Instructor's Guide to *Energy Efficiency in the Home*

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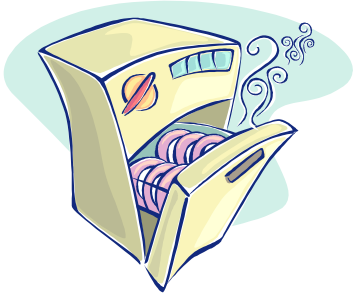
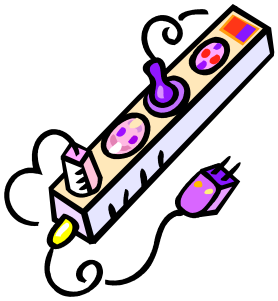


ETEC 632 Spring 2013



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Course Description

Did you know that as of January 1, 2013, Hawai'i's electric rates are about 3-4 times higher than the national average? Additionally, Hawai'i utilities used 11.3 million barrels of petroleum for electricity production in the last year (hawaiienergy.com). Hawai'i is one of the few states in our country that utilizes crude oil to produce electricity. This practice has been known to produce carbon dioxide as well as other harmful emissions which are released into our environment. These harmful chemical pose a hazard to our immediate islands as well as the global condition as a whole.

Additionally, this oil we are dependent on is a finite resource. It has become increasingly hard to extract, increasingly expensive to import, and can only pose as a temporary solution to our energy needs. The solution to this problem is multi-faceted, consisting of demand reduction, sustainable energy generation, and infrastructure management. The first and least expensive step toward reducing our demand for imported oil is to be conscious of our energy consumption and reduce it as much as possible.

Working toward greater efficiency and conservation in the use of electricity in our households is the essential first step that individuals can take to reduce the amount of oil we use for energy production. Additionally, the reduced demand in energy is, in turn, easier to supply through alternative sustainable methods. Areas that will be explored in this course include lighting, water heating, appliances, and phantom loads.

Hawai'i high school environmental science students grades 9-12 on how to find alternative energy solutions for reduction of energy use in the home in each of the four areas. Learners will be able to find alternative solutions (CFL bulbs, shorter showers, use of clothes line, eliminating phantom loads, etc.) to lower energy consumption in the home. Students will be able to measure energy consumption and test alternative energy solutions to decrease energy usage in the home.

Intended Audience

This course is targeted to Hawai'i high school environmental science students in grades 9-12. Prior knowledge must entail general reading, writing, science and math skills aligned to State Common Core and Hawai'i Content Performance Standards. It is expected that the learner has little or no experience with sustainable energy issues or concepts. The student will need access to a computer with reliable internet access and know how to check the course website and email regularly. Learning styles that will be addressed will be visual, logical, and interpersonal and intrapersonal learning through online activities, videos, and readings.

Course Description and Goal

The goal of this course is to educate Hawai'i high school environmental science students in grades 9-12 on how to find alternative energy solutions for reduction of energy use in the home in each of the four areas (lighting, water heating, large appliances, and reduction of phantom loads). Learners will be able to find alternative solutions (CFL bulbs, shorter showers, use of clothes line, eliminating phantom loads, etc.) to lower energy consumption in the home. Students will be able to measure energy consumption and test alternative energy solutions to decrease energy usage in the home.

Instructors

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Class Meeting Time and Location

Asynchronous via Canvas website address: https://canvas.instructure.com/courses/786247

This course will be conducted completely online asynchronously. There will be no face-to-face or synchronous sessions. You will be meeting with other students synchronously via Skype for group assignments. It is recommended that you have a headset/microphone to connect to your computer. It is imperative you log into the course website regularly to keep up with the course and to interact with your classmates.

Course Content

- What is energy efficiency
- Energy efficiency and the home
- Alternative solutions (lighting, water heating, large appliances, and phantom loads)

Course Outcomes/Objectives

At the completion of this asynchronous course students will be able to:

- Define energy efficiency for the home.
- Identify alternative energy solutions for the following areas in the home: lighting, water heating, large appliances, and phantom loads.

- Read TeenBiz assigned articles and answer thought questions.
- Compare alternative energy solutions for the home.

Hawai'i DOE State Standards

Environmental Science

Standard 5: Interdependence of The Environment and Human Societies—Understand the interdependence between environmental systems and human societies.

At the conclusion of this course, student will be able to:

SC.ENV.5.1 Explain how economic and societal decisions affect global and local ecosystems.

