

Workshop Structure

9 am - Introductions (30 min)

- Who we are
- Group formation

9:30 am: Client Focused Approach

10:30 am : Break (30 min)

11:00 am - Part II (45 min)

- D-Lab Toolkit
- Build a course (Activities II-IV)

11:45 am - Lunch (1 hr)

12:45 am - Part III (1 hr)

Activities V-VII

1:45 pm - Break (15 min)

2:00 pm – Elevator pitches and discussion





Today's **Deliverables**

1-page course brief, Elevator Pitch

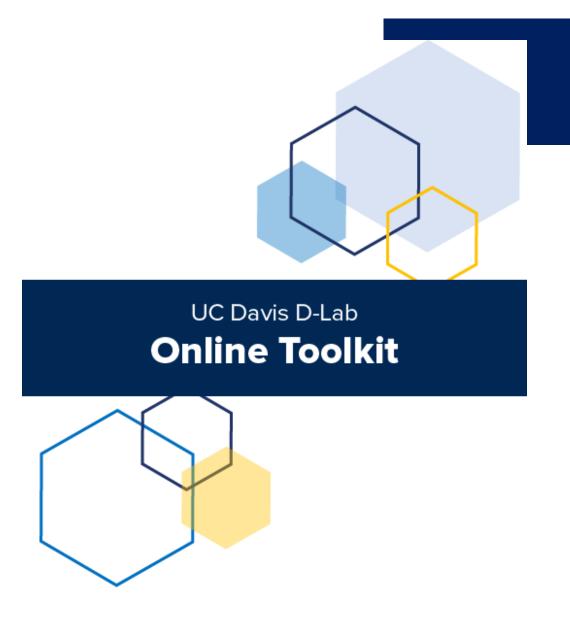
- Title
- Format
- Course Description: Skills, Tools, & Activities
- Course Objectives
- Resources: People, places, funds, potential Clients and Projects
- Evaluation Method







Introductions



Who are we?



Kurt Kornbluth, PhD
Founder & Director
Davis D-Lab



Magdalena Brum
Energy Manager
Sandford University



Alice Dien

M.S. Student – Biological
Systems Engineering





















Group formation



- 1. Course framing (active listening)
 - Who are they? What are their skills?
 - Focus area?
 - What is their dream course? (5 keywords)
- 2. Elevator pitch to the class (Synthesis, Articulation)
- 3. Summary on a sticky note

Kurt Kornbluth

Likes design, cool technology
Wants a course to teach
applied skills for RE evaluation

- 1. Energy
- 2. Modeling
- 3. Economics
- 4. Hands-on
- 5. Climate
- 6. Prototyping

D-Lab Client-focused, project based learning

Development through

Dialogue

Design

Discovery

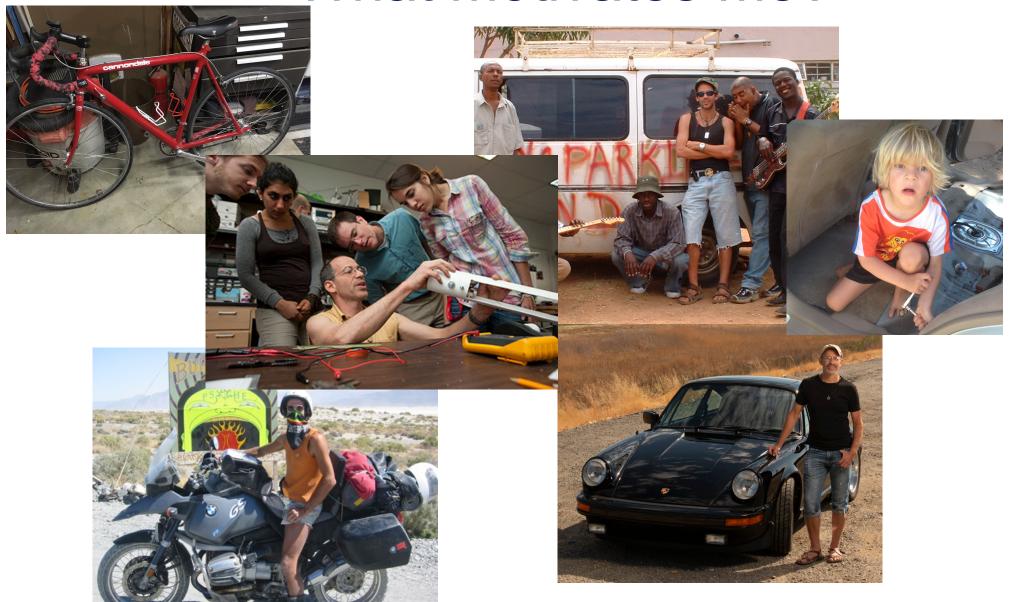
&

Dissemination





What motivates me?



