ARE 4030: GREEN BUILDING HISTORY AND THEORY

Lecture: M 2-3:30
Discussion section 1: M 3:30-5
Discussion section 2: W 2-3:30

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This is an architectural history course which will examine Green Building themes as practiced in the past and present. Areas of emphasis are: methods of heating, cooling and lighting in pre-modern buildings; the history of mechanical heating, cooling and lighting, and its impact on architecture; and connections between exemplary contemporary buildings and historical examples. I believe you will be able to use the learning from this course to make better design decisions as a practicing engineer (or architect).

This is a rather novel course – I haven’t found another quite like it being offered anywhere else. There isn’t a standard text. And in some of these subjects my own expertise is a bit thin; we’ll be learning together. To some extent I hope you’ll feel like you’re participating in a cool experiment and approach it in that spirit. I strongly believe it’s an important subject and I’m very excited.

PREREQUISITES
- ARE 2410 Fundamentals of Building Performance
- ARE 3030 Architectural History

We will occasionally review concepts from these courses and build upon them with additional material.

COURSE MATERIAL
Required texts:
- Mechanical and Electrical Equipment for Buildings (MEEB), 10th or 11th edition

There will be substantial additional material distributed weekly.
ARE 4030: GREEN BUILDING HISTORY AND THEORY

COURSE FORMAT, EXPECTATIONS, RESPONSIBILITIES

The success of this course will absolutely depend on your preparation and participation.

The course is formatted like an ‘honors seminar’, with a lot of interaction. I will (loosely) prepare some lecture material, but most of the class time will be devoted to participatory activities such as thought experiments, small-group discussions, large-group discussions, maybe even some sketching exercises and solving equations.

The course material is organized by theme, not chronologically like many history courses. I’ve worked pretty hard to find themes that make sense, and to put together interesting readings and buildings that illustrate important principles. But again there isn’t a textbook that simply lays out these ideas in a neat fashion. Sometimes the connections between things over time will be somewhat elusive or abstract—what does a Franklin stove have to do with modern methods of heating? I believe that you’ll be critical and imaginative readers and thinkers, and that we’ll have some excellent, probing discussions. Even during the ‘lecture’ portions you should participate by asking questions and offering observations.

GRADING POLICY

You’ll be evaluated in a variety of ways:

40% Weekly written submissions related to the reading material.
   About 2 pages typed. Some questions will be distributed with the weekly readings. Bring one copy to turn in and one copy to keep for discussion. The purpose is to ensure that everyone comes to class prepared and that we have successful discussions.

20% Notebook/sketchbook.
   During class (lecture and discussion) you should take extensive notes, including sketching. I will collect and grade your notebooks at the end of the semester. There are no exams and no memorization required.

10% Peer-evaluations of small-group discussions.
   Small groups will be assigned randomly each week.

10% My subjective assessment of your preparation and participation.

20% Research project.
   Each of you will devise a research project of your own (in consultation with me). It may be a scholarly paper, a design project, or anything in between or beyond. We’ll have further discussions about this. There will be at least 2 preliminary submittals/meetings and the final submission, perhaps including a presentation.

DISABILITY STATEMENT

If you have a physical, learning, or psychological disability and require accommodations, please let the instructor know as soon as possible. You must register with, and provide documentation of your disability to University Disability Support Services (UDSS) in SEO, room 330 Knight Hall.

ACADEMIC HONESTY

The University of Wyoming is built upon a strong foundation of integrity, respect and trust. All members of the university community have a responsibility to be honest and the right to expect honesty from others. Any form of academic dishonesty is unacceptable to our community and will not be tolerated [from the UW General Bulletin]. Teachers and students should report suspected violations of standards of academic honesty to the instructor, department head, or dean. Other University regulations can be found at:
http://uwadmnweb.uwyo.edu/legal/universityregulations.htm
# ARE 4030: GREEN BUILDING HISTORY AND THEORY