SC.ENV.5.2 Assess the effect of human actions on an environmental system

SC.ENV.5.3 Explain how population growth and natural resource consumption affect global sustainability

SC.ENV.5.6 Explain why recycling and conservation of resources are important

Readings

There is no book for this course. All course readings and videos will be posted in the module course site.

Grading Criteria

Final Grades will be determined by the following scale:

A+ = 100%	**B+ = 87-89%**	**C+ = 77-79%**	**D+ = 67 - 69%**
A = 95 - 99%	**B = 84 - 86%**	**C = 74 - 76%**	**D = 64 - 66%**
A- = 90 - 94%	**B- = 80 - 85%**	**C- = 70 - 73%**	**D- = 60 - 63%**
F = below 60%			

Course Deliverables and Respective Points

*All assignments are due the Sunday of each week by 6pm (HST).

*Note Self-Introduction is due Sunday, June 2 at 6pm (HST).

Date	Details	Points
June 2 (Pre-course)	**Assign. 1: Self-Introduction**	**3**
June 9 (week 1)	**Assign. 2: Peer-Feedback**	**2**
	Assign. 3: Group activity (SKYPE)	**10**
	Assign. 4: TeenBiz Article - Energy and the Environment	**5**
June 16 (week 2)	**Assign. 5: Discussion - Watt consumption**	**10**
	Assign. 6: TeenBiz Article - It's Lights Out for some Bulbs	**5**
June 23 (week 3)	**Assign. 7: Discussion - Water heating options**	**10**
	Assign. 8: TeenBiz Article - Getting Power from the Sun	**5**
June 30 (week 4)	**Assign. 9: Discussion- Large appliances**	**10**
	Assign. 10: TeenBiz Article - Going Green	**5**
July 7 (week 5)	**Assign. 11: Discussion - Phantom loads**	**10**
	Assign. 12: TeenBiz - Green Energy Jobs	**5**
July 14 (week 6)	**Assign. 13: Final Project (Group project)**	**15**
	Peer Assessments	**5**
TOTAL POINTS		**100**

Student Expectations

There is a high level of effort and professionalism expected in this course. This course is an asynchronous course which requires learners to be self-motivated.

Course members are expected to:

- Participate in small group synchronous activities
- Turn in all assignments using the course website by the posted due date
- Provide constructive feedback to their classmates
- Contribute positively to a community of learners dedicated to promoting and learning alternatives to energy efficiency in the home

Instructors Notes

- Course content is delivered via Canvas.instructure site
- Course forum, grades, and assignments are on Canvas and TeenBiz.com site
- Canvas can also be used to access all student emails, and to deliver announcements, which Canvas can deliver to students via email

Software and Hardware Required

- Computer with internet access
- Canvas
- Access to a kill-a-watt meter (maybe on loan through school?)

Outside Resources Needed

- Videos
- T.E.D.
- YouTube

Course materials

- Readings on energy efficiency in the home
- Appliance energy ratings
- Kill-o-watt meter

Course Timeline

Pre-Course

- Assignment

- Personal introduction: In the 'Discussions' section under Class Members Introductions, post a description of yourself in about 50 words. Please include your interests, hobbies, and your occupation if applicable. Additionally, attach an image to go with your introduction. If you are not comfortable posting a picture of yourself, feel free to use a picture of a pet or personal hero(ine).

Week 1: Introduction (2 hours Asynchronous)

- Introduction to Course Content and Syllabus
- Energy Basics
  - Context, energy production in Hawai'i
  - Energy consumption in the home

- Small group activity - Energy: What, Where, How? (Skype)
  - Students will form small groups and discuss what they know or don't know about energy. Where do they think the majority of energy is used in their home? Where does our energy come from? What kind of impact do they think using energy has on the environment?