Education Environment

- A place to meet
- Client focused
- Co-Creation
- Interdisciplinary
- Multidisciplinary (Teachers and students)
- Design-think approach
- Bi-directional
- Guided & mentored
- Individual, group, & peer evaluation



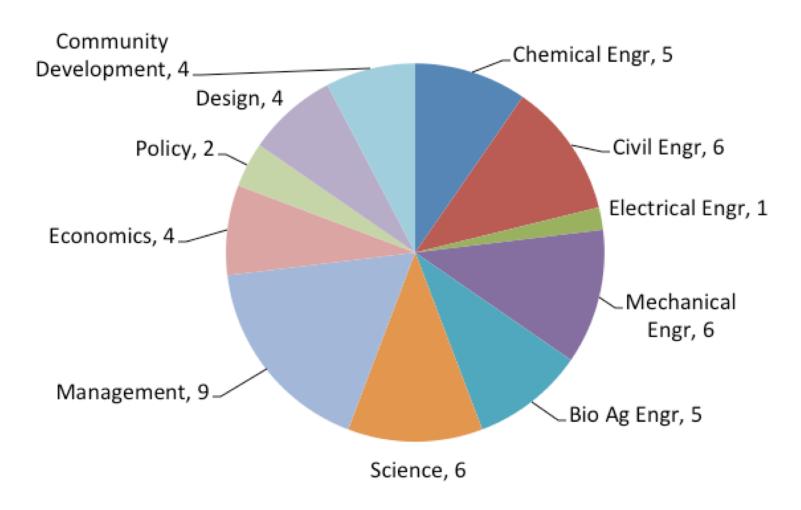
A Place to Meet & Work

D-Lab student Innovation Space





Multidisciplinary



Interdisciplinary

- Environmental
 - Local impacts
 - Life cycle impacts

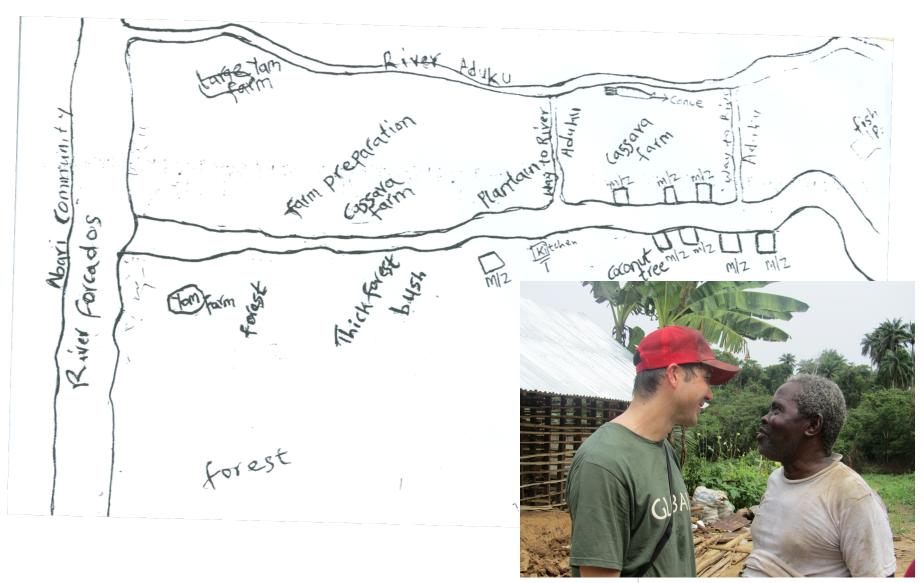
- Social
 - Key Stakeholders
 - Community ownership
 - Gender Issues

- Economic
 - Market segmentation
 - Costs & Benefits
 - Financing/Dissemination Strategy ?

