ARCH 4/510  Green Roof Design Northwest
Department of Architecture | University of Oregon | Spring 2010

Course: ARCH 4/510 [CRN: 36991, 4 credit hours
Satisfies technology requirements. Additional enrollment based on availability. Open to
PSU students, space available.

Instructors: Adjunct Professor Ben Vaughn, Walker Macy, tba uoregon address
Professor Alison G. Kwok, Ph.D., AIA, LEED AP akwok@uoregon.edu
Office hours by appointment

Class Meeting: Tuesdays and Thursdays 10:00-12:00 noon
WSB Room 555

Prerequisites: ECS 1 or 2 or equivalent

Course Description and Overview
The Green Roof Design course will introduce major design principles, extensive and intensive types of
green roof products and systems, materials, construction techniques, plant physiology/growing media,
technical requirements, contemporary research investigations, and the importance of green roofs in the
Northwest region and beyond, and design criteria necessary for successful green roof projects. In-depth
information of green roof implementation issues from design conception, insurance and permit issues,
site analysis, construction considerations, sub contracting, post-construction maintenance will be
covered. The course features guest speakers delivering lectures from various areas of expertise, weekly
fieldtrips to green roof installations in Portland, and collaborative exercises. This course will introduce
students to the technical aspects of landscapes built over structures. The course will explore
“intensive” (roof garden) and “extensive” (ecoroof) style gardens. Emphasis will be placed on the
detailed study of materials and construction techniques involved in the design and documentation of
these landscapes. This course is intended to serve as preparation for professional work within the field
of Architecture and Landscape Architecture. The vocabulary and technical skills required to design these
unique landscape will be essential for the next generation of design professionals.

Course Format
The course will be presented in a collaborative format, with lectures from the instructor and from
professional guests, interactive discussion, class exercises, student presentations and critiques. An
emphasis will be placed on design through detail and design techniques inherent to landscapes built over
structures. Several on-structure landscapes will be explored first hand in Portland during class hours.
You will conduct a few assignments individually and others as design teams to study a hypothetical roof
garden project. Each team will work together to produce construction document level boards. The
boards will highlight details, materials, and design images from class exercise and the field trips.
Information will be presented through a layer of the construction documentation process typical of the
profession.

Course Evaluation: graded or Pass/No Pass
Each student will be evaluated based on:
• Relating lecture and site visit topics into exercises and group projects
• Thorough analytical studies of materials, detail, and design
• Attendance and participation in class discussion and exercises
• Clear presentation skills, including written, graphic and spoken

<table>
<thead>
<tr>
<th>Attendance, Participation, Discussion</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment Exercises (5 total)</td>
<td>50% (10% each)</td>
</tr>
<tr>
<td>Detail and Design Sketchbook</td>
<td>10%</td>
</tr>
<tr>
<td>Final Project and Presentation</td>
<td>30% (20% applied to each team member for boards; 5% for presentations; 5% teamwork grade, awarded by the team)</td>
</tr>
</tbody>
</table>

**Course Materials**
The following materials are required for each student in this class (not needed until class #2) and can be purchased at Art Media or the UofO Bookstore:

- 1 5x7 or 8x10 sketchbook or journal with 1/4-inch grid.
- 1 25-foot tape measure
- 1 8.5x11 graph paper
- 1 Pentel Sign Pens, black, ($1.50 each)
- 1 Niji Stylist Pen, black, ($1.29)
- 2 red Prismacolor “ColErase” (0.60c)
- 2 blue Prismacolor “ColErase” (0.60c)
- 2 2B pencil ($1) or mechanical/drafting pencil ($6)
- 1 architectural 6” length flat scale

Optional (each team needs at least 1, but you will find these useful in your career)
- 1 architectural triangular scale
- 1 roll of 12” trace paper (white or yellow) 50 yards

A digital camera will be important for site investigation and for the final report. Each design team must have access to at least one.

**Computer Software**
Students will be given flexibility in their choice of presentation medium. Computer aided drawing is encouraged and drawings can then be presented with the aid of a combination of InDesign, AutoCAD, Illustrator, Photoshop and Word, according to team and student abilities and preferences. Final reports should be submitted in 24x36 hard copy(rolled) and Adobe PDF format(CD) so Adobe Illustrator will be very useful for this. A working knowledge of all these programs will be professionally very useful (if not essential) so students are encouraged to familiarize themselves with these relatively simple programs. The use of AutoCAD or Sketchup is not required and you can produce a design boards without it, but if you or your team are familiar with and have access to these programs, by all means employ them.
Course Readings
There are no required textbooks for this course. Excerpts from several texts will be provided but you do NOT need to purchase any of them. There are many excellent reference books for this topic and the following is a list for reference:

1. Theodore Osmundson, *Roof Garden*
2. Earth Pledge, *Green Roofs: Ecological Design and Construction*
4. *Green Roof Plants*
5. *Planting Green Roofs and Living Walls*

Other References
2. Green Roofs for Healthy Cities [www.greenroofs.org](http://www.greenroofs.org)

All class readings will be posted on Blackboard and/or distributed in class.