- Readings
  - TeenBiz Article: Energy and the Environment (https://login.achieve3000.com/index.php?logout=1&lang=1&msg=)
  - Energy Basics (http://www.eia.gov/kids/energy.cfm?page=about_home-basics)
  - Climate Change (http://michaelbluejay.com/electricity/climatechange.html)
  - Hawaii Energy: Get the Facts (http://www.hawaiienergy.com/13/get-the-facts)
  - How Much Electricity do Household Items Use? (http://michaelbluejay.com/electricity/howmuch.html)
  - Hawaiian Electric Company: Top 10 Tips for Energy Conservation (http://tinyurl.com/alaoyx5)
  - **Applicable for all weeks:** Energy Star: Save Energy at Home (http://www.energystar.gov/index.cfm?c=products.pr_save_energy_at_home)

- Video
  - Energy Drips - How To Save Money And Energy In Your Home http://www.youtube.com/watch?v=VC3C_8eQgeE
  - Energy of Tomorrow video (Discovery Education Quicktime Video)

- Assignments

- Peer feedback on introductions: In the 'Discussions' section under Class Members Introductions, post feedback to a minimum of two peer introductions. You are encouraged to touch on anything you have in common or what you found interesting about your peer.
- Energetic reaction: In the 'Discussion' section under Week 1 post a minimum 250-word reflection of your group's discussion. This should cover your own thoughts, that of the other group members, and how the discussion added to your understanding of energy and its use. It is encouraged to reference this week's reading and video materials and make use of the carbon footprint calculator (http://michaelbluejay.com/electricity/carboncalculator.html).
- Sustainable Energy Unit ongoing assignment through TeenBiz: Students will be required to do the readings and answer thought questions from the articles.

Week 2: Lighting (2 hours Asynchronous)

- Discussion of watt consumption vs lumens, leds, cfls, daylighting

- Readings
  - TeenBiz Article: It's Lights Out for Some Bulbs (https://login.achieve3000.com/index.php?logout=1&lang=1&msg=)
  - How to Save Electricity on Lighting (http://michaelbluejay.com/electricity/lighting.html)

- Videos
  - Natural Lighting and Electricity (Discovery Education Quicktime Video)
  - Energy 101: Lighting Choices (http://www.youtube.com/watch?v=lP_KcsVtng0)
  - Energy 101: Lumens (http://www.youtube.com/watch?v=kZWiT_NVouA&list=SPACD8E92715335CB2&index=1)
  - Energy 101: Daylighting (http://www.youtube.com/watch?v=-7EG4d-W4W8&list=SPACD8E92715335CB2)

- Assignments
  - TeenBiz article thought questions
  - In the 'Discussion' section under Week 2 post a minimum 250-word reflection of your alternative solutions and predictions for lighting in your home. It is encouraged to reference this week's reading and video materials.

Week 3: Water (2 hours Asynchronous)

- Water heaters
  - Discussion on water heater ratings
  - Discussion on sources in the home of hot water consumption (washing machine, showers, etc)
- Alternatives
  - Discussion on water heater options vs. what is currently being used. Heaters to be considered:
    - old in-efficient water heater
    - better insulation on the old water heater
    - a water heater timer
    - gas water heating (and "tankless" water heating)
    - solar water heaters

- Readings
  - TeenBiz Article: Getting Power from the Sun (https://login.achieve3000.com/index.php?logout=1&lang=1&msg=)
  - Water Heater Energy Use (http://michaelbluejay.com/electricity/waterheaters.html)
  - 9 Ways to Save with a Water Heater (http://waterheatertimer.org/9-ways-to-save-with-water-heater.html)
  - Energy.gov: Estimating Costs and Efficiency of Water Heaters (http://energy.gov/energysaver/articles/estimating-costs-and-efficiency-storage-demand-and-heat-pump-water-heaters)
  - Energy.gov: Reduce Hot Water Use for Energy Savings (http://energy.gov/energysaver/articles/reduce-hot-water-use-energy-savings)
  - Energy.gov: Solar Water Heaters (http://energy.gov/energysaver/articles/solar-water-heaters)

- Videos
  - Eco Kids Explore Solar Power (http://www.youtube.com/watch?v=1UccTg4GAc0)

- Assignments
  - TeenBiz article thought questions
  - In the 'Discussion' section under Week 3 post a minimum 250-word reflection of your alternative solutions and predictions for water heating solutions in your home. It is encouraged to reference this week's reading and video materials.