Technical

- Performance
- Resource Requirements
- Capacity Requirements

Co-Creation/Primary research



Learning by Doing



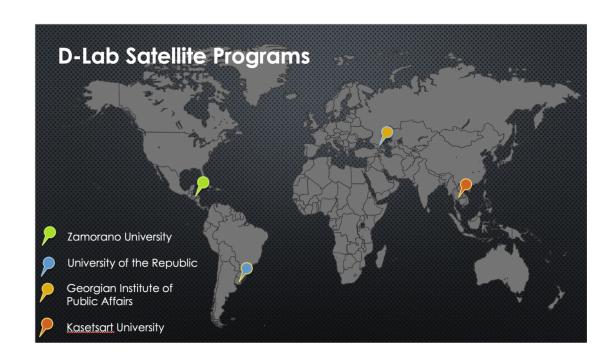


Client-focused... **Mentors** advise the team The client or community partner Get brings the problem Support Student teams work as **consultants** Learn **Address** Real Needs

...produces intrinsic motivation (fear)

Global Outreach

- D-Lab Toolkit
- D-Lab Satellites
- Global Campus Partnerships





Course Setup

UC DAVIS HORTICULTURE AND D-LAB TOOLKIT

How to setup a client-focused, project-based course











October 22 - 24

UC Davis Conference Center

Scaling for impact

D-Lab Professional:

Feasibility Studies
Design Build & Test
Art and Engineering
WATER AND SANITATION HEALTH

A Path to Zero Net Energy A Path to Zero Waste



ABT 212 - PATH TO ZERO NET ENERGY

A Hands-On Approach

2019 ZNE Group Projects

Project Name	Client
Growth Chamber Efficiency	Controlled Environment Facility
Innovation Hub	Facilities Management
Efficient Lighting Retrofit	Fleet Services
Ultra-Low Freezer Efficiency	Office of Sustainability
Renewable Energy Design	McLaughlin Reserve
Harvesting Daylighting	Energy Conservation Office
Hop Kiln Energy Sourcing	Rühstaller Beer



A Path to Zero Waste

D-Lab Project Framing Seminar **FALL 2019**

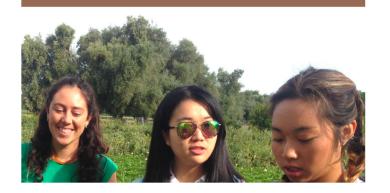
Looking for students interested in:

- Learning about sustainable waste management
- Facing challenges and designing solutions
- Participating in local and international waste management projects

Learn more about the role of managing waste on solving real world issues.

Guest Speakers & Case Studies

Students will work with clients to take action on pressing global issues through dialogue, design, and dissemination.



2019 PZW Projects

- Design of Smart Bins
- Composting and Carbon Policy for Yolo County Landfill
- FS for Almond Shell Plastic Composites
- Biogas Purification for the UC Davis Biodigester
- Economic Feasibility Study for Recycling System In Bukina faso
- Wood Waste Reduction at Yolo County Landfill

Thermal Storage Tank



Optimize TES charge and discharge schedules to minimize operational cost

- Davis, CA > 40 °C
- Cooling 365 days/year
- Energy & Climate Concerns
- \$
- Client: UCD Facilities
- Team: ME, Econ, CD



Net Present Value (NPV)

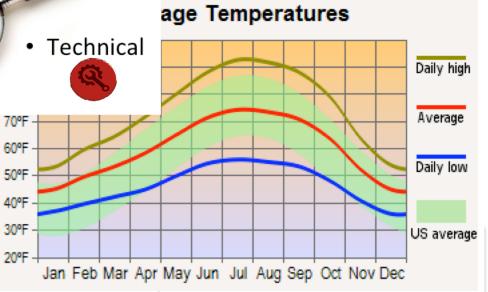
NPV =
$$\sum_{t=1}^{T} \frac{\text{Cash Flow } t}{(1+i)^{t}} - \text{Initial Cash Investment}$$

• Economic

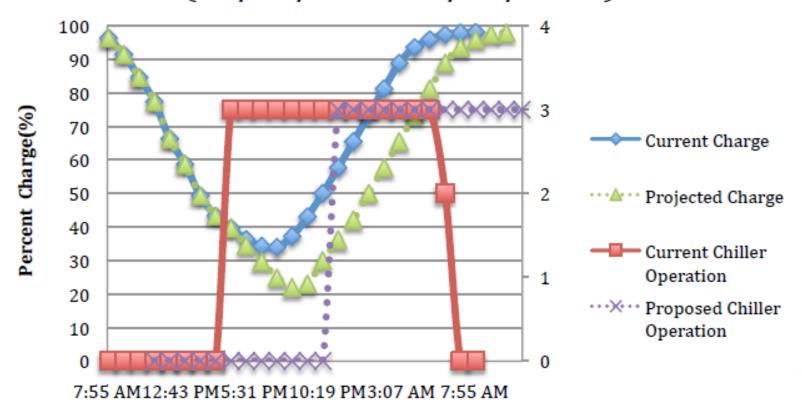
Environmental







Summer Chiller Operation and TES Charging Plot (07/13/2011-07/14/2011)



Time



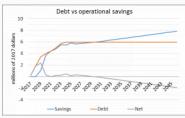
Home About Projects Courses PIET Partners Resources Get Involved

Zero Net Energy

Recent Path to Zero Net Energy projects are described below. Please refer to the library for earlier projects.

