Team Members

Tina Evans, Assoc. Professor, Sustainability Studies (Lead)
Whitney Chandler, Teaching Assistant, Student & Researcher
Becky Edmiston, Asst. Professor, Biology
Dan Edmiston, Adjunct Faculty, Outdoor Ed
Tracey Hughes, Librarian
Becky Potter, Professor, English/Communications
John Saunders, Professor, Wilderness Studies
Natalie Savage, Student & Researcher
Shawn Sigstedt, Assoc. Professor, Biology
Tom Smiley, Assoc. Professor, Restaurant & Culinary Management
Cynthia Zyzda, Professor, Visual Arts & Humanities

Photos accessed at http://permaculture.org
Outline

• Key Principles & Guiding Vision
• Background on Permaculture
• Educational Programming
• Greenhouse Options
• Potential Revenue Streams
• Potential Grant Opportunities
• Existing Local (Routt County) Efforts
• Discussion

Photos accessed at http://permaculture.org
Key Concept

Permaculture principles as the overarching guide

The greenhouse is a stage for comprehensive, immersive, practical learning experiences with permaculture principles as the solid foundation and driver.

Photo by CRMPI – Accessed at http://crmpi.org/
DRAFT Guiding Vision

Developing leaders with the passion, innovative potential, and solid practical experience necessary to make effective contributions to sustainability projects that involve social, business, scientific, technological, and economic dimensions.
A bit of background on permaculture...
Australia in the 1970s

• David Holmgren & Bill Mollison

• About relationships among people, dwellings, climate, plants, animals, soil, and water
  — Integration of land use & community building

• A focus is on food, but that is not the only focus of permaculture
  — Includes social and economic aspects

“Permanent Agriculture” or “Permanent Culture”
Permaculture’s Professional Recognition

- **Permaculture Institute** is current ‘accrediting’ body
- PINA is being established as an accreditation agency (Permaculture Institute of North America)
Potential Occupations for Permaculturists

- **Arts**
  - Photographers
  - Authors
  - Artists
  - Illustrators

- **Building Trades & Related**
  - Designers
  - Landscape architects
  - Architects
  - Builders

- **Business**
  - Ecopreneurs
  - Marketers
  - Consultants

- **Education**
  - Researchers
  - Educators

- **Sustainability Specific**
  - Activists
  - Ecologists
  - Practitioners
Colorado Permaculture Degree Programs

- Large variation in types & names of programs

- Available at certificate, AA, BA & Masters level

- Sampling presented here w/Colorado focus

Photos accessed at http://permaculture.org
Sampling of Degrees

Community/Junior Colleges
- Northeastern Junior College
- Front Range Community College
- Delta Montrose Community College
- Otero Junior College
- Trinidad State Junior College
- Lamar Community College
- Pickens Technical College
- Emily Griffith Opportunity School

4-Year Colleges
- Fort Lewis
  - Minor in Agroecology/Sustainable Agriculture
- Colorado State University (CSU)
  - Minor in Organic Agriculture
  - Master of Agriculture in Integrated Resource Management
Permaculture Design Certificate Programs

- Variation in depth, length, and cost
Program Outline for an Existing 13-Day Course

- Principles of Natural Systems
- Sustainable Design Methodologies
- Patterns in Nature, Culture and Society
- Reading the Land & Understanding Natural Processes
- Large Scale Land Restoration Techniques
- Water Harvesting Techniques
- Design Principles of Sustainable Human Settlements
- Grey Water Recycling
- Natural Building Strategies
- Cultivated & Productive Ecologies
- Food Forests, Plant Guilds, Gardens for Self-Sufficiency
- Energy Conservation Technologies
- Appropriate Technologies and Renewable Energies
- Urban Environment Permaculture
- Wildlife Management and Biological Pest Control
- Land Arts and Community Activism
- Invisible Structures: EcoVillages & Credit Unions
- Community Supported Agriculture
- Strategies for an Alternative Nation
- Group Design Project

http://www.permaculture.org/nm/index.php/site/permaculture_design_course/
Professional Competencies for Permaculture

<table>
<thead>
<tr>
<th>Education</th>
</tr>
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<tbody>
<tr>
<td>Media</td>
</tr>
<tr>
<td>Site Design &amp; Development</td>
</tr>
<tr>
<td>Community Services</td>
</tr>
<tr>
<td>Finance &amp; Business</td>
</tr>
<tr>
<td>Technical Development</td>
</tr>
<tr>
<td>Resource Development</td>
</tr>
<tr>
<td>Architecture &amp; Building</td>
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<tr>
<td>Research</td>
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</table>

