List learning goals for your course, lesson, or activity that highlight new sustainability elements.

1. Students learn to apply strategies of passive energy design into their design studio projects, developing buildings that become architecturally and spatially strong through implementation of a holistic approach to building
2. Students learn how to apply Sefaira Energy Simulation Software to predict energy performance and comfort for their designs

Explain the new sustainability element(s) proposed to be incorporated into your course and how they relate to the learning goals above (at course, lesson, or activity level). Describe how you see these elements relating to sustainability.

1. UofU Building Energy Analysis: In groups of 2-3, students will chose a building on campus (this might be a new construction or an older building) and analyze and document it for its spatial and functional qualities first. They will then analyze and document it for its passive (build-in) energy efficiency and its active systems. Students might need to schedule appointments with facilities or the building management to get a tour and understand the building’s systems. Students will present their resulting work in a 20-30-minute final presentation in class, where the results will be critically discussed. Alternatively students might choose to guide the class through the building of their choice. By exploring critical elements of passive and active design – all related to building performance – students explore means of sustainability on a building of their choice.
   a. The objectives of this exercise are:
      i. To compare and discuss strategies of passive and active energy use for a specific building;
      ii. To detect potentials to save energy in their every day life;
      iii. To understand the built situation in which we live and work, looking at a building’s strengths and its weaknesses;
      iv. To discuss potentials to enhance a specific and general building standard.

2. Sefaira Energy-Modeling exercise: In groups of 2, students will be given a simple 2-story building shape (box) that they will initially place on a fictitious site in SLC
downtown, using the Salt Lake City international airport climate data set. During two, in-class simulation sessions on Mon., Oct. 31 and Wed., Nov. 02 participants will learn how to use Sefaira as an energy modeling and simulation tool. There will be two additional in-class consultation sessions on the 16th and 21th of November. Additional consultation will be given during studio hours.

a. The objectives of this exercise are:
   i. To apply Sefaira energy modeling software;
   ii. To create SketchUp files specifically for Sefaira;
   iii. To receive instant feedback on changes in a building’s configuration, components, orientation, location;
   iv. To understand the direct correlation between location, orientation, building design and building systems.

Provide a concise listing of sustainability lessons and activities and show their location in the course schedule. For selected new activities attach a completed Activity Sheet.

1. Lectures:
   a. Human Impact onto the environment
   b. Rating Systems + Benchmark Tools
   c. Design Decisions
   d. Passive House
   e. Building Envelope
   f. Solid Wood Construction
   g. Glazing Systems
   h. Daylighting
   i. Shading, TIM
   j. Thermal Mass
   k. Natural Ventilation
   l. Solar Thermal, PV

2. Activities:
   a. Research, documentation, site visit and presentation on a building on Campus. The following building have been chosen and documented by the students:
      i. Quinny Law Building
      ii. Student Life Center
      iii. Fieldhouse
      iv. Lassonde Institute
      v. Library
   b. Habitat for Humanity Field of Dreams Construction Site Visit / Girl Scout of Utah Cabin visit
   c. Sefaira Energy-Modeling exercise and assignment
Location in the seminar schedule (marked yellow):
# Wasatch Experience
## Implementation Summary

### Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Time</th>
<th>Monday 09:45am</th>
<th>Wednesday 09:40am</th>
<th>Weekly Tasks + Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 01 Aug 22-26</td>
<td></td>
<td></td>
<td>Introduction to class</td>
<td>No class</td>
<td>Mon: A_01 available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Assignment A_01 [Footprint out]</td>
<td>Lecture: Rating Systems + Benchmark tools</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Reading due: An Inconvenient Truth</td>
<td>Reading due: Energy Efficiency Benchmarks for Housing</td>
<td>Mon: Read: An Inconvenient Truth Wed: A_01 due via Canvas Read: Energy Efficiency Benchmarks for Housing</td>
</tr>
<tr>
<td>Week 03 Sep 05-09</td>
<td></td>
<td></td>
<td>Labor Day</td>
<td>Lecture: Design Decisions</td>
<td>Wed: Keep: Site Matters</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No classes</td>
<td>Reading due: Site Matters</td>
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<tr>
<td></td>
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<td></td>
<td>SCIF Fund presentation</td>
<td>Reading due: Understanding Buildings as Systems</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Emerson Andrews</td>
<td>Lecture: Cladding Systems</td>
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<tr>
<td>Week 05 Sep 19-23</td>
<td></td>
<td></td>
<td>Lecture: Bond Wood Construction</td>
<td>Reading due: Complex Envelopes</td>
<td>Mon: A_02 available Wed: Read: Optimized Envelopes - Seattle Library</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Assignment A_02 [Footprint out]</td>
<td>Lecture: Shading, TM</td>
<td>Wed: Read: Ventilating Envelope - San Francisco Federal Building</td>
</tr>
<tr>
<td>Week 06 Sep 26-30</td>
<td></td>
<td></td>
<td>Lecture: Daylighting</td>
<td>Reading due: Ventilating Envelope - San Francisco Federal Building</td>
<td>Wed: Read: Ventilating Envelope - San Francisco Federal Building</td>
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<tr>
<td></td>
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<td></td>
<td>No Class due to field trip</td>
<td>Lecture: Natural Ventilation</td>
<td>Wed: Read: Warg, Sustainability is a Cultural Problem</td>
</tr>
<tr>
<td>Week 09 Oct 07-11</td>
<td></td>
<td></td>
<td>No Class due to field trip</td>
<td>Lecture: Solar Thermal, PV</td>
<td>Wed: Read: Warg, Sustainability is a Cultural Problem</td>
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<tr>
<td></td>
<td>Oct 07-11</td>
<td></td>
<td>No Class due to field trip</td>
<td>Reading due: Sustainability is a Cultural Problem</td>
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</tr>
<tr>
<td>Week 10 Oct 24-28</td>
<td></td>
<td></td>
<td>Workshop: Sefaira #1</td>
<td>Lecture: Solar Thermal, PV</td>
<td>Wed: Read: Warg, Sustainability is a Cultural Problem</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Workshop: Sefaira #2</td>
<td>Reading due: Sustainability is a Cultural Problem</td>
<td>Wed: Read: Warg, Sustainability is a Cultural Problem</td>
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<tr>
<td>Week 11 Nov 01-Nov 05</td>
<td></td>
<td></td>
<td>Workshop: Sefaira #1</td>
<td>Workshop: Sefaira #2</td>
<td>Sat, Nov. 05: 9:00am – 2:00pm Site visits: Habitat for Humanities projects, B.C., Korea</td>
</tr>
<tr>
<td>Week 12 Nov 07-11</td>
<td></td>
<td></td>
<td>Lecture: Extra / Projects</td>
<td>Presentation A_02 UofU projects: 1. Quinn Law Building 2. Student Life Center</td>
<td>Mon: Read: Common sense instead of high tech Wed: Assignment A_02 due A_03; A_05 validibe</td>
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<tr>
<td></td>
<td>Nov 07-11</td>
<td></td>
<td>Reading due: Cueman Seminar: Instead of High Tech</td>
<td>1. Quinn Law Building 2. Student Life Center</td>
<td>Mon: Read: Common sense instead of high tech Wed: Assignment A_02 due A_03; A_05 validibe</td>
</tr>
<tr>
<td>Week 13 Nov 14-18</td>
<td></td>
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<td>No Class due to field trip</td>
<td>Presentation A_02 UofU projects</td>
<td>Mon, Wed: Assignment A_02 due</td>
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<td></td>
<td>Nov 14-18</td>
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<td>No Class due to field trip</td>
<td>5. UofU Fieldhouse</td>
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<tr>
<td>Week 14 Nov 21-25</td>
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<td>Presentation A_02 UofU projects: 3. Lassone Institute</td>
<td>Assignment 04 Consultation</td>
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<td></td>
<td>Nov 21-25</td>
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<td>3. Lassone Institute</td>
<td>Envelope Study/Sefaira</td>
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<tr>
<td>Week 15 Nov 28-Dec 02</td>
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<td>Assignment 04 Consultation</td>
<td>Assignment 04 Consultation</td>
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<td>Nov 28-Dec 02</td>
<td></td>
<td>Envelope Study/Sefaira</td>
<td>Envelope Study/Sefaira</td>
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<tr>
<td>Week 16 Dec 05-09</td>
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<td>Pin Up + Discussion</td>
<td>Assignment A_02 [Footprint]</td>
<td>Final Graduate Studio Review Week</td>
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<tr>
<td></td>
<td>Dec 05-09</td>
<td></td>
<td>Assignment A_02 [Footprint]</td>
<td>Assignment A_02 [Footprint]</td>
<td>Final Graduate Studio Review Week</td>
</tr>
<tr>
<td>Week 17 Dec 12-16</td>
<td>Mon Dec 12, 11:59pm:</td>
<td></td>
<td>Assignment A_03, A_04</td>
<td>Assignment A_03, A_04</td>
<td>Assignment A_03, A_04 due</td>
</tr>
</tbody>
</table>

Studio information and updates will be made frequently and as a matter of course be conveyed through student group emails. Content and schedule is subject to change given the nature of the class process, student progress and the availability of guest lecturers. Students / class participants must acknowledge receipt through an email reply when requested.
What motivated you to change your course?

Bringing the students out into the field provides a great learning opportunity for them to show how designs really work, how buildings are detailed, where a component makes sense, and where not. Giving them at hand tools to quantify findings gives them the opportunity to objectively judge on a strategy, this specifically in the field of building performance. Showing them the difference between a successful theoretical performance rating (such as LEED) ‘on paper’ versus actual status quo of a constructed building challenges each student to critically rethink and questioning such systems – they learn that we can do much better, and that a rating system is just the beginning of what I call the path towards a truly sustainable / resilient building.

Adding the field trip to two different buildings showed class participants how strategies discussed in the classroom have been implemented – these are excellent ‘best practice and beyond’ experiences to support an understanding of the matter on the professional side.

Finally, teaching students how to use a real-time energy-modeling software that allows them to instantly apply and objectively check each measure towards better building performance and higher resilience on an ongoing design project (they are required to apply Sefeira in their actual studio projects) gives them an objective understanding about the effectiveness of such measures, which can than be documented and further analyzed.
The advent of a new period only occurs after long and quiet preparatory work – Le Corbusier

Sustainable and Energy-Efficient Architecture, also known as “Green Architecture” or “Green Building,” is an approach to architectural design that emphasizes the place of buildings within both local ecosystems and the global environment. Sustainable architecture, framed by the larger discussion of Sustainability having to do with the pressing economic and political issues of our world, seeks to minimize the negative environmental impact of buildings by enhancing efficiency and moderation in the use of materials, energy, and development space. In addition, it provides a higher degree of resilience toward natural disasters, climate changes and system failures that come with such.