Projects of Spring 2016:

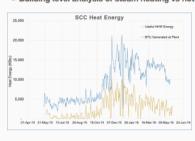
■ Financing the conversion of steam district heating to hot water at UC Davis



This project contrasted the estimated cost of steam-to-hot water conversion to the business-as-usual case, considering maintenance and energy use. The conversion includes implementation of heat recovery chillers for cogeneration of cooling and heating. Over a 30-year analysis period and based on justifiable assumptions used in the financial model, the conversion has an NPV of \$21M and MIRR of 8%. Financing options include public-private joint venture, energy savings performance contracts, energy services agreements, student fees and revolving loan funds.

Poster: Steam-to-Hot Water Conversion, Financing

■ Building level analysis of steam heating vs hot water heating



This project evaluated the potential energy savings at the building level due to conversion from steam to a hot water heating system. Two buildings were selected: Student Community Center (SCC) containing space heating and domestic hot water (DHW) loads and Robbins Hall containing space heating, DHW and process (laboratory) loads. Calculations suggests savings of 20% and 48% over the baseline for Robbins Hall and SCC, respectively, which are primarily due to lower distribution losses and virtually negligible condensate loss.

Poster: Steam-to-Hot Water Conversion, Building Analysis

■ Commuting emissions of UC Davis Medical Center in Sacramento



This project evaluates the effectiveness of the Green Commuting Program on commuting emissions reductions implemented at the UCD Sacramento Medical Center. The Program promotes commuting by ZipCar, campus shuttles, bike, walk and vehicle pooling. Fuel economy of personal transport was obtained from a sample of 200 vehicles at the UCDMC parking lots. MapQuest data was used to obtain driving distances from the UCDMC to the zip codes of residences. Total communiting emissions reductions due to the

Our Partners



LICE AVIC

FACILITIES MANAGEMENT

Energy Conservation Office

Our interdisciplinary student teams work with international mentors and partners to address Energy, Agriculture, Human & Animal Health, and Environmental issues.

Our offices are located on the western side of the UC Davis campus, in the new zero-net-energy community of <u>UC Davis West Village</u>. Directions are below the map.



View Map to 1605 Tilia Street, Davis, Calif. 95616 in a larger map

piet.ucdavis.edu

How do we do it?

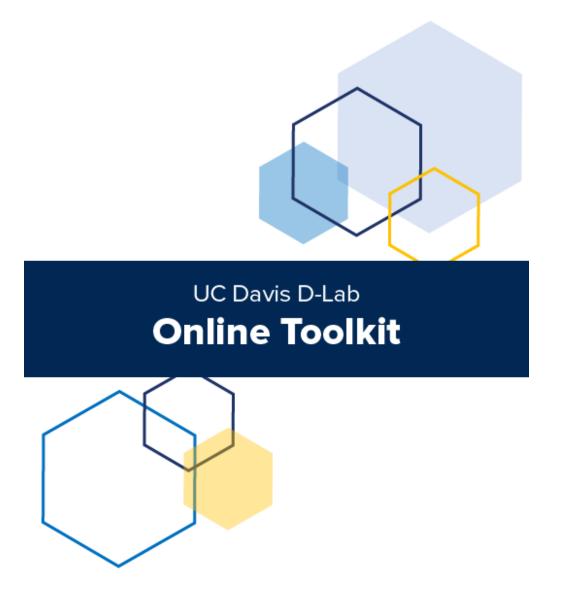
Before: Course Set-Up	During: Course Execution	After: Follow-up
Client recruitment	Multidisciplinary Team formation	Project Continuity (Further Study, publications, implementation)
Project Development	Problem Framing	Course Evaluation & Improvement
Student Outreach	Primary and Secondary Research	
Identify Resources: Funding, speakers, literature, materials, site visits	Mentoring	
	Presentation, feedback, Final Report, & Evaluation	