<table>
<thead>
<tr>
<th>WEEK 1</th>
<th>INTRODUCTION: DOUBLE SKINS</th>
</tr>
</thead>
<tbody>
<tr>
<td>readings:</td>
<td>&quot;Le Corbusier and the 'Mur Neutralisant': An Early Experiment in Double Envelope Construction,&quot; Harvey Bryan (1991)</td>
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<td>&quot;Ventilation and its evolution in the architectural work of Le Corbusier,&quot; Harris Sobin (2007)</td>
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<td>&quot;The Tectonics of the Double Skin: Green Building or Just more Hi-Tech Hi-jinx?&quot; Terri Meyer Boake (2010)</td>
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<tr>
<td>historic examples:</td>
<td>Cité de Refuge, Le Corbusier (1938)</td>
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<td>Loomis House, William Lescaze (1937)</td>
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<td>Occidental Chemical Building, Cannon Design (1980)</td>
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<td>contemporary examples:</td>
<td>Commerzbank headquarters, Foster &amp; Partners (1991-97)</td>
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<td>Cleveland Clinic Abu Dhabi, HDR (2008-12)</td>
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</tbody>
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| WEEK 2 | NO CLASS - HOLIDAY |

<table>
<thead>
<tr>
<th>WEEK 3</th>
<th>HOME &amp; CLIMATE</th>
</tr>
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<tbody>
<tr>
<td>readings:</td>
<td>&quot;Primitive Architecture and Climate,&quot; James Marston Fitch and Daniel Branch (1960)</td>
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<td>&quot;A Home is Not a House,&quot; Reyner Banham (1965)</td>
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<td>IB: Two-Family House (335-344)</td>
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<td>IB: Magney House (315-324)</td>
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<tr>
<td>historic examples:</td>
<td>various ancient &amp; vernacular examples</td>
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<td>contemporary examples:</td>
<td>Oak Alley Plantation (1830s)</td>
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<td>Passivhaus examples (1990-present)</td>
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<th>WEEK 4</th>
<th>SOLAR HOUSES</th>
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<tr>
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<td>&quot;Solar Heating Design Problems,&quot; Hoyt Hottel, et. al. (1955)</td>
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<td>&quot;Solar Heating for Houses,&quot; Maria Telkes and Aladar Olgyay (1959)</td>
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<td>historic examples:</td>
<td>House of Tomorrow, George Fred Keck (1933)</td>
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<td>Lof House, George Lof (1957)</td>
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<td>Village Homes, David Bainbridge (1977-78)</td>
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<th>WEEK 5</th>
<th>GLASS &amp; WINDOWS</th>
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<td></td>
<td>&quot;Glass as a building element—the use and misuse in the gulf region,&quot; Mohnsen Aboulnaga (2006)</td>
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<td>IB: 36-38</td>
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<td>IB: John Deere (141-154)</td>
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<td>IB: Willis Faber (155-165)</td>
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<td>historic examples:</td>
<td>Thermopane (1940s)</td>
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<td>Farnsworth House, Mies van der Rohe (1951)</td>
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<td>Crystal Cathedral, Philip Johnson (1977-80)</td>
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<td>Prada Store Tokyo, Herzog and de Meuron (2003)</td>
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<th>WEEK 6</th>
<th>SHADING/ NAT COOLING</th>
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<tr>
<td>readings:</td>
<td>excerpt from Natural Energy and Vernacular Architecture, Hassan Fathy (1986)</td>
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<td>&quot;The Traditional Technology Trap: Stereotypes of Middle Eastern Traditional Building Types and Technologies,&quot; Susan Roaf (1990)</td>
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<td>IB: Arab World Institute (261-273)</td>
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<td>IB: British Pavilion (286-298)</td>
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<td>historic examples:</td>
<td>Badgir/Malqaf and Mashrabiya in traditional Middle Eastern architecture</td>
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<td>Ball-Paylore House, Arthur Brown (1950)</td>
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<td>contemporary examples:</td>
<td>King Abdullah University of Science &amp; Technology (KAUST), HOK (2006-09)</td>
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<td>Carnegie Institute for Global Ecology, EHDD (2002-04)</td>
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# ARE 4030: GREEN BUILDING HISTORY AND THEORY

