Yestermorrow Natural Building Certificate
Program Syllabus

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a. General course overview

Our six-week Natural Building Certificate is a unique course of study providing hands-on exploration of earthen and natural elements and the means by which they can be used to create structures and shelter. From the design and planning stages through the finishing touches, students will gain comfort and experience working with straw, wood, clay, sand, stone, water, and lime as they design, erect, shape, sculpt, and detail the walls, roofs, and floors that enclose healthy, comfortable, and low-impact living spaces. The program includes an Introduction to Natural Building, as well as segments on Insulative Natural Wall Systems, Thermally Massive Natural Building Systems, Natural Plasters, Advanced Plaster Techniques, Natural Paints & Finishes, and will conclude with individual practicum projects and presentations. The Natural Building Certificate provides the opportunity to develop a range of natural building skills for owner-builders and aspiring professional natural builders alike.

b. Course learning outcomes and objectives

During this six-week program, students will learn:

- to identify what considerations factor into design, and how to approach and complete future designs.
- basic building science principles and utilize them in the application of natural building techniques
- to work with straw, wood, clay, sand, stone, water, and lime in the context of creating shelter.
• to execute a natural building project; while we don’t take on a foundation-to-finish project, students will gain proficiency on a variety of installations and experience many aspects of a construction project, from the design and planning stages through the finishing touches.

c. Major topics list and sequence

1. Shelters and Design
2. Insulation
3. Mass Building
4. Earth Plasters
5. Lime Plasters
6. Natural Paints
7. Practicum Project

d. Mandatory and supplemental reading list

Mandatory readings:

The Natural Building Companion A Comprehensive Guide to Integrative Design and Construction, by Ace McArleton and Jacob Deva Racusin


Supplemental resources:

Internet Resources

www.nbne.org - Website for Natural Builders NorthEast, an organization of natural building professionals throughout New York, New Jersey, and New England. Provides basic information from a northeastern perspective, as well as regional events and a member listing of professional builders and designers.
www.strawbuilding.org – Home of CASBA, the California Straw Building Association, a non-profit devoted to promoting the building technology, including testing and evaluation. Not just for Californians...

www.thelaststraw.org – Home of The Last Straw, a quarterly-or-so publication on the cutting edge of the straw bale world. A must-read for anyone seriously considering working with bales, or anyone who really wants to know what’s going on.

www.sbregistry.greenbuilder.com – The International Straw Bale Registry, a terrific resource of straw bale buildings, builders, lending and insurance agencies, and more. Greenbuilder.com also houses a variety of other resources, including a job posting/job request forum for employment and volunteer opportunities offered and sought.

www.crest.org – Center for Renewable Energy and Sustainable Technology: the name says it all. Lots of information on a wide variety of topics, and host to many online discussion groups, including a straw bale group.

groups.yahoo.com – home to “sb-r-us”, another straw bale discussion group, currently more active than the CREST group.

www.dirtcheapbuilder.com – Run by Charmaine Taylor, this publisher/bookseller offers books, videos, and information about building with dirt (and straw, stone, wood, paper, etc.) for dirt-cheap. Great information on- and offline on many, many subjects.


www.dcat.net – The Development Center for Appropriate Technology. An tremendously valuable organization, headed by David Eisenberg, working to promote ecologically-sound building practices in many arenas, including developing relationships with trade groups and building regulation organizations.

Publications

Design of Straw Bale Buildings: The State of the Art, by Bruce King – Currently the best available resource for engineering and building science perspectives on straw bale building, featuring contributions from the best minds in the field.

More Straw Bale Building: A Complete Guide to Designing and Building with Straw, by Chris Magwood, Peter Mack, and Tina Therrien – An updated version of their original Straw Bale Building, these Canadian builders put out a great, comprehensive, information-rich manual on best current construction and design practices, with inclusion of cold climate detailing.
Serious Straw Bale, by Paul Lacinski and Michel Bergeron – A valuable resource written with the Northeast climate in mind; one of the first books to address detailing in cold climates, and features many pioneering details and techniques.

Build it with Bales, by Matts Myrman and S.O. MacDonald – An early classic on the subject.

The Beauty of Straw Bales, by Bill and Athena Steen – An aesthetic study of the medium by two masters in the field.

The Straw Bale Book, by Bill and Athena Steen and David Bainbridge – Another classic, part of the Real Goods Solar Living series published by Chelsea Green.

Straw Bale Details, by Chris Magwood – A collection of construction details for a variety of applications with straw.


Clay Culture: Plasters, Paints and Preservation, by Carole Crews – A comprehensive look at clay finishes, from paint to plaster to floors.

The Natural Plaster Book, by Cedar Rose Guelberth and Dan Chiras – Another comprehensive and accessible publication on the subject, paying specific reference to the marriage of plaster and straw.