Course Framework

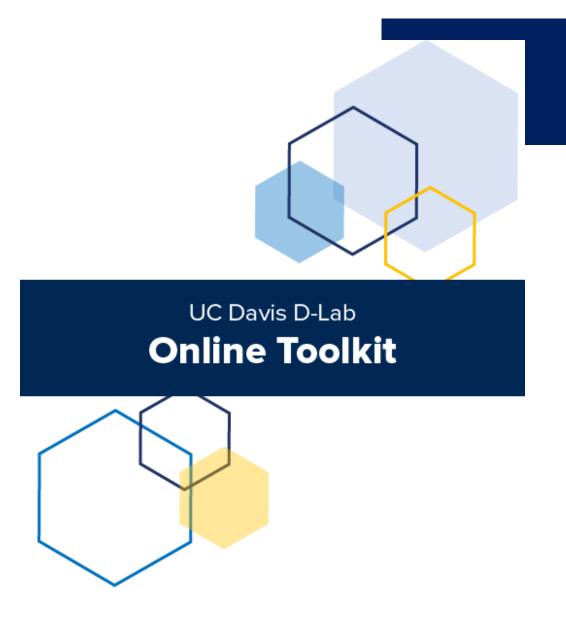
(Present, Participate, Mentor, Articulate, Document, and Evaluate)

- Project Description and Selection
- Team formation and Protocol
- Initial Research
- Client Communication and Consultation
- Project Framing & Scoping (4-lenses)
- Primary and Secondary Research
- Project Framing Presentation (Client sign off)
- Technical tools and concepts, project planning, renewable energy, economics, energy modeling,...
 - Lectures
 - Guest Speakers
 - Experiential Learning (Hands-on Labs)
- Research, Analysis, and Synthesis
- Final Presentation and Report

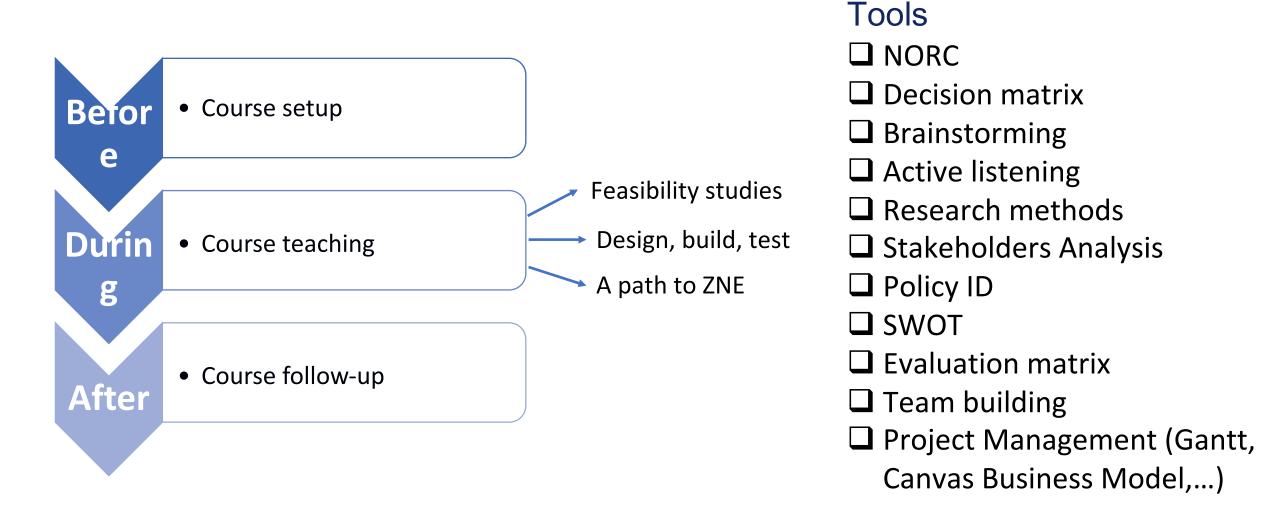
Break (30 min)



Part II Course Design



How do we do it?



Key Terms

- Client: The person or organization who provides the project
- Project: Need identified by the client and related to a specific topic
 (e.g. energy) for who the team does free consulting
- **Team:** Group of 3 students with different backgrounds
- Mentors: Professionals with relevant expertise that guide students
- Reviewers: Individuals with relevant expertise that provide feedback on the student's work







Draft Projects

Determine clients' needs and availability Gather as much data as possible Draft one-page project briefs

Final Details

Finalize project briefs Monitor enrollment Finalize schedule Organize curriculum materials

6 months before

3 months before

Start Date

Getting Started

Contact potential clients Compile curriculum Identify guest speakers

Recruit Students

Design a flyer to advertise course Promote course on social media Share course info with administrators



Teach the course!







Four Lenses of Sustainability

Technical



Performance
Available Materials
Capacity
Requirements

Environmental



Local Pollutants
GHG Emissions
Water/Resource Use

Economic



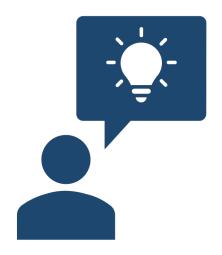
Cost/Benefit Analysis
Business Model
Return on Investment

Social



Key Stakeholders
Community
Ownership
Gender Equity

Let's Build a course



Brainstorming Objectives

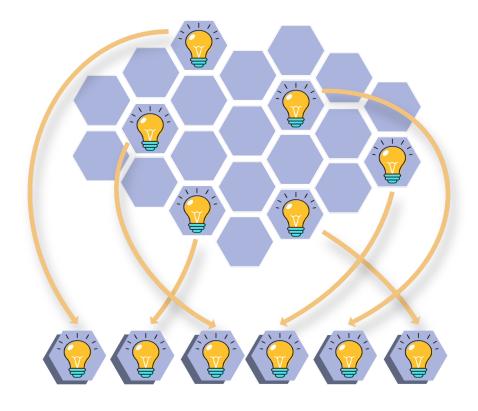
- Generate as many "course objectives" as possible
- Go for quantity
- Just write them down, without judging



Group Example

Activity II: Brainstorming Objectives

Brainstorm 10-20
Select your top 6-8 criteria



What makes a good course project?

- Good client (Must be communicative, motivated)
- Project scope (Achievable end-goal)
- Theme (Aligned, relevant, and interesting)
- Alignment with skillset (Appropriate for your students)
- Required resources
- Scalability (Potential to be replicated)

Finding Clients

- 1. Engage former clients
- 2. Outreach for new clients
- 3. Establish communication
- 4. Clients "apply" with a project proposal



Application

Project Title: *	
Country/Community/Location: *	
Brief Proposed Project Goals (250 words max): *	
Please explain the what steps have already been taken to achieve this project, where you for feasibility study and/or concept design and testing.	presee this project in the future, and how D-Lab students can assist your project with either a
Photo:	
Choose File No file chosen	
Lead contact– International Partner (email): *	
Contact- Potential local project mentor(s) (Name, Phone, Email):	

Project Brief

 Communication: E-mail, phone calls

Draft Brief

Final brief

POTATO STORAGE FACILITY (FEASIBILITY STUDY)

Location: Bareti, Republic of Georgia

In-Country Partner Organization: Environment & Development

Project Background: Bareti is located in the Tsalka Municipality of the Kvetmo-Kartli Region. A 2017 market analysis report indicates that the average potato production in the Kvemo-Kartli Region is 10.83 tons per hectare whereas the average for developed countries is 50-60 tons per hectare. Because these are mostly subsistence farmers, progression is stifled by any risk of a negative impact to their operation. This lack of economic mobility means that few farmers are willing and able to shift their methods unless it has been proven to be successful in the region. This has led to the continuation of outdated farming methods resulting in reduced yields thus continuing a cycle of poverty within this already depressed area.

Project Problem Statement: The lack of an adequate storage facility and potential for post-harvest loss has a large financial impact. Local farmers in Bareti and the surrounding villages continue to use dilapidated and ineffective storage facilities, which results in post-harvest loss. The farmers have seen firsthand the perpetuating loss in yield due to seed degradation. Because of freezing temperatures during storage months, the storage facility must be constructed in a way which maximizes insulation and minimizes heat loss. The client estimates that the space should be 500 square meters and accommodate for 60-70 farmers in the community who will pay for storage. There is interest in utilizing the space as a training facility outfitted with windows. The project budget is currently pending a \$90,000 grant from the Japanese Embassy in Georgia.

Project Goals and Objectives:

- Feasibility Study
 - a. Investigate existing potato storage facility designs
- Conceptual Design
 - Conduct prior art research on windows, insulation, layout, energy efficiency, and any other pertinent components
 - b. Work with the client to determine design criteria
- 3. Make recommendations for D-Lab II Design; Build; Test (D-Lab II)