Preamble
With the release of the IPCC (Intergovernmental Panel on Climate Change) reports during recent years, the discussion about the influence of the industrialized world and emerging nations onto the world’s climate went public in the United States. Architects, planners, developers, and educators became aware of the urgency of applying more holistic, sustainable architectural and urban planning methods and strategies to their work. Projections show that the United States will double its exiting building stock until 2040. Considering that people use 26% more energy than 20 years ago, that the energy consumption of buildings represents at least 40% of the global primary energy use, and that buildings consume about 77% of the U.S. electricity consumption, it is obvious that there is an enormous potential on future energy savings, hence carbon dioxide reduction in the entire construction market. When considering today’s potential regarding knowledge, technology and materials in the building sector, we have to realize that every building that is build to code standard today becomes an instant case for an energy-remodel and quality-upgrade the day it goes into operation! Therefore it is the architect’s ethical and professional responsibility to design and develop buildings that drastically reduce operational energy, provide healthier and more comfortable interior spaces, are resilient within their environments, thus contribute to a more sustainable, long-lasting high quality built environment.

SoA Environmental Stewardship Statement
The School of Architecture at the University of Utah is the leading regional center for promoting the value of sustainable architecture through education. Our vision is to effect a transformation in attitude toward architecture, leading to high quality and highly sustainable built environments that provide a nourishing and healthy life for all current and future generations.

Fall Semester 2016
Mon, Wed
09:40 am - 10:45 am
BUC 211 / studio / different locations tbd

Faculty: Jörg Rügemer
ruegemer@arch.utah.edu
Seminar Goal
This seminar’s goal is to acquire a comprehensive understanding of sustainable strategies in architecture that will help to better develop our future built environment. An ecological environment and sustainability are issues that touch many aspects of architecture, construction, and design. The main educational value of this class is to serve as a source for sustainable design inspiration and to provide participants with knowledge and tools to represent a continually expanding repertoire of sustainable architectural strategies. The structure of the class allows the engagement in both theoretical and practical projects and issues. Emphasis will be on sustainable architectural design and construction theory and practice, on passive as well as active sustainable systems, and on aspects of sustainable urban development. Included herein are strategies on the larger urban scale, an aspect that is often neglected on the building scale itself. Although there is a new tendency toward more environmentally friendly buildings, the standard of structures is relatively low compared to what is possible and can be done at cost today. This class will address these deficiencies on several levels.

Pedagogical Objectives
This seminar focuses on the actual implementation of efficiency and sustainability measures into the design process, thus exploring the relationship between buildings and environmental forces to maximize non-wasteful, efficient use of resources such as energy, water and building materials. This includes investigations of the impact of solar energy, airflow, building materials, passive as well as active systems, wall assemblies, building components, details and indoor air quality on spatial quality and form making.

Students learn to
- include all aspects of social, environmental, and economic (SEE) aspects of sustainability
- apply strategies of passive energy design into their design studio projects, developing buildings that become architecturally and spatially strong through implementation of a holistic approach to building;
- apply building materials, assembly research and details in their projects.

Seminar Assignments
During the course of the semester, participants will work on the following assignments. Comprehensive submission is required to receive credit for completion of the course:

A.01 Carbon Footprint [due Wed, 31. Aug via Canvas]. In this assignment, you will document your personal carbon footprint. You will hand in the results electronically as a PDF-file, and we will look and discuss the results in class thereafter.
A_02 UofU Building Analysis [due according to schedule and in agreement with your instructor; all projects have to be delivered through the Canvas system no later than 11:59pm on November 16, 2016].
In groups of 2-3, according to seminar size. You will document a building on campus by analyzing its passive (build-in) energy efficiency and its active systems. You will present your work in a 20-minute final presentation in class, where we will critically discuss the results.

A_03 Energy Simulation Exercise in Sefaira [due Wed., 30. Nov 2016 as Pin-Up in class. Also visible in your final studio project presentation. All digital files have to be delivered through the Canvas system no later than 11:59pm on December 12, 2016].
Using Sefaira and the build-up knowledge of the class, you will explore different energy strategies for a small-scale project and later for a few units of your studio design project.

A_04 Envelope Study [due Wed., 30. Nov 2016 as Pin-Up in class. Also visible in your final studio project presentation. All digital files have to be delivered through the Canvas system no later than 11:59pm on December 12, 2016].
You will research different building envelope systems to be discussed and determined. Using the facade system of your studio project, you will draw those systems to scale, determine location of components, and build a 1/2"=1'-0" scale mock-up, which will also serve for your final studio project review.

A_05 Studio Implementation [due in your graduate studio project final presentation. All digital files have to be delivered through the Canvas system no later than 11:59pm on December 12, 2016].
Strategic implementation of your newly gained knowledge into your respective studio project.

Seminar Organization and Conduct
Classes will meet from 9:40 to 10:30 am, Monday and Wednesday, in Room WEB 1460, and on one additional Saturday according to schedule. Seminar attendance is required for all participating students. You are expected to prepare for class by reading assigned readings, preparing your presentation, thus showing up prepared to discuss the topic in the group. The seminar setting includes class discussions, presentations, pinups, and reviews, which are an integral and critical component in architectural teaching, and a tool to communicate, present, and discuss ideas and projects. Participant’s interactivity and regularly contribution in presentations and discussions is mandatory and expected; your level of participation in class discussions will be used to determine your final grade (see below). It is expected that you will work self-directed in completing your course requirements in a timely manner.

Please turn off cell phones during class. Do not use your laptop computer during other people’s presentations, lectures, etc., because it shows disrespect toward your peers and your professor.