From [http://permaculturenorthamerica.org/history/](http://permaculturenorthamerica.org/history/) on 11/6/13
# Permaculture Design Certificate Details

<table>
<thead>
<tr>
<th>Organization</th>
<th>Location</th>
<th>Month</th>
<th>No. of Days</th>
<th>Cost</th>
<th>Cost/Day</th>
<th>College Credits?</th>
<th>10 participants</th>
<th>15 participants</th>
<th>20 participants</th>
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<td>14</td>
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<td>University Centers of San Miguel</td>
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<td>$23,000</td>
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<td>Permaculture Institute</td>
<td>CO, NM, Costa Rica, Etc.</td>
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<td>Avg. cost of course</td>
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<td></td>
<td>1575</td>
<td></td>
<td></td>
<td></td>
<td>$15,750</td>
<td>$23,625</td>
<td>$31,500</td>
</tr>
</tbody>
</table>

Average gross from course
CMC Steamboat Curricular Integration

SUS - Courses identified w/strong focus on greenhouse/garden use

- Sustainable Agriculture (SUS 341)
- Foodshed Sustainability (SUS 322)
- Art and Sustainability (SUS 346): students could construct art for the site (sculpture, mosaic, murals, etc.).
- Sustainability Internship (SUS 387)
- Sustainability Capstone (SUS 489)
- Special Topics in Sustainability (SUS 375)
- Field Experiences in Sustainability (SUS 391)
- Conservation Biology (SUS 410)
CMC Steamboat Curricular Integration

SUS & BUS Internships & capstone projects

• Development of greenhouse plantings and outdoor garden space over time
  – Plant selection research, purchasing, planting, and growing
  – Site preparation (i.e. swales, building and using cold frames
  – Marketing and/or business plans for the site, accounting regarding produce and its uses

Beekeeping courses – credit & non-credit

Permaculture Design Certificate Program & Workshops

• Credit for SUS students and certificate program students; noncredit option for community
CMC Steamboat Curricular Integration

Collaborations with other programs

• Designing and constructing a tool shed and area seating in collaboration with engineering students
• Designing and constructing a solar food dryer
• Designing and constructing a wood-fired horno oven
• Creating works of art for the site
• Planning and installing micro-irrigation systems
• Collaborating with Culinary Management for bread baking & food preservation courses (i.e. drying, canning, pickling, and freezing)
• Field trips for Biology 111 and Astronomy 150 classes
• Space for art students to draw
• Potential offering of a botanical illustration certificate program
CMC Steamboat Curricular Integration

Culinary Management

Students will be able to learn:

- About edible gardening.
- About sustainable food production systems.
- How to match up herbs and fresh greens to their names through herb and greens identification.
- How fresh herbs and greens enhance recipes.
- Harvesting and preservation principles.
- Farm to table sustainable cuisine practices.
- Recycling, composting, energy conservation and local crops.

In addition the greenhouse offers the Restaurant and Culinary Management Program the ability to expand its course offerings of both credit and non-credit classes. Possible classes could include:

- Farm to Table Cuisine
- Sustainable and Bio-diverse Agricultural Production
- The Agricultural Marketing System
- Herb and Micro-Green Identification and Uses
- Edible Flowers
- Growing Principles
- Seasonal Menu Production
Community Partnership & Outreach Ideas

• Partner with Northwest Colorado Food Coalition (NWCFC) & Culinary program for food growing education & cooking classes for low income people
• Partner with NWCFC’s community gardening program
• Support field trips for local school children to our site — benefits to long term student recruiting
• Visitor, work & learn landscape tours (perhaps for a fee once better established)
• Sustainability discussion forums
• Potlucks
• Introductory & Guest workshops
• Harvest events

“From a marketing standpoint the greenhouse offers not only the Restaurant and Culinary Management Program but the whole college the opportunity to enhance its image by hosting seasonal community dinners prepared with products of the garden and greenhouse.”