Publishing Companies

Chelsea Green – A Vermont publishing company specializing in books for sustainable living. Many wonderful titles, including a very healthy selection about shelter.

New Society Publishers – A company from British Columbia, Canada who also engages in socially- and environmentally-sound practices promoting books of socially- and environmentally-relevant topics.
e. Course expectations for successful participation in the program

Classes will run from 9am to 5pm everyday, with an hour lunch break from 12 to 1. Presence and punctuality are mandatory and students will be required to notify their instructor if they plan on missing any classes.

For reading and homework assignments as well as the personal practicum project, a general time commitment of 8 to 10 hours per week is required beyond the set 9-5 curriculum.

Each week will be spent both in the classroom and onsite (for hands-on learning). For the classroom portion of the courses, students are expected to come to class prepared, having gone through the assigned readings and completed homework assignments in a timely fashion. For the onsite building portion, we expect students to arrive prepared (with appropriate work-clothes, footwear and mandatory safety gear) and participate in the physical work required for the construction projects.

Since it won’t be possible to cover every aspect of Natural Building to the depth it deserves, we encourage students to come to us with questions and subjects that interest them and we will gladly point them in the directions of written resources, professionals, and other avenues that could be helpful to them.

There is no final exam in this course; however, students are expected to take notes, are encouraged to keep a journal, and will be asked to meet regularly with their instructors to discuss participation, personal learning objectives and practicum projects.

Students will be evaluated and critiqued on the presentation of their final practicum projects

Extra-curricular activities and participation:

At Yestermorrow, natural building and community are inseparable. The experience of working and learning with others creates social ties that are often immediate and long lasting, and these connections are fostered and encouraged through gatherings both formal and informal throughout your time at the school.

Food and music are frequently shared, and ideas are free flowing as builders and designers of all levels of skill and experience meet and grow to know one another. Plenty of interesting guests come and go from Yestermorrow, and there are many remarkable buildings in the Mad River Valley area to explore to further natural building knowledge.
**Shelter and Design**

This week will start with an exploration of Natural, Green and Sustainable building, examining the definitions and the differences between them. We’ll go over ‘shelter’, which is to say we’ll give a general overview of buildings, from foundation to finish, with emphasis on natural buildings. The second part of this course will focus on design and drafting. We will present design and drafting basics and allow each student to build a toolkit to support their efforts during the remainder of the program. Students will choose a particular drafting project and present it to the group on Friday. Practicum projects will be introduced.

**Insulation**

In this course we’ll look at different types of natural insulation, with a particular emphasis on straw and straw bale construction. From a building science perspective to practical jobsite knowledge, we’ll look at every aspect of using natural materials like straw, light-straw clay and woodchip clay in modern-day construction. Balancing sessions in the classroom to a demonstration project (CUBE), students will work with bales (re-sizing, shaping, stacking) and the post-installation plaster preparation work for straw bale walls.

**Earth Building**

This week will be spent looking at earthen construction. From rustic cob building to high-end earthen floors, massive construction using earth is standard in many parts of the world. We’ll look at different climate-appropriate uses of earthen construction and look at different examples of projects in the Mad River Valley. Students will help plan and build an earthen project (details tbd).

**Clay Plasters**

In this class, students will learn about the history of clay plasters, as well as how regional climates affect clay plaster uses (i.e. The difference between using local soils and bagged clay and clay/lime hybrid plasters). Students will be guided through sourcing the required materials, preparing wall surfaces (drywall, lath, straw bales) for clay plastering, mixing and tinting plasters and applying clay to wall surfaces. During the workshop, students will create a series of different clay plasters, learn how to make the appropriate plaster choices for different projects and how to troubleshoot plaster failures.

**Lime Plasters**

In the first part of this class, we’ll go over the history of lime plasters, as well as how regional climates affect typical lime plaster uses. Students will be guided through
sourcing the required materials, preparing wall surfaces (drywall, lath, straw bales) for lime plastering, mixing and tinting plasters and applying lime to wall surfaces. During the workshop, students will create a series of different lime plasters, learn how to make the appropriate plaster choices for different projects and how to troubleshoot plaster failures. The second half of this class is dedicated to tadelakt - an advanced lime plaster technique. Students will learn how to mix and apply tadelakt to cob, clay tiles and the group will work on a tadelakt project on Yestermorrow's campus.