Introductory reading required for the class:

Kwok, Alison G., Grondzik, Walter T.
The Green Studio Handbook
Elsevier Architectural Press
San Diego 2007

Lechner, Norbert
Heating, Cooling, Lighting: Sustainable Design Methods for Architects

Detail Research
The Future of Building: Perspectives
Institut für Internationale Architekturdokumentation 2012

For more course readings please refer to the bibliography section below. Most of the books and journals are available through the Marriott Library. Other readings might be added during the course of the semester.
### Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday 09:40am</th>
<th>Wednesday 09:40am</th>
<th>Weekly Tasks + Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 01 Aug 22-26</td>
<td><strong>Introduction to class</strong> Assignment A_01 [Footprint] out</td>
<td>No class</td>
<td><strong>Mon:</strong> A_01 available</td>
</tr>
<tr>
<td>Week 02 Aug 29-Sep 02</td>
<td>Lecture: Discussion: Human Impact on the environment <strong>Reading due:</strong> An Inconvenient Truth</td>
<td>Lecture: Rating Systems + Benchmark tools <strong>Reading due:</strong> Energy Efficiency Benchmarks for Housing Assignment A_01 [footprint] due via Canvas</td>
<td><strong>Mon:</strong> Read: An Inconvenient Truth <strong>Wed:</strong> A_01 due via Canvas Read: Energy Efficiency Benchmarks for Housing</td>
</tr>
<tr>
<td>Week 03 Sep 05-09</td>
<td>Labor Day No classes</td>
<td>Lecture: Design Decisions <strong>Reading due:</strong> Site Matters</td>
<td><strong>Wed:</strong> Read: Site Matters</td>
</tr>
<tr>
<td>Week 04 Sep 12-16</td>
<td>Lecture: Passive House SCIF Fund presentation Emerson Andrews</td>
<td>Lecture: Building Envelope <strong>Reading due:</strong> Understanding Buildings as Systems</td>
<td><strong>Wed:</strong> Read: Understanding Buildings as Systems</td>
</tr>
<tr>
<td>Week 05 Sep 19-23</td>
<td>Lecture: Solid Wood Construction Assignment A_02 [UofU Building Analysis] out</td>
<td>Lecture: Glazing Systems <strong>Reading due:</strong> Optimized Envelopes - Seattle Library</td>
<td><strong>Mon:</strong> A_02 available <strong>Wed:</strong> Read: Optimized Envelopes - Seattle Library</td>
</tr>
<tr>
<td>Week 06 Sep 26-30</td>
<td>Lecture: Daylighting</td>
<td>Lecture: Shading, TIM <strong>Reading due:</strong> Ventilating Envelope - San Francisco Federal Building</td>
<td><strong>Wed:</strong> Read: Ventilating Envelope - San Francisco Federal Building</td>
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<tr>
<td>Week 07 Oct 03-07</td>
<td><strong>Studio Project Consultation</strong> 9:30 am to 11:00 am</td>
<td><strong>Studio Project Consultation</strong> 9:30 am to 11:00 am</td>
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<tr>
<td>Week 08 Oct 10-14</td>
<td>Fall Break No classes</td>
<td>Fall Break No classes</td>
<td></td>
</tr>
<tr>
<td>Week 09 Oct 17-21</td>
<td>No Class due to field trip</td>
<td>Lecture: Thermal Mass <strong>Reading due:</strong> Theory And Practise Of Impermanence Assignment A_03 [Simulation] out</td>
<td><strong>Wed:</strong> Read: Theory And Practise Of Impermanence A_03 available</td>
</tr>
<tr>
<td>Week 10 Oct 24-28</td>
<td>Lecture: Natural Ventilation</td>
<td>Lecture: Solar Thermal, PV <strong>Reading due:</strong> Sustainability is a Cultural Problem</td>
<td><strong>Wed:</strong> Read: Wang, Sustainability is a Cultural Problem</td>
</tr>
<tr>
<td>Week 11 Oct 31 - Nov 05</td>
<td>Workshop: Sefaira 01</td>
<td>Workshop: Sefaira 02</td>
<td>Sat., Nov. 05: 9:00am - 2:00pm Site visits: Habitat for Humanities projects, SLC, Kearns</td>
</tr>
<tr>
<td>Week 12 Nov 07-11</td>
<td>Lecture: Extra / Projects <strong>Reading due:</strong> Common sense instead of high tech</td>
<td>Presentation A_02 UofU projects: 1. Quinn Law Building 2. Student Life Center Assignment A_04 [Envelope]; Assignment A_05 [Implementation] out</td>
<td><strong>Mon:</strong> Read: Common sense instead of high tech <strong>Wed:</strong> Assignment A_02 due A_04: A_05 available</td>
</tr>
<tr>
<td>Week 13 Nov 14-18</td>
<td>no class due to field trip</td>
<td>Presentation A_02 UofU projects 5. UofU Fieldhouse</td>
<td><strong>Mon, Wed:</strong> Assignment A_02 due</td>
</tr>
<tr>
<td>Week 14 Nov 21-25</td>
<td>Presentation A_02 UofU projects: 3. Lassonde Institute 4. UofU Library</td>
<td>Assignment 04 Consultation Envelope Study/Sefaira 9:00 am to 10:30 am</td>
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<tr>
<td>Week 15 Nov 28-Dec 02</td>
<td>Assignment 04 Consultation Envelope Study/Sefaira 9:00 am to 10:30 am</td>
<td>Assignment 04 Consultation Envelope Study/Sefaira 9:00 am to 10:30 am</td>
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<tr>
<td>Week 16 Dec 05-09</td>
<td>Pin Up + Discussion: Assignment A_03 [Simulation] Assignment A_04 [Envelope] Faculty Lounge</td>
<td>Final Graduate Studio Review Week</td>
<td></td>
</tr>
<tr>
<td>Week 17 Dec 12-16</td>
<td><strong>Mon Dec 12, 11:59pm:</strong> Assignment A_03; A_04; A_05 due</td>
<td></td>
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</tr>
</tbody>
</table>