Week 4: Appliances (2 hours Asynchronous)

- Large Appliances
  - Refrigerators
  - Washer and dryer
  - Stove / Range
  - TV

- Readings
  - TeenBiz Article: Going Green (https://login.achieve3000.com/index.php?logout=1&lang=1&msg=)
  - How Much Electricity Does a Refrigerator Use? (http://michaelbluejay.com/electricity/refrigerators.html)
  - How Much Does it Cost to Run a Washing Machine? (http://michaelbluejay.com/electricity/laundry.html)
  - Clothes Dryer Energy Use (http://michaelbluejay.com/electricity/dryers.html)
  - Energy Used by Cooking (http://michaelbluejay.com/electricity/cooking.html)
  - Energy Efficient Appliances (http://sustainablog.org/2012/09/energy-efficient-appliances)
  - How to Buy an Energy-Efficient Home Appliance (http://www.ftc.gov/bcp/edu/pubs/consumer/homes/rea07.shtm>)

- Videos
  - Save with Energy-Efficient Appliances (http://www.youtube.com/watch?v=tGZtH2ZuA0Y)

- Assignments
  - TeenBiz article thought questions
  - In the 'Discussion' section under Week 4 post a minimum 250-word reflection of your alternative solutions and predictions on the reduction in energy use for their large appliances in your home. It is encouraged to reference this week's reading and video materials.

Week 5: Phantom Loads (2 hours Asynchronous)

- Phantom Loads
  - Discussion on what a phantom load is.

- Alternative Solutions
  - Discussion of conceptual, kill-a-watt use, smart power strips hands on at home.

- Readings
  - TeenBiz Article: Green Energy Jobs (https://login.achieve3000.com/index.php?logout=1&lang=1&msg=)
  - How Much Electricity Costs (http://michaelbluejay.com/electricity/cost.html#kilowatt)
  - How to Measure Electricity Usage (http://michaelbluejay.com/electricity/measure.html)

- Videos
  - Vampire Appliances and Phantom Loads (Discovery Education Quicktime video)

- Assignments
  - TeenBiz article thought questions
  - In the 'Discussion' section under Week 1 post a minimum 250-word reflection of your alternative solutions and predictions for a reduction of phantom loads in your home. It is encouraged to reference this week's reading and video materials.

Week 6: Overview / Final Project

Groups of 4 or more students will be established and each group will be responsible for producing a multimedia presentation including audio, video, and text. The project is a combination of activities from prior weeks.

The group is to pick a different proposed energy solution from each member (1 solution from each week 2-5). Together the students will then propose the ideas as a proposal for energy reduction on an entire home.

Students will need to cover estimated previous electricity use, solutions, estimated cost, and final energy use.

Assessment Rubrics

Assignments Rubric

Category	*Excellent*	*Satisfactory*	*Underdeveloped*	*Limited*	*No Credit*
Quality of Discussion	The discussion post is focused and coherently integrates examples with explanations or analysis. The entry reflects in-depth engagement with the topic.	The discussion post is reasonably focused, and explanations or analysis are mostly based on examples or other evidence. The post reflects moderate engagement with the topic.	The discussion post is mostly description or summary, without consideration of alternative perspectives, few connections are made between ideas.	The discussion post is unfocused, and displays no evidence of student engagement with the topic.	The discussion post is missing or consists of one or two disconnected sentences.
Resource/ Document Reference	Clear reference to text being discussed and connects to it to other text or reference points from previous readings and discussions	Has done the reading with some thoroughness, may lack some detail or critical insight	Has done the reading; lacks thoroughness of understanding or insight	Has not read the entire text and cannot sustain any reference to it in the course of discussion	Unable to refer to text for evidence or support of remarks
Spelling and mechanics	Discussions contain grammatically correct sentences without any spelling errors.	Discussions have one or more grammatically incorrect sentences and/or two spelling errors.	Discussions are written with some grammatically incorrect sentences and/or have some spelling errors.	Discussions are written using grammatically incorrect sentences and/or have greater than 8 spelling errors.	No discussion posted.

Total points (5 points/discussion) = _____

Final Project Rubric

Category	***Excellent***	***Satisfactory***	***Underdeveloped***	***Limited***	***No Credit***
Style	Makes excellent use of font, color, graphics, effects, etc. to enhance the presentation.	Makes good use of font, color, graphics, effects, etc. to enhance to presentation.	Makes use of font, color, graphics, effects, etc. but occasionally these detract from the presentation content.	Use of font, color, graphics, effects etc. but these often distract from the presentation content.	Makes no use of graphics
Organization	Content is well organized using headings or bulleted lists to group related material.	Uses headings or bulleted lists to organize, but the overall organization of topics appears flawed.	Content is logically organized for the most part.	There was no clear or logical organizational structure, just lots of facts.	No organization.
Permissions	All permissions to use graphics "borrowed" from web pages or scanned from books have been requested, received, printed and saved for future reference.	All permissions to use graphics "borrowed" from web pages or scanned from books have been requested and received.	Most permissions to