Detail and Design Sketchbook
Each student is required to keep a 5x7 or 8x10 sketchbook or journal with 1/4“ grid to be used in the recording of information during site visits and class lecturers. The sketchbook exercise shall be completed individually and sketchbooks are due on the final day of class. The sketchbooks shall include the following for each garden visited. No make up site visits will be arranged for those roofs where special arrangements were made. The objectives are to capture the essence of roof quickly through gestural sketches:

- General / Vicinity Information (project name / major cross streets / garden type / date visited / weather)
- Two detailed sketches for each garden visited (field measurements required for one sketch)
- Diagrammatic Site Analysis (prevailing wind, views, public spaces, microclimates). A Kestrel Weathermeter is a handheld sensor that is handy for quick environmental measurements
- General Plant Types (soil depth, plant species)
- Diagrammatic cross section through garden (optional)

Group Project
Your design team will be considered as a consulting firm for an urban infill green roof project. The assignment will be to refine the design of the project’s roof garden through details and material selection. Design teams can select from instructor’s design examples or provide a unique solution with the instructor’s approval. Your team will be required to provide (3) three 24”x36” boards: Image Board, Detail Board, and Site Plan Board with detail callouts, finish schedule, grading spots, and material legend. Reference material from the boards can be derived from the site visits, details discussed in class exercises, course readings, and explorations of design through photo documentation and sketches. These boards will be an excellent opportunity to explore design through detail and build material for your career portfolio. The boards should be creatively and professionally crafted in 24”x36” format, color or black and white. The final class will provide an opportunity for each design team to present their work to the class and receive critical feedback. The board will include, but not limited to the following information:

- North arrow, scale of each drawing or detail
- Design Statement (50 to 75 words).
- Site analysis diagram (shade study, climate, circulation, views, experiential factors).(optional)
• Material schedule, finish legend, furnishing legend.
• Six representative design and material images. Two representative plating images.
• Custom site details (scales t.b.d.). (A minimum of 2 details for each team member)
• Reference to all details, images, and material on Site Plan with callouts.
• Technical, scaled site plan (hand drawn or AutoCAD) with conceptual garden design, architectural & structural features, major dimensions, property lines, drains, furnishing, schematic grades, materials, and detail callouts.
• Cross sections through site and surrounding streets.
• Summary of project’s costs. (not Required)
• Team projects will be assembled in a book representing the final projects; publishing releases will be obtained from each student.

*Additional assignment information to be distributed during the term. Subject to change
## Course Schedule (subject to change)

<table>
<thead>
<tr>
<th>Wk</th>
<th>Topic</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/30 Introduction</td>
<td>Exercise #1: Images</td>
</tr>
<tr>
<td></td>
<td>Student introductions.</td>
<td>Due: April 6</td>
</tr>
<tr>
<td></td>
<td>Course objectives, schedule, materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A brief history of green roofs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Major green roof types (Intensive vs Extensive)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collaborative design process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design through detailing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4/1 Fieldtrip: Portland Building/Hamilton</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4/6 Roof Garden Detail and Design (Extensive)</td>
<td>Exercise #2: Roof Stories</td>
</tr>
<tr>
<td></td>
<td>Major Environmental Influences (shade, climate, sun, soil, views)</td>
<td>Due: April 13</td>
</tr>
<tr>
<td></td>
<td>Architectural Structures that support landscapes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roof Garden Design Principles (materials, grading, architecture)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overview of Green Roofs Components</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*In-class discussion: What are the benefits of Roofgardens? (ecological, social, function, environmental)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4/8 Fieldtrip: Louisa, Museum Place, Maurice</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4/13 Roof Garden Components (Extensive)</td>
<td>Exercise #3: Detail Call Outs</td>
</tr>
<tr>
<td></td>
<td>Planting types</td>
<td>Due April 27</td>
</tr>
<tr>
<td></td>
<td>Soil types and saturated weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soil depth requirements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planters, walls, and paving types</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drainage System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Individual student presentations of roof garden images.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In-class discussion: detail and design of images presented</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Introduction to group project and formation of Design Teams (Exercises 3-5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4/15 Fieldtrip: Cyan, Modera</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4/20 Ecoroof Detail and Design (Intensive)</td>
<td>Exercise #4: Detail and sections</td>
</tr>
<tr>
<td></td>
<td>Different Systems and Approaches</td>
<td>Due: May 11</td>
</tr>
<tr>
<td></td>
<td>Ecoroof Components</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plant Types</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special Considerations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select an appropriate design scheme for the group project.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4/22 Fieldtrip: Construction site</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4/27 Design and Detail Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Details (scale, callouts, getting started)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Material selection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development of design through details</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Construction document process (Guest)</td>
<td></td>
</tr>
</tbody>
</table>
4/29 Fieldtrip:

6  5/4 **Structural Design** (Chris Higgins, OSU tbd)
   5/6 Fieldtrip: 12W, office tour

7  5/11 **Stormwater Management & Monitoring**
   5/13 Fieldtrip: Energy/PV Integrated green roof PSU (Sailor?)

8* 5/18 **Constructability and Cost Analysis**
   *In-class exercise: cost analysis spreadsheet
   5/20 In class: Live Roof and other companies

9  5/25 **Team Final Presentations**
   5/27 **Team Final Presentations**

10 6/1 UO Final Review Week (no class)

11 Final Exam Week