# GSD 6404: ZED Workshop - Live / Work Prototype

Harvard Design School, Department of Architecture  
Fall Semester 2009  
Instructors: William Dunster, RIBA + Kenneth Martin Kao, Dr.Tech.Sci. AIA  
Class Fridays 1-4 pm, Gund 510  
Dunster Workshop * Thursdays 5-7 pm, Gund 510

## Schedule  
Revised 9/8/09

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Time</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>1a</td>
<td>Thu* Sep 3</td>
<td></td>
<td>ZED Case Study: Beddington Live / Work Prototype (Dunster @ GSD)</td>
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<td>1b</td>
<td>Fri Sep 4</td>
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<td>ZED Case Study: Jubilee Wharf &amp; Recent Projects (Dunster @ GSD)</td>
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<td>2</td>
<td>Fri Sep 11</td>
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<td>ZED Research: Students’ Design / Research Charrette @ Studio (no lecture)</td>
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<td>3</td>
<td>Fri Sep 18</td>
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<td>ZED Research – Key Concepts (class discussion, Dunster AV)</td>
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<td>4</td>
<td>Fri Sep 25</td>
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<td>Sustainable Housing Development: Solar City, Linz (Schroepfer)</td>
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<td>5</td>
<td>Fri Oct 2</td>
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<td>Net Zero Energy Home / Open-Source Building Systems (Benson)</td>
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<td>6</td>
<td>Fri Oct 9</td>
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<td>Living Building &amp; Eco Towns Challenge - Beyond LEED &amp; Energy Star</td>
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<td>7a</td>
<td>Thu* Oct 15</td>
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<td>ZED Charrette: Design Workshop (Dunster @ GSD)</td>
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<td>7b</td>
<td>Fri Oct 16</td>
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<td>8</td>
<td>Fri Oct 23</td>
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<td>Engineering Net Zero Energy &amp; Carbon-neutral Planning (Arup)</td>
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<td>10</td>
<td>Fri Nov 6</td>
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<td>Water Conservation Management &amp; Eco-waste treatment (Todd &amp; Todd)</td>
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<td>11</td>
<td>Fri Nov 13</td>
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<td>ZED Design Workshop: (Dunster AV Link)</td>
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<td>12</td>
<td>Fri Nov 20</td>
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<td>Building Prototype &amp; Mass Customization: Toyota Green Prefab Houses</td>
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<td>(Thanksgiving Recess)</td>
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<td>13a</td>
<td>Thu* Dec 2</td>
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<td>ZED Prototype: Presentations &amp; Discussion (Dunster @ GSD)</td>
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<td>13b</td>
<td>Fri Dec 3</td>
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1a. Thu* Sep. 3 ZED Case Study: Beddington Live / Work Prototype (Dunster @ GSD)

- Philosophy of Zero (fossil) Energy Development;
- ZED living approach; ZED design strategies & standards
- Planning gains: high quality of life on a low ecological footprint;
- Beddington Zero Energy Development project assessment;
- Collaboration framework to creating a Live/Work prototype community;
- Performance measures - Lessons learned


1b. Fri Sep. 4 ZED Case Study: Jubilee Wharf & Recent Projects (Dunster @ GSD)

- ZED factory: Designing, developing, and realizing ZED recent projects.
- Jubilee Wharf, Cornwall; Earth Center, Duncaster; Rural ZED; Suburban ZED;
- Urban ZED; project analysis; Evaluating the ZED physics model; Ecological footprint analysis, baseline data

Readings: Bill Dunster, Craig Simmons, Bobby Gilbert, the ZED book, Designing & Realising ZED standards projects, pp. 85-116; Part III, Case studies, pp. 216-247; pdf: Bill Dunster Architects, from A to ZED, realizing zero (fossil) energy development. CD2006 pp. 139-169;

2. Fri Sep 11 ZED Research: Students’ Design / Research Charrette @ Studio (no lecture)

- Envisioning a Zero (fossil) Energy master planning development; Research bioclimatic Potential project site typologies, identify key topics and issues for sustaining ZED living. Outline master plan, spatial and building concepts of a ZED prototype; Program & design of a Live/Work prototype unit;

