic principles of how wind interacts with a building;
- the basic principles of wind- and stack-driven natural ventilation, and particular implementation strategies in demanding urban contexts;
- green walls, green roofs, and their role at the building and urban level
- the difference between “concept-based” vs. “product-based” sustainable design approaches;
- the benefit a non-linear, collaborative design process in delivering high performance sustainable buildings /real estate;
- how to proceed to analyze a building claimed to be sustainable;
- various green building ratings systems, their benefits and their limitations;
IV. Format and Procedures:
Learning in this course is supported primarily by lecture content research undertaken by the students. To keep the class engaging, the format will vary somewhat to include guest lectures, in-class labs including hands-on activities, and one on-campus site visit. Student participation in all activity is a necessary condition to the existence of a lively and supportive learning community.

The course content, schedule and delivery method are subject to change without prior notice.

Assignment: In this course, students in pairs or individually research, analyze, and document a building from a whole-system, concept-based perspective. The case study-like research encompassed multiple nested scales of analysis of the building, from occupant experience to urban livability in passing by climatic context and the geography of sourcing of materials and human talent. Students seek input from the design and development team to gain insights into how the building came to be and how it performs. The analysis should also touch upon aspects of the local regulatory and incentive context of the project, including the sustainability rating system(s), and other incentives that influenced the owner’s, developer’s and design team’s vision and decisions. The work of the semester culminates in the production of a well-organized and graphically-pleasing booklet presenting the researched building.

V. My Assumptions
This course assumes that you...
- come with a certain degree of dissatisfaction with the “business-as-usual” attitude in building design and real estate development, and are suspicious of the ambient “green-washing”,
- have question about green building rating systems, and think that they are an end in itself
- are willing to learn more about climate, human thermal comfort, basic building physics, passive solar design principles, active systems, and systems integration in order to form a more complete picture of environmentally sustainable design;
- are willing to engage in researching a building beyond a superficial internet search;
- are convinced that you can learn from your peers, and are determined to commit your full involvement in the class, including participation in discussions and asking questions, in order for you and for your peer to learn the most;
- will contribute, along with everyone else, to making the classroom a safe environment for anyone to raise any questions and voice any opinion.

VI. Course Requirements:
- Attendance: come to class unless you have flu-like symptom or death in the family. Repeated unexcused absences will have a negative impact on a student’s final grade.
- Course readings: there is no required textbook per se but a selection of readings will be posted on Blackboard for students to download or just handed out in class.
- Deadline: assignments must be submitted on the day they are due. Late submission could impact your grade negatively
- The research/precedent analysis/case study assignment unfolds over the whole semester and should proceed gradually. You need to make your best effort at collecting information so that when you get in touch with the design team and development team, you are already very
knowledgeable about the project and thus able ask precise questions. Your interlocutors will be grateful for it. This also will reflect positively on your degree program and the university at large. Perhaps, these initial contacts could translate one day in internship or other employment opportunity. Be as professional as you can be in your interaction with these people who generously contribute their time to your education.

-Expected travel for course (and expected expenses not covered by Dept.): N/A. Only one class meeting to take place in the Nevin Welcome Center at Cornell’s botanical garden.

**VII. Grading Procedures**

Grades will be based on:
- Attendance and participation: 20%
- Homework, in-class labs, review of another project: 10%
- Building research and analysis: 55%
- Booklet documentation: 15%

Undergraduate vs. graduate work will be reflected in the extend of the precedent analysis/case study.

**VIII. Academic Integrity**

Each student in this course is expected to abide by the Cornell University Code of Academic Integrity. [http://cuinfo.cornell.edu/Academic/AIC.html](http://cuinfo.cornell.edu/Academic/AIC.html)

Any work submitted by a student in this course for academic credit will be the student's own work, except in the cases of projects that are specifically structured as group endeavors. (Optional: For this course, collaboration is allowed in the following instances: list instances.)

You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students.

However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy.

Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment.

Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action.