- Tom Smiley

Brainstorming of Site Features & Elements

Photos by CMC Staff & CRMPI – Accessed at http://crmpi.org/
Shawn Sigstedt’s Passive House
Brainstorming of Site Features & Elements

Design for CSC
Stelle, IL

Overstory
Semi-dwarf Fruit Trees – Black Locust (N)

Midstory
Hazelnut – Service Berry – Dwarf Fruit Trees
- Elderberry – Siberian pea shrub (N)

Understory
Gooseberry – Currents – Asparagus –
Rhubarb – Herbs – False Indigo (N)

Ground Cover
Strawberry – Nasturtium – Clovers (N)

Vines
Grapes – Winter Hardy Kiwi – Hops

In Swale
Daylilies – Comfrey

Hugelkultur & Linear Food Forest
Perennial trees and plants located along the entire downhill side of the hugelkultur swales

Based on an illustration from Introduction to Permaculture by Bill Mollison
Modified by Bill Wilson of Midwest Permaculture

Greenhouse Building Types

- Hoop houses
- Domes
- Traditional greenhouses
- Earthships

Photos by CMC Staff and Earthship Biotechnology - accessed at http://earthship.com/
# CRMPI Greenhouse Building Type Details

- Year-round greenhouse to accommodate very cold temperatures
- Mediterranean climate, with a minimum indoor temp of around 40°F
- Potentially add insulating curtains at additional cost
- Permaculture design, including planting beds, soil analysis, soil building strategies, and forest garden layout and planting calendars at additional cost

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Out/In ΔT:</th>
<th>Const. $/SF</th>
<th>~ Const. Cost:</th>
<th>~ Design Fees:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple hoophouse or high tunnel greenhouse w/o CB:</td>
<td>+20°F</td>
<td>$12 - $15</td>
<td>~ $25,000.: 1500sf</td>
<td>~ $1,250.</td>
</tr>
<tr>
<td>Insulated hoophouse or high tunnel greenhouse w/ CB:</td>
<td>+35°F</td>
<td>$25 - $30</td>
<td>~ $45,000.: 1500sf</td>
<td>~ $2,500.</td>
</tr>
<tr>
<td>Growing Spaces Dome w/ Climate Battery:</td>
<td>+40°F</td>
<td>$45 - $60</td>
<td>~ $80,000.: 1400sf</td>
<td>~ $2,500.</td>
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<tr>
<td>Full 4-season Tropical House w/ Climate Battery:</td>
<td>+50°F</td>
<td>$85 - $100</td>
<td>~ $140,000.: 1500sf</td>
<td>~ $10,500.</td>
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</table>
Earthship Biotecture, NM - Building Type Details

Six Hallmarks of Earthship Biotecture:

1. Building with recycled and natural materials like tires, cans, bottles, cardboard, etc.
2. Passive heating and cooling using thermal mass partially provided by pounded tires.
3. Water catchment on the roof stored in cisterns.
4. Electricity created from solar and wind.
5. Contained sewage treatment - Zero discharge.*
6. Food production from the botanical cells.

*Also the primary water source for botanical cells in the earthship greenhouses- send grey water (shower and sink) to the lined planters inside and black water to lined cells outside.
CMC Steamboat specific design idea:

• To use waste water from a campus building to "feed" the greenhouse (if building codes allow)

Design Cost

• $1000 for initial design costs
• Approximately $15,000 for complete designs (typically design costs run 10% of the overall cost of the building)

Construction Cost

• For earthship houses, typically $200 per square foot

Fundraising Opportunities

• Earthship Biotecture currently runs an academy in Taos and are beginning to do this globally.
• They charge $2000 dollars and accept forty people per six week session.
• They could create a workshop or several workshops to help raise funds for the project.
Climate Battery from Start to Finish!

Photo by CRMPI - Accessed at http://crmpi.org/
New FTE Faculty 12 Month Position: Duties

- Teach half time in the Sustainability Studies B.A. program.
- Design & Manage effective food growing systems for greenhouse and park.
- Apply permaculture design principles.
- Develop curriculum & food-related, hands-on learning experiences for courses and student clubs.
- Recruit, train, mentor, and supervise student interns to assist with greenhouse and garden planning, development, and management.
- Develop partnerships with food-related organizations in the local community and region.
- Engage in outreach and student recruitment activities.
New FTE Faculty 12 Month Position: Qualifications

Education & Teaching Experience

• Master’s degree in Sustainable Agriculture, Agroecology, Horticulture, Ecology, Sustainable Food Systems, or a closely related field.
• Permaculture design certification.
• Teaching experience commensurate with program needs.
• Curriculum development experience.