Studio information and updates will frequently and as a matter of course be conveyed through student group emails. Content and schedule is subject to change given the nature of the class process, student progress and the availability of guest lecturers. Students / class participants must acknowledge receipt through an email reply when requested.
Grading
Final Grades will be based on the following percentage of credit:

- Class attendance, preparation and participation: 15%
- Assignment 01: Carbon Footprint: 5%
- Assignment 02: Building Audit: 20%
- Assignment 03: Energy Simulation: 25%
- Assignment 04: Envelope Study: 25%
- Implementation of your work into your studio project: 10%

Students will be evaluated upon performance in their presentations and research projects/case studies. While a satisfactory grade (C+ to B-) in this class may be attained by the completion of all work required to the satisfaction of the professor, individual initiative and investigation of research issues that extend beyond the basic requirements are expected and strongly encouraged. Grading will follow rigorous standards; it is difficult to get an A in this class, a B is considered a very good grade! Following is a general definition for grades for both classes:

Marginal Work [E, D, C]: Exhibiting difficulty in demonstrating through the work/discussion recognition and understanding of the issues and concepts presented in the assignments.
Competent and Satisfactory Work [C+, B-]: Addressing all of the issues presented in the assignment and demonstrating an understanding of these issues at the graduate level.
Notable Work [B, B+]: Addressing and expanding upon the issues presented in the assignments, and demonstrating not only understanding but also achievement in directing the investigations and development in seminar work at the graduate level.
Extraordinary Work [A-, A]: Addressing and expanding upon the issues presented in the assignments, and discovering/proposing issues which are reciprocal, similar, and coincidental to the assignment, demonstrating the ability to achieve and excel independently in the development of seminar work.

Outcomes
Students should expect within the requirements of this class to demonstrate an understanding of the following NAAB required Student Performance Criteria:

A.3 Investigative Skills: Ability to gather, assess, record, and comparatively evaluate relevant information and performance in order to support conclusions related to a specific project or assignment.
A.6 Use of Precedents: Ability to examine and comprehend the fundamental principles present in relevant precedents and to make informed choices about the incorporation of such principles into architecture and urban design projects.
B.4 Technical Documentation: Ability to make technically clear drawings, prepare outline specifications, and construct models illustrating and identifying the assembly of materials, systems, and components appropriate for a building design.
B.6 Environmental Systems: Understanding the principles of environmental systems’ design, how systems can vary by geographic region, and the tools used for performance assessment. This demonstration must include active and passive heating and cooling, solar geometry, daylighting, natural ventilation, indoor air quality, solar systems, lighting systems, and acoustics.
B.7 Building Envelope Systems and Assemblies: Understanding of the basic principles involved in the appropriate selection and application of building envelope systems relative to fundamental performance, aesthetics, moisture transfer, durability, and energy and material resources.
B.8 Building Materials and Assemblies: Understanding of the basic principles used in the appropriate selection of interior and exterior construction materials, finishes, products, components, and assemblies based on their inherent performance, including environmental impact and reuse.
Class Standards
Attendance and class participation are required at all class meetings (see Course Schedule). Four (4) unexcused absences automatically result in a failing grade for the course. Every unexcused absence is 20% off of your grade. An acceptable excused absence is defined by the student having missed class due to extraordinary circumstances beyond his or her control and must be accompanied by written proof. In the event that you miss a class, you are responsible for all material covered. No late work will be accepted. Being absent at a presentation / final review or failing in handing in the required material in digital format will result in a failing grade. If you have any questions you may contact your professor via e-mail or phone.

Student Names & Personal Pronouns
Class rosters are provided to the instructor with the student’s legal name as well as “Preferred first name” (if previously entered by you in the Student Profile section of your CIS account). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class, on papers, exams, etc. Please advise me of any name or pronoun changes (and update CIS) so I can help create a learning environment in which you, your name, and your pronoun will be respected.

ADA Statement
The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Service (www.sa.utah.edu/ds), 162 Olpin Union Building, 801 581 5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to the Center for Disability Services. (www.hr.utah.edu/oeo/ada/guide/faculty)

Electronic Devices
Electronic devices of any kind including laptop computers, cell phones, Ipods, etc. are NOT allowed to be used during studio lectures unless previously approved by the instructor for reasons of a disability or otherwise determined appropriate by the SOA. Furthermore, audio & visual distractions such as movies, audible music, games, email, internet surfing, assignments from other courses etc. are expressly forbidden during seminar and studio sessions.

Studio Culture
Consult the Studio Culture Policy for your responsibilities for conduct in the studio:
http://www.arch.utah.edu/?school_of_architecture%3Estudio_culture_policy_and_procedures
See also attached document of the Studio Culture Policy.

Academic Honesty
According to U of U Codes of Student Conduct, any activity that tends to compromise the academic integrity of the University, or subvert the educational process is considered as academic misconduct. Examples of academic misconduct include, but are not limited to plagiarism and copying the work of another student. A proper reference style should be used when using works or ideas of other people.