Readings:
- Dunster, the ZED book, Part II, Building fabric and insulation, passive solar design, thermal mass, low energy systems, pp.159-206; BioRegional Solutions for Sustainability: BedZED tool kit Part I; A guide to construction materials for carbon neutral development, (Bill Dunster Architects, from A to ZED, realizing zero (fossil) energy development. CD2006) pp. 85-137

3. Fri Sep 18 ZED Research – Key Concepts (class discussion, Dunster AV)
Development of ZED concepts, principles, and metrics; Carbon-neutral developments; Student presentation of research on: Planning gain, Bio-climatic design, Thermal, Electrical, Water, Transport, Renewable Energy; Quality of Life; The Living Building, Site and Infrastructure Challenge; Restorative Design;


4. Fri Sep 25 Sustainable Housing Development: Solar City, Linz
   Consultant: Thomas Schroepfer, Harvard GSD

   Integrated planning, public-private partnership in sustainable planning, design and construction; optimum density – low carbon transportation; flexibility of housing types; low impact self sufficient energy generation; low energy building; water and waste management on site; preservation of river ecology and biodiversity. Thomas Herzog + Partners; Low energy building designs.


   Consultant: Tedd Benson, Benson Woodworks, Factory Visit.

   Prototyping Green / Smart home; MIT House of the Future: House n –Initiative; Open Source Building System; Experimental Prototype collaboration Engineering & Fabrication;

   Readings: Kent Larson, 2008.11.13 Open Prototype Initiative webcast; architecture.mit.edu/house_n/documents/Project_List.pdf; architecture.mit.edu/house_n/publications.html; Barry Bergdoll, Home Delivery, Fabricating the Modern Dwelling; pp.12-25, 40-140; momahomedelivery.org; livinghomes.com;

6. Fri Oct 9 Living Building & Eco Towns Challenge

   Integrated holistic planning; Performance based design, construction, and operation; Life Cycle environmental Impacts; Real Estate Development Metric & Market Valuation; Overcoming barriers to implementation, process and strategies.


7a. Thu* Oct 15 ZED Charrette: Design Workshop (Dunster @ GSD)

   Students design workshop & discussions
7b. Fri Oct 16  
**ZED Charrette: Design Workshop (Dunster @ GSD)**

Students design workshop & discussions.

8. Fri Oct 23  
**Engineering Net Zero Energy & Carbon-neutral Planning**

Consultant: Mark Walsh Cooke, Director Arup – Boston

Carbon Neutral Engineering; Net-Zero Energy programming; Life / Work Style energy assessment and conservation; Dynamic load planning and reduction; Renewable energy demand planning; Case Studies: Dongtan; Treasure Island;


9. Fri Oct 30  

Consultant: Daniel M. Kammen, Distinguished Professor of Energy, University of California, Berkeley, Founding Director, Renewable and Appropriate Energy Laboratory, Lead Author, Intergovernmental Panel on Climate Change, which shared the 2007 Nobel Peace Prize

Green Energy Infrastructure layout; Renewable Energy Micro-grid Development. Building integrated systems, PV & Wind turbines; Integrated glazing and power generation cladding; High intensity PV pane, Emerging R+D


10. Fri Nov 6  
**Water Conservation Management & Eco-waste treatment**

Consultant: Dr. John & Jonathan Todd, Todd Ecological Design, Inventor of Living Machine; Winner of the Buckminster Fuller Prize.

Living Machine, Eco Waste Treatment; Constructed wetlands; Water conservation, hydrology & site management; Nutrient development integrated food production; Vegetated vertical screens, air filtration and purification, Building integrated vegetation and buildings;

11. Fri Nov 13  ZED Design Workshop: (Dunster AV Link)

Development of select topics of the Allston project
Design / Research Consultations with key resources.

12. Fri Nov 20  Building Prototype & Mass Customization: Toyota Green Prefab Houses

Technology Transfer, design and engineering green prefabs using digital mass customization; Green housing prototype for computer aided mass production; Total Quality Management, Lean Production, and Just-in-time strategies; Development of integrated web-based mass home marketing.


Fri Nov 27  (Thanksgiving Recess)

13a. Thu* Dec 2  ZED Prototype: Presentations & Discussion  (Dunster @ GSD)

13b. Fri Dec 3  ZED Prototype: Presentations & Discussion  (Dunster @ GSD)