IB: 40-43  
IB: Richards Bldg (83-95)  
IB: Salk Inst (96-106)  
DMA: Richards Bldg  
historic examples: Olivetti Factory, Marco Zanuso (1956-58)  
IB: Hong Kong & Shanghai Bank (383-401)  
historic examples: John Gorrie & ice-making  
The Air-Conditioned Village Project, Austin, TX (1953)  
contemporary examples: Crystal Tower Osaka, Takenaka Corp (1990)  
Council House 2 Melbourne, DesignInc (2002-06) |
excerpt from *Thermal Delight in Architecture*, Lisa Heschong (1979)  
IB: PA Tech Lab (119-128)  
historic examples: Newgate Prison, London (18th C.)  
*On the Principles and Practice of Warming and Ventilating Buildings*, Thomas Tredgold (1825)  
*Studies on the Transformations of Paris*, Eugène Hénard (1909)  
contemporary examples: Manitoba Hydro Place, KPMB (2004-09)  
Personal Environments, Johnson Controls  
| NO CLASS - HOLIDAY |
| WEEK 10 | LIGHT | readings: | excerpt from *Artificial Sunshine*, Maureen Dillon (2002)  
excerpt from *Electrifying America*, David Nye (1990)  
IB: Lockheed Bldg (178-189)  
historic examples: projects by Thomas Jefferson; Argand lamp  
Bibliotheque Nationale, Henri Labrouste (1858-68)  
Maison Horta, Victor Horta (1898)  
contemporary examples: Bethke Elementary, RB+B (2008) |
IB: Bateson Bldg (405-418)  
historic examples: Plywood Model Demonstration House, Richard Neutra (1936)  
contemporary examples: Oakland Cathedral, SOM (2000-08) |
# ARE 4030: GREEN BUILDING HISTORY AND THEORY

## WEEK 12 STRUCTURES: MODULAR & PREFAB
**readings:**
- "Designing a New Industry," Buckminster Fuller (1946)

**IB:** 24-25  
IB: Eames House (301-314)  
IB: Pompidou Center (347-360)

**historic examples:**  
- Dymaxion house, Buckminster Fuller (1929)  
- Packaged House, Konrad Wachsmann and Walter Gropius (1941-1952)  
- Eames House & furniture, Charles and Ray Eames

**contemporary examples:**  

## WEEK 13 STRUCTURES: BIOMIMICRY
**readings:**
- Excerpt from *The Intelligence of Flowers*, Maurice Maeterlink (1907)  
- "Nature’s Swell, But Is It Worth Copying?" Steven Vogel (2002)  
- "Wild Structures," Tom Wiscombe, 2008

**IB:** Stansted Airport (204-17)  
IB: Kansai Airport (231-244)

**historic examples:**  
- Crystal Palace, Joseph Paxton (1851)  
- "On Growth and Form," D’Arcy Thompson (1917)  
- Eden Project, Grimshaw & Hunt (2001-)

**contemporary examples:**  
- Beijing Water Cube, Arup Engineering (2003-08)

## WEEK 14 SUSTAINABLE CONSTRUCTION
**readings:**
- "Lean and Integrated Project Delivery," Ryan Smith, et. al. (2011)  
- "Meet the Best Little House Builder in Texas," Christina Novicki (1996)

**historic examples:**  
- Central Beheer, Herman Hertzberger (1967-72)  
- C. K. Choi Building, Matsuzaki Wright Architects (1996)  
- 301 Monroe, Catherine Mohr (2008-10)  
- Open-Built® system, Bensonwood & MIT

**contemporary examples:**  

## WEEK 15 SUBURBANISM/NEW URBANISM
**readings:**
- Excerpt from *The Culture of Cities*, Lewis Mumford (1938)  
- Excerpt from *Cradle to Cradle: Remaking the Way We Make Things*, William McDonough (1999)  
- "It's time to update the definition of 'smart growth'," Kaid Benfield (2010)

**historic examples:**  
- Radburn, Clarence Stein & Henry Wright (1929)  
- Seaside, FL, Duany and Plater-Zyberk (1982)

**contemporary examples:**  
- Curitiba, Brazil  
- Masdar City, UAE, Foster & Partners (2006-2015)

### 1:15-3:15 FINAL EXAM PERIOD  
**RESERVE FOR PROJECT PRESENTATIONS**