Hands-On Experience

• Greenhouse development and management, preferably in a cold winter climate (plant hardiness zone 4 or below).
• Experience designing and managing outdoor gardens and/or orchards.
• Program development and management experience, including managing budgets.
• Permaculture design and management of permaculture systems.
• Supervisory experience.
New FTE Faculty 12 Month Position: Qualifications

Values

• Demonstrated understanding of and commitment to sustainability as a concept and practice.
• In-depth interest in and commitment to developing sustainable food systems through educational engagement and direct action.
• Demonstrated commitment to educating diverse people in food system concepts and practices.
• Enthusiasm for developing effective partnerships with community organizations, local government, and other institutions and agencies relevant to sustainable food system praxis.

Outreach

• Experience coordinating events.
• Experience recruiting students.
Potential Revenue Streams

- **Permaculture Design Certification program**
  - Program fees & housing revenues

- **Culinary**
  - Culinary Management courses

- **Food Service**
  - Reduced expenditures for herbs and specialty products i.e. microgreens for the Culinary program
  - Supporting the student initiative, “20% Real Food by 2020”.

"A big beneficiary of a greenhouse could be the students, faculty, and community members that patronize the CMC dining hall and ultimately a student run restaurant if the program eventually acquires one. Having the greenhouse nearby would allow for fresh, local ingredients in menu items and will significantly reduce the amount of money the school spends on fresh herbs, micro greens, lettuces, edible flowers, etc." – Tom Smiley
Potential Revenue Streams

Sustainability Studies course/program opportunities

Community courses & programs

Produce & Product Sales
- Small CSA (community supported agriculture) program
- Sell produce/products through Yampa Valley Food Co-Op
- Preparing and selling value added products such as jam, salsa, and bread.

Tours/Field Trips
- Offer field trips for local children which could benefit student recruiting
- Visitor tours of the site (perhaps for a fee once we’re up and running and have a lot to see).
- Seasonal community dinners with greenhouse products
Potential Grant Opportunities

• Jewel-Osco - support healthy and thriving communities by funding nonprofit organizations
  • Environmental stewardship: environmental stewardship and sustainable operations
  • Potential award: $125,000

• Fidelity Foundation - strengthen the long-term effectiveness of nonprofit organizations by helping them build the organizational capacity they need to fulfill their missions.
  • Potential award: $50,000

• Organic Crop Improvement Association - support organic agriculture through research and education projects that will benefit producers, processors, and consumers.
  • Potential award: $1,500

• Clif Bar Family Foundation - support grassroots efforts to promote environmental protection, sustainable food and agriculture, and the reduction of environmental health hazards, as well as efforts that contribute to building stronger communities.
  • Potential award: $8,000

• Fiskars Brands, Inc. - support the community garden movement by providing tools and financing for unique new community garden initiatives
  • Potential award: $3,500
Related CMC Activities

• Edwards Campus
  — Garden & Sustainable Cuisine program

• Breckenridge Campus
  — Greenhouse partnership with High Country Conservation Center
  — [Summer Sustainability Institute](#)

• Timberline Campus
  — [NRS Soils Lab & Greenhouse](#)
Routt County Greenhouses & Growing Facilities

- Soroco High School, Oak Creek
  — (16’x32’ - $40K cost)

- Firefly Mountain Produce
  — (not fully year round)

- Elkstone Farm

- Lowell Whiteman - breaking ground soon!
Local Education Efforts

- **Lowell Whiteman Sustainable Agriculture Program (SAP)**

- South Routt High School

- Montessori Daycare on S. Maple across from high school w/Deep Roots
Discussion

Photo by CRMPI - Accessed at http://crmpi.org/
Resources/Webligraphy

• http://www.crmpi.org
• http://permacultureprinciples.com
• http://www.permaculture.org
• http://hialtpc.org (High Altitude Permaculture)
• http://www.agriculture-programs.com/agriculture-degrees-in-colorado.php
• http://organic.colostate.edu/documents/OrganicAgbrochure.pdf
• http://catalog.fortlewis.edu/preview_program.php?catoid=5&poid=570&returnto=116
• http://sustainableaged.org/Projects/AcademicPrograms/tabid/86/Default.aspx

Routt County Specific
• Soroco High School: http://www.exploresteamboat.com/news/2011/apr/30/soroco-high-school-students-see-fruits-labor
• Elkstone Farm: http://elkstonefarm.com
• Lowell Whiteman Sustainable Agriculture Program: https://sites.google.com/a/lws.edu/sap/home
• Firefly Mountain Produce: http://www.fireflymtnproduce.com/photos.php