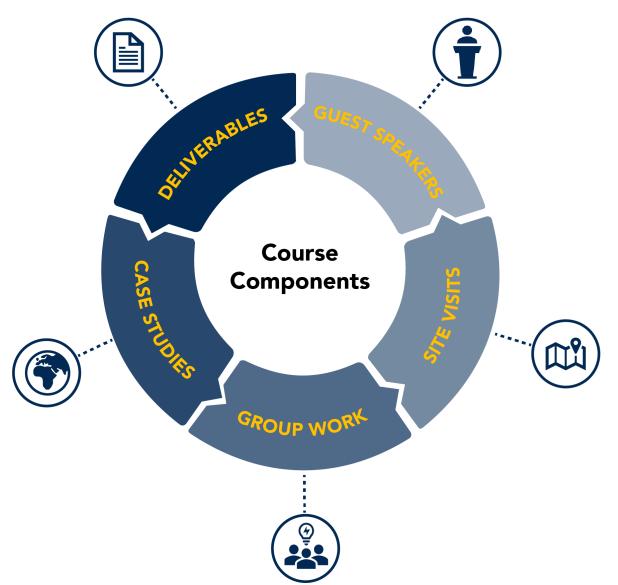




Activity III: Clients & Projects (10 min)

- Generate a List of 3-5 Potential "Clients" and describe:
 - What is their core business?
 - What are their needs?
 - Potential projects

Building the Curriculum



- 1. Deliverables
- 2. Case Studies
- 3. Site visits
- 4. Guest speakers
- 5. In-class activities

Course Framework

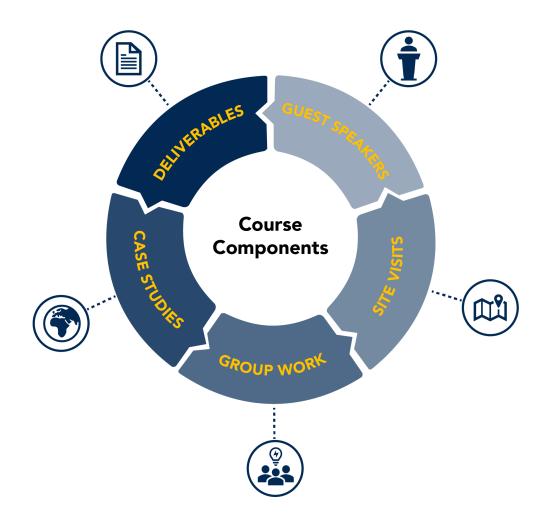
(Present, Participate, Mentor, Articulate, Document, and Evaluate)

- Project Description and Selection
- Team formation and Protocol
- Initial Research
- Client Communication and Consultation
- Project Framing & Scoping (4-lenses)
- Primary and Secondary Research
- Project Framing Presentation (Client sign off)
- Technical tools and concepts, project planning, renewable energy, economics, energy modeling,...
 - Lectures
 - Guest Speakers
 - Experiential Learning (Hands-on Labs)
- Research, Analysis, and Synthesis
- Final Presentation and Report

Activity IV:

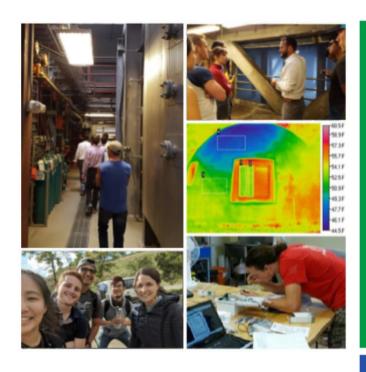
Identify potential Case Studies, Site visits, Guest speakers, In-

class activities (10 min)



Student Recruitment

- Who is your target?
- Advertising
- Application
 - Email
 - Name
 - Student ID
 - Grad/Undergrad
 - College
 - Major
 - ½ page essay "Why do you want to be in this course?"



ABT 212 - PATH TO ZERO NET ENERGY

A Hands-On Approach

Explore the concepts behind designing and operating zero net energy communities through lectures, field trips, labs, and hands-on <u>projects</u>. Course content includes fundamentals of energy in buildings and transportation, renewable energy systems, electric power systems, energy decisions, greenhouse gas emissions, markets, economics, and policies as well as current trends and innovations for energy sustainability.



UCDAVIS
FACILITIES MANAGEMENT
Energy Conservation Office

Explore the principles and challenges of zero net energy

Apply your skills to help UC Davis reduce its carbon footprint

Work on real projects with UC Davis and community partners

Spring Quarter 2019 T/Th 2:10-4:00 Soc. Sci. & Hum., Room 90 CRN # 60538

Open to graduates and upper division undergrads, or with instructor consent.

For more information,
please visit
http://piet.ucdavis.edu
or contact
Lisa M. Slaughter at
lmslaughter@ucdavis.edu

Come to our info session featuring

FREE PIZZA

Learn about the course and meet the staff!