Disclaimers
All projects and other work developed as part of this seminar are acknowledged as public domain. All forms of documentation of work done as a part of the seminar fall under the College policy on student work.
Instructor’s Absence
Faculty members are involved in a variety of activities in addition to their teaching: research, scholarship, professional practice, university and professional service, and other university related activities that may cause them to be absent from school from time to time during the semester. Every effort will be made to inform students ahead of time about expected absences from studio.

Medical/Personal Problems
Students with medical problems or family emergencies, which will keep them from the seminar or cause a paper presentation or studio presentation to be submitted late are expected to notify their faculty as soon as possible, and preferably before the work is due. Verification of illness or family emergencies may be required (i.e., physician’s statement, obituary, etc.). Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student’s ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness - www.wellness.utah.edu; 801 581 7776.

Addressing Sexual Misconduct
Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Even though this is a School of Architecture Seminar, please also refer to the School’s Studio Culture Policy at: http://soa.cap.utah.edu/wp-content/uploads/sites/3/2015/05/Studio-Culture-Policy.pdf
Bibliography

Required reading:

- Kwok, Alison G., Grondzik, Walter T.  
  The Green Studio Handbook, 2. Edition  
  Elsevier Architectural Press, San Diego 2011

- Lechner, Norbert  
  Heating, Cooling, Lighting: Sustainable Design Methods for Architects  

Detail Research

- The Future of Building: Perspectives  
  Institut für Internationale Architekturdokumentation 2012

Recommended readings:

- Krähen, J. L. with Enquirit, P. and Rapaport, R.  
  City Building - Nine Planning Principles for the Twenty-First Century  
  Princeton Architectural Press, New York 2010

- Aberley, Doug (Ed.)  
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  New Society Publishers, Gabriola Island 1994

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- Behling, Sophia, Stefan  
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  ISBN 3-7913-1670-2

Detail Publications:

- ISSN 001-9571 the newer publications are all available in English:  
  Solares Bauen, 03/1999; 06/2002; 06/2005  
  Einfaches Bauen, 03/2001; 06/2003  
  Bauen mit Licht, 04/2004  
  Licht und Innenraum, 04/2006  
  Energetische Sanierung, 11/2006  
  Energieeffiziente Architektur, 06/2007  

- Edwards, Brian  
  Towards Sustainable Architecture  

- Elisabeth, L.; Cassandra, A.  
  Alternative Construction: Contemporary Natural Building Methods  

- Gonzalo, Robert; Habermann, Karl J.  
  Energy-Efficient Architecture – Basics for Planning and Construction  
  Birkhäuser – Publishers for Architecture, Basel, Switzerland 2006  
  ISBN 3-7643-7253-2

Guzowski, M.  
Towards Zero Energy Architecture - New Solar Design  
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  The Environmental Brief  

- Jones, David L.  
  Architecture and the Environment: Bioclimatic Building Design  
  The Overlook Press, New York 1998

- Lewis, P. H.  
  Tomorrow by Design: A Regional Design Process for Sustainability  
  John Wiley & Sons, New York 1996

- McDonough, William; Braungart, Michael  
  Cradle to Cradle: Remaking the Way we Make Things  
  North Point Press, New York 2002

- Mendler, S. F.; Odell, W.; Lazarus, M. A.  
  The Guidebook to Sustainable Design  

- Merkel, Jim  
  Radical Simplicity: Small Footprints on a Finite Earth  
  New Society Publishers, Gabriola Island, B.C. 2003

- Sassi, Paola  
  Strategies for Sustainable Architecture  

- Schnittlich, Christian (Ed.)  
  Solar Architecture  
  In Detail, Institut für Internationale Architekturdokumentation, Munich 2003, ISBN 3-7643-0747-1

- Smith, Peter F.  
  Architecture in a Climate of Change  

- Steemers, Koen; Steane, Mary Ann (Ed.)  
  Environmental Diversity in Architecture  
  Spon Press, New York 2004  

- Steele, James  
  Sustainable Architecture: Principles, Paradigms, and Case Studies  

- Voss, K., Musall, E.  
  Nullenergie Gebäude  
  Detail Green Books, München, Germany 2011

- Yeang, Ken  
  Ecodesign – A Manual for Ecological Design  
  Wiley-Academy, Great Britain 2006  
  ISBN 0-470-85291-7

Web Links

- Passivhaus InstituteUS: http://www.passivehouse.com/
Complete one Activity Sheet for each activity you developed that incorporates sustainability into your course.

Activity Name: Assignment A_02: University of Utah Building Energy and Performance Analysis

Instructor Name: Jörg Rügemer

State the activity learning goal(s).

- To understand the importance of a healthy building with regard to its spatial and functional qualities.
- To compare and discuss strategies of passive and active energy use for a specific building.
- To detect potentials to save energy in our every day life.
- To understand the built situation in which we live and work, looking at a building’s strengths and its weaknesses.
- To discuss potentials to enhance a specific and general building standard.

Summarize activity.

Students teamed up in groups of 3-4. Each group chose, analyzed, explored and documented a building on campus, focusing on passive and active aspects of sustainability. Besides taking general notes and findings, tools such a thermal imaging camera, laser thermometers and others helped them to identify leaks in the building envelope, pointing out well-performing or weak components, documenting large quantities of glass in facades with/without exterior sun shading on west, south and east facades; and many more. The group’s findings were summarized in an InDesign template, which was given to the students via Canvas. For specific buildings, the class organized building tours (this last fall we visited the Fieldhouse and the new Lassonde Center). The results were presented in class in 20-minute presentations with concluding, critical discussions. A final digital summary was delivered at the end of the semester via the Canvas system.