**Natural Paints**

This course will be an exploration of clay and lime as natural paint ingredients. The workshop will cover sourcing paints and ingredients, preparing surfaces (including surfaces that have already been painted) and mixing paints and pigments. Students will have the opportunity to apply numerous paints to different surfaces and learn the techniques for working with natural paints.

g. **Weekly learning objectives and goals**

At the conclusion of the program, students will have acquired the skills and knowledge to allow them to:

**Shelter and Design**
- Understand basic principles of construction and shelter
- Define and differentiate between green, sustainable and natural building
- Utilize basic drafting skills
- Execute and present individual drafting projects

**Insulation**
- Understand basic principles of insulation, air sealing and building envelopes
- Use a chainsaw in a safe, controlled environment
- Work comfortably with straw bales, woodchips and light straw clay as insulation materials
- Identify the different phases of straw bale installation (pre-bale prep, install, post-bale plaster prep)
Mass Building
- Understand basic principles of massive and earthen building as well as climate-based and regionally appropriate uses
- Differentiate between mixes used for cob, rammed earth, earth floors and other types of earth building
- Execute (design, mix, apply) an earthen construction

Clay Plasters
- Understand the place and importance of a plaster skin as part of the building envelope
- Prepare different substrates (drywall, lath, straw bales…) for plaster
- Recognize the differences and appropriate uses for plasters made from local soils, bagged clay as well as clay-lime hybrid plasters
- Understand the differences between basecoat and finish plasters
- Use a mortar mixer in a safe, controlled environment
- Mix, tint and apply basecoat and finish plaster to a variety of different substrates
- Troubleshoot plaster failures

Lime Plasters
- Know the historical, regional and climate-appropriate uses of lime plaster
- Understand the differences between basecoat and finish plasters
- Mix, tint and apply lime plaster to a variety of different substrates
- Mix and apply tadelakt to cob, clay tiles and other substrates

Natural Paints
- Know the historical, regional and climate-appropriate uses of clay and lime paints
- Prepare different substrates for paint
- Mix, tint and apply clay-based paint, milk paint and lime wash

h. Daily topic and activity schedule, including content, learning activities, hands-on work, guest speakers, field trips, etc.

Week 1: Shelter and Design
M. Welcome/Introductions/Syllabus
Intro to Natural Building Certificate
Lecture: Shelter 101
T. Lecture: Shelter 101
W. Tour of Natural Building Projects
Th. Lecture: Intro to Design/Drafting
F. Drafting
   Presentations
   Intro to Practicum Projects

Week 2: Insulation

M. Lecture: Natural Insulation
   Building Science and Insulation
T. Bales 101: shaping & re-sizing
   Straw bale work (build CUBE)
W. Straw bale work (build CUBE)
Th. Woodchip Clay and Light Straw Clay work (build CUBE)
   Straw bale work (prep CUBE for plaster)
F. Review of Insulation
   Practicum

Week 3: Mass Building

M. Lecture: Earth Building
   Building Science and Earth
T. Adobe (ingredients, mixing, application & make cob for tadelakt)
W. Earth Building Project (earthen oven or earthen floor)
Th. Earth Building Project (earthen oven or earthen floor)
F. Review of Earth Building
   Practicum

Week 4: Earth Plasters

M. Lecture: Earth Plasters
   Building Science and Earth Plasters
T. Plaster ingredients
   Surface preparation
   Mixing and application
W. Earth Plaster Project (at Yestermorrow or at Mark Krawczyk’s)
Th. Earth Plaster Project (at Yestermorrow or at Mark Krawczyk’s)
F. Lecture: Review of Plasters
Practicum

Week 5: Lime Plasters
M. Lecture: Lime and lime plasters
   Plaster ingredients
   Surface preparation
   Mixing and application
T. Lime Plaster Project (at Yestermorrow or off-site location)
W. Lecture: Tadelakt
   Tadelakt ingredients
   Surface preparation
   Mixing and application
   Tadelakt tiles and cob balls
Th. Tadelakt Project (at Yestermorrow)
F. Review of Tadelakt
Practicum

Week 6: Paints & Practicums
M. Panel discussion (professionals in the field).
T. Lecture: Natural Paints
   Clay Paints, Milk Paints and Lime washes
   Practicum Projects
W. Practicum Projects
Th. Practicum Projects
F. Presentations and Graduation

i. Explanation of final practicum project, process and deliverables

The Natural Building Certificate will conclude with students engaging individually on design, research, or small modeling/building projects that propel their learning to the next level.

Students investigate a topic in detail and develop their own views about it. This usually involves working individually or in a small group with other students to research a topic and produce written work or make presentation for a seminar.
Practicum projects begin the first week of the program, the idea having been introduced as early as the initial pre-program acceptance interviews. Time is set aside each week for students to work on their practicum projects and the last two days of the program are dedicated entirely to practicum research and development.

Practicum Project Plan

1. My practicum is:

2. My practicum goals are:

3. My practicum will serve my growth in these ways:

4. My practicum will result in these deliverables:

5. The steps I need to take to create these deliverables are:

6. The things needed to successfully create these deliverables are: (include any research, interviews, experiments, products or materials, other organizations or people, inner strength or courage etc., and/or tangible building or creation projects needed):