**IX. Accommodations for students with disabilities**

In compliance with the Cornell University policy and equal access laws, I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances, so arrangements can be made. Students are encouraged to register with Student Disability Services to verify their eligibility for appropriate accommodations.
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<thead>
<tr>
<th>#</th>
<th>Date</th>
<th>Topic(s), Lecture</th>
<th>In-class Lab</th>
<th>Due on that date</th>
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<tbody>
<tr>
<td>1</td>
<td>01/26</td>
<td>Overview, Syllabus, Introduction Assign01 Find a sustainable building</td>
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<td>2</td>
<td>01/31</td>
<td>Why Sustainability in Real Estate?</td>
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<td>Read Guy &amp; Farmer</td>
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<td>3</td>
<td>02/02</td>
<td>A review of the basics of building physics: Understanding the physical world around us</td>
<td>Inverted / Lab?</td>
<td>Read Alcott</td>
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<td>Understanding Thermal Comfort-Potential for innovative paradigm changes within the construction and real estate industries</td>
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<td>Assign 01 proposal</td>
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<td>4</td>
<td>02/07</td>
<td>Climate, (and open spaces) Example of free-floating room simulation</td>
<td>Mapping comfort my room, guessing and measuring temperatures.</td>
<td>Read Charles</td>
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<td>5</td>
<td>02/16</td>
<td>Vernacular and Contemporary Architectural Examples. Learning from the past</td>
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<td>6</td>
<td>02/21</td>
<td>February break (no class)</td>
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<td>7</td>
<td>03/02</td>
<td>Systems I: Whole Building Form &amp; Materials: from immediate health benefits to long-term societal benefit of building recyclability. Build to use vs to sell</td>
<td>Presentations</td>
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<td>8</td>
<td>03/14</td>
<td>Systems II: Wind- and buoyancy-based natural ventilation- User comfort and/or energy saving? Assign06: Contact Arch/ Engr/ Devel</td>
<td>Presentations</td>
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<td>9</td>
<td>03/16</td>
<td>Systems IV: Mechanical ventilation</td>
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**Notes:** (Subject to change without prior notice)
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<tr>
<th>Date</th>
<th>Day</th>
<th>Event</th>
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<tbody>
<tr>
<td>03/21</td>
<td>Tue</td>
<td>Systems IV: Building tour of the Nevin Welcome Center, Cornell Plantations (TBC)</td>
<td>Tour Nevin</td>
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<td><strong>Note ROOM CHANGE:</strong> meet you there</td>
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<td>03/23</td>
<td>Thu</td>
<td>Building Analysis Presentation Assign07:Booklet Draft InDesign</td>
<td>Presentations</td>
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<td>A06 Powerpoint Analysis with input from 06: Arch/ Engr/ Develp</td>
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<td>03/28</td>
<td>Tue</td>
<td>Systems VI: Building enclosure I: Performance, control, initial investment and retrofit</td>
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<tr>
<td>03/30</td>
<td>Thu</td>
<td>Systems VII: Building enclosure II, Green facades. Guest lecture: Joachim RUOFF, FH Koblenz, Germany</td>
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<td>04/04</td>
<td>Thu</td>
<td>No Class/ Spring Break</td>
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<td>04/11</td>
<td>Tue</td>
<td>The LEED rating system</td>
<td>Local rating systems</td>
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<td>Interviews/communication with architect, engineers, developer</td>
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<td>04/13</td>
<td>Thu</td>
<td>Final Booklet workshop. Assign08 Booklet Final InDesign</td>
<td>Booklet workshop</td>
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<td>A07 Booklet Draft</td>
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<td>04/18</td>
<td>Tue</td>
<td>Guest Lecture: Nigel HOWARD , Clarity Environment, Sydney, Australia From setting up rating systems (UK, US), to developing Life Cycle Analysis tools Watch 10 min. movie explain Envest. Clarityenv.com.au/envest Read TBA</td>
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<td>04/20</td>
<td>Thu</td>
<td>Work session workshop</td>
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<td>04/25</td>
<td>Tue</td>
<td>Guest Lecture: TBC</td>
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<td>04/27</td>
<td>Thu</td>
<td>Final Presentation (Part I). or</td>
<td>Presentations</td>
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<td>A08 Booklet Final InDesign</td>
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<td>05/02</td>
<td>Tue</td>
<td>Final Presentation (Part II).</td>
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<td>05/04</td>
<td>Thu</td>
<td>Final Presentation (Part III).</td>
<td>Presentations</td>
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<td>05/09</td>
<td>Tue</td>
<td>Final Presentation (Part IV) Wrap-up session: Refrigerator</td>
<td>Presentations</td>
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