At what point in your course is this activity delivered?

Assignment made available: Week 05 (Sept. 19)
Assignment due for presentation in class, essay (including a building tour in some cases): Week 12-14 (Nov. 07 to Nov. 21).
Final digital delivery: Week 17 (Dec. 12).

Provide teaching tips to help other instructors implement your activity in their courses.

A comprehensive assignment description that includes all items expected from the students has been key over the past years, to ensure a high quality of deliverables. This includes the template, which avoids graphically weak presentations. I place the assignment at a point in time when the
class has gone through most of the lectures, which train the students in the topics and items that are important to critical examine the chosen building. During their presentation, I allow for questions from the other students (of myself) – thus we often start discussing a project already from the beginning on. It has also proven successful to have a class session or two after those presentation sessions as a ‘backup’ – we often need more time to thoroughly discuss the projects, with such discussions being very fruitful for the education of the students.

*Describe your assessment strategy and instruments for student learning and attitudes. Attach grading rubric and/or assessment instruments.*

The assignment is assessed in two ways:

a) During classroom or on-site presentation, according to the grading rubric attached.

b) At the end of the semester, and based on the PDF file that being delivered, also according the grading rubric attached.

Student learning instruments are a comprehensive in-class presentation and discussion of the template provided before the students start to work on the assignment. During this exercise, we also look at past projects that were of outstanding quality – that way the students get a very clear understanding of what is being expected from this specific assignment.

*How effective was the activity? What are your ideas for improvement in the future?*

From my perspective as a teacher, but also from the feedback of the students (both verbal and through the class evaluations) the assignment has been very effective. Students not only learned to explore a building along the lines of passive and active measures of energy-efficiency, sustainability and resilience, they also learned how to critically questioning given information and, for example, a specific ‘reputation; about a building. This includes eye-opening experiences with buildings that received high LEED-ratings (silver) but show frightening shortcomings if looked at the strategies from a holistic point of view.

For next fall’s class, I will enhance the scheduling of the assignment within the class, allowing for extra building tours, since the actual visit on site is more effective than the sole classroom presentation.
<table>
<thead>
<tr>
<th>Professionalism of presentation</th>
<th>The presentation on the building chosen has been professionally prepared - it includes a brief historical introduction or introduction, a main body and a conclusion. It is recited in clear and understandable voice (be prepared to adjust to different noise levels within the urban environment if you present outside the classroom), facing your audience and using an appropriate tone.</th>
<th>The presentation on the building chosen has been professionally prepared - it includes most of the following items: a brief historical introduction or introduction, a main body and a conclusion. It is recited in an acceptable manner.</th>
<th>The presentation lacks professionalism. It is missing important items listed under the previous rubrics. It is hard to understand and follow when presented in class or on site.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engaged of Source Materials</td>
<td>The presentation effectively engages materials from different sources, the class readings, lectures and classroom discussions, to support the presenter’s stance. It is evident that the students have been actively involved into class. Sources are being cited.</td>
<td>The presentation attempts to engage materials from different sources, the class readings, lectures and classroom discussions, to satisfactorily support the essay’s stance. It lacks some evidence that the students have been actively involved into class. Most sources are being cited.</td>
<td>Engagement of source material is weak or incorrect. It is not evident that the students have been actively involved into class. Sources are not cited or plagiarized.</td>
</tr>
<tr>
<td>Body of work presented</td>
<td>The presentation has a strong introduction, clearly states intent and chosen topic(s) of the project, and finishes with a strong conclusion. It includes all items that are listed in the assignment sheet A_02, offering opinions of people who are working in the building. The work is properly delivered as a PDF file at the end-of-the semester due date.</td>
<td>The presentation has an acceptable introduction, satisfactorily states intent and chosen topic, and finishes with an acceptable conclusion. It includes most of the items listed in the assignment sheet A_02. The work is mostly properly delivered as a PDF file at the end-of-the semester due date.</td>
<td>Introduction, conclusion and statement of intent and chosen topics are unclear or completely missing – important items from the assignment sheet A_02 are missing. The work is delivered in an low-quality summary as a PDF file at the end-of-the semester due date.</td>
</tr>
<tr>
<td>Handout</td>
<td>A professionally prepared handout has been delivered to the audience, to support the presentation. It includes the title of the presentation, name of the building, year of construction, architect, function, history overview and most important data. It also includes the group author’s names.</td>
<td>A satisfactory prepared handout has been delivered to the audience, to support the presentation. It includes most of the following items: title of the presentation, name of the building, year of construction, architect, function, history overview and most important data. It also includes the group author’s names.</td>
<td>No handout has been delivered to audience</td>
</tr>
<tr>
<td>Quality of Photographs</td>
<td>Photographs have been edited for submission, including size, brightness, color, and alignment. Photo file sizes are appropriate for the file.</td>
<td>Photographs have been edited to some extend, including some parameters such as brightness, color, and alignment. Photo file sizes are appropriate for the file.</td>
<td>Photographs have not been edited, are of poor quality, and appear unprofessional. File size slow page buildup down.</td>
</tr>
<tr>
<td>Spelling and Grammar</td>
<td>Literally no spelling or grammar mistakes. Assignment is clear and easy to understand.</td>
<td>Multiple spelling and grammar mistakes throughout the assignment.</td>
<td>Assignment is difficult to comprehend because of significant spelling and grammar mistakes.</td>
</tr>
</tbody>
</table>

Comments:
Complete one Activity Sheet for each activity you developed that incorporates sustainability into your course.