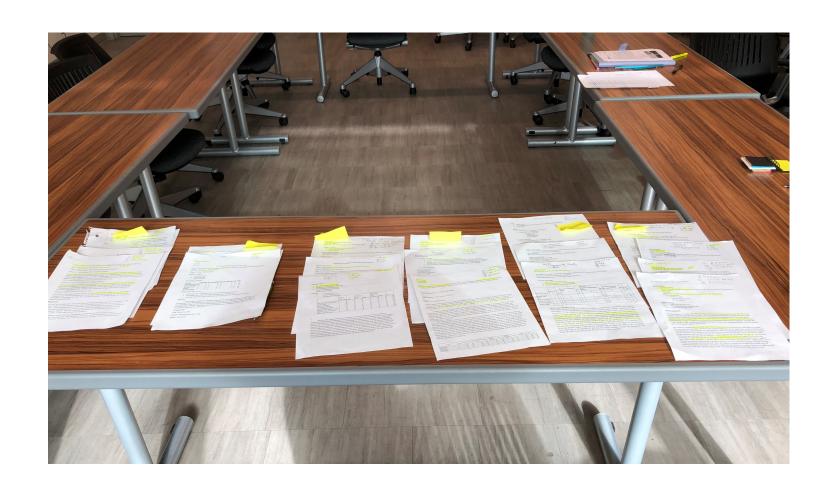
Thursday, Feb 28th 12:00 am – 1:30 pm Bainer Hall, room 2045

Team Formation

- Groups of 3 students
- Important considerations:
 - Assign students in one of their three top project preferences
 - Mix students from different disciplines
 - Mix students from graduate and undergraduate
 - Level of expertise or skillset related to the project

Student Profile & Project Selection

- Deliverable 1:
 - Student profile
 - Top 3 preferences
 - Decision matrix
 - Justification essay



Lunch (1 hour)



UC Davis D-Lab
Online Toolkit



Part III (1 hour)



UC Davis D-Lab
Online Toolkit



Activity V: Evaluation Methods (Discussion 10 min)

- Summative
- Formative
 - Mid-quarter & final presentations (group)
 - Individual Assignments
 - Final Report (group)
 - Pier Review
 - Course evaluation

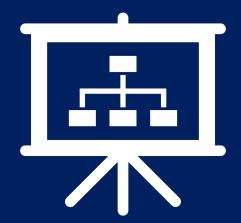


COURSE DESCRIPTION

Team Information
Names:
Email:
Institutions:
Course information
Course Title:
Format and length:
Course Description:
Course Objectives:
Activities/Lectures/Materials/Resources:
Evaluation methods

Activity VI
Synthesis:
Choose a title and generate a course description,
(25 min)

Elevator Pitch



Elevator pitch should include:

Who

You/Your group/Organization

What

Problem you are trying to solve

How

Your proposed solution

Why

- Why is it important
- Key benefit of your solution



8 C's of the Elevator Pitch

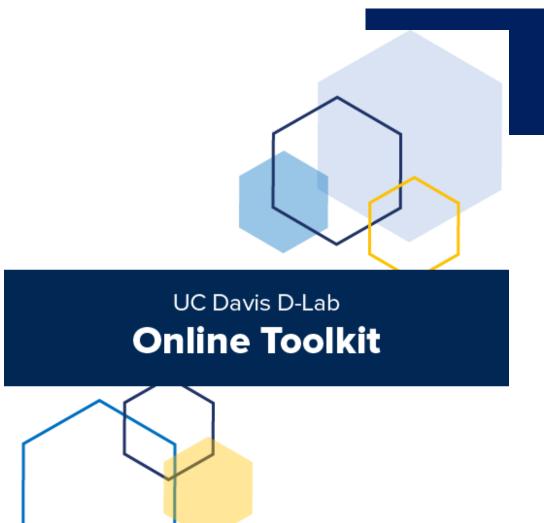
- Concise. Get to the purpose of the message quickly without any extra words
- Clear. Should be understood by your grandparents
- Compelling. Explain the problem of pain that you take away
- Credible. Tell your qualifications if they are relevant
- Concrete. Be very specific about who you are and what benefits you bring to the table
- Customized. You may have to change your message depending on who your audience is
- Consistent. Who you are, and the benefits have to be real and line up
- Conversational. Not rehearsed or phony.

Activity VII: Prepare elevator pitch



"You have 1-minute to convince me about your course idea"

Break (15 min)



Elevator pitches and Discussion



UC Davis D-Lab
Online Toolkit



Thank You!