Activity Name: Assignment A_03: Energy Simulation Exercise in Sefaira

Instructor Name: Jörg Rügemer

State the activity learning goal(s).

- To create SketchUp/Revit files specifically for the use in Sefaira simulation software.
- To learn to utilize Sefaira as an energy-modeling and simulation tool.
- To receive instant feedback on changes in a building’s configuration, components, orientation, location.
- To understand the direct correlation between location, orientation, building design and building systems.

Summarize activity.

Students teamed up in groups of 2 and were given a simple 2-story building shape (box) that they placed on a fictitious site in SLC downtown, using the Salt Lake City international airport climate data set. During two in-class simulation sessions on Mon., Oct. 31 and Wed., Nov. 02, participants learned how to use Sefaira as an energy modeling and simulation tool. To support each group in the application of the software, two in-class consultation sessions were given on the 16th and 21th of November, which students used both for their assignments 03 and 04 (Sefaira, Envelope Study). Additional consultation was given during studio hours. Most students applied the final Sefaira exercise to their actual studio projects.

At what point in your course is this activity delivered?

Workshop dates: Week 11, Oct. 31, Nov. 02.
Assignment made available: Week 12 (Nov. 09)
Assignment due for presentation in class: Week 16 (Dec. 05).
Final digital delivery: Week 17 (Dec. 12).

Provide teaching tips to help other instructors implement your activity in their courses.

A comprehensive assignment description that includes all deliverables expected from the students has been key over the past years to ensure a high quality of the work. This includes providing an initial site and simple building volume to start with – thereafter, the students usually take off on their own. Careful scheduling is important too – last fall the Sefaira workshop and assignment had been scheduled too late in the semester –class participants picked up Sefaira very well, but weren’t able to use it in their studio projects to the extend expected, simply because the actual design process in the studios happened earlier in the semester. I also recommend to set up the technical side of the class right at the start of the semester – this include securing seats for each student (Sefaira is a web-based, licensed tool with an educational online version, which
Wasatch Experience
Activity Sheet

required a seat for each student in class), asking participants to prepare using the Sefaira online introduction, installing the plug-ins on either their own computers or their computer pool accounts.

Describe your assessment strategy and instruments for student learning and attitudes. Attach grading rubric and/or assessment instruments.

The assignment is assessed during the final presentation, either in the seminar setting (for those students who are not in the instructor’s architectural design studio), or during the actual final studio review (for those students who are also in the instructor’s architectural design studio). An additional assessment is concluded through the participant’s digital deliver at the end of the semester – grades for presentation skills, communication of the results, content, graphical representation and creativity in using the software are accumulated and averaged into a final grade.

Student learning instruments are two, in-class workshop sessions in which participants learn the basics of the software. Thereafter, they further develop their skills mostly on their own, being supported by additional consultation hours. In addition, I also work with the students during architectural design studio times to deepen their skills.

How effective was the activity? What are your ideas for improvement in the future?

Some of the students came to class with some very rudimentary skills of the software; others hadn’t been exposed to it at all. I received very positive feedback directly after the workshop, but also at the end of the semester. Looking at the final assignment results, and, more importantly the implementation of the tool into the student’s design studio projects, I evaluate the exercise as extremely successful – until last year we had few student on the school level who would actually use a energy simulation tool – since last fall I see it implemented into the work of many of our students in general, with an expectation of many of them using it in the near future as a ‘normal’ design tool (which is at least my hope).

In the final seminar de-briefing session (usually the last class of the semester) students proposed to move the Sefaira session to an earlier point in the semester, to allow them to apply the tool better to their projects – I will accommodate for this in my fall 2017 class.
**Wasatch Experience**  
*Activity Sheet*

<table>
<thead>
<tr>
<th>Professionalism of Presentation and Final Outcome</th>
<th>The work is layout in a professional manner, using appropriate and efficient graphics and explores all of the following: Different location settings; different envelope assemblies; different material assemblies; different system configurations; ROI analysis.</th>
<th>The work is layout in an understandable manner, using clear and readable graphics and explores some of the following: Different location settings; different envelope assemblies; different material assemblies; different system configurations; ROI analysis</th>
<th>The work lacks professionalism. It is missing most of the items listed under the previous rubrics.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: uNiD: Grade:</td>
<td>7-10 pts.</td>
<td>3-6 pts.</td>
<td>0-2 pts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use of Sefaira</th>
<th>The software has been applied in an explorative manner, using all its different layers in both the local as well as online version. Several project alterations have been explored and analyzed, with the differences clearly documented.</th>
<th>The software has been applied in an explorative manner, using some of its different layers in both the local as well as online version. Some project alterations have been explored and analyzed, with the differences clearly documented.</th>
<th>The software has been used in a superficial manner, exploring only a very few alterations of the project.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: uNiD: Grade:</td>
<td>4-5 pts.</td>
<td>2-3 pts.</td>
<td>0-1 pts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engagement of Source Materials</th>
<th>To support the author's stance, the work effectively engages strategies discussed and documented in the classroom, and from other sources. It is evident that the students have been actively involved into class.</th>
<th>To support the author's stance, the work engages some strategies discussed and documented in the classroom, and from other sources. It is evident that the students have been involved into class only to a certain degree.</th>
<th>Engagement of class content or source material is weak or incorrect. It is not evident that the students have been actively involved into class.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: uNiD: Grade:</td>
<td>7-8 pts.</td>
<td>4-6 pts.</td>
<td>0-3 pts.</td>
</tr>
</tbody>
</table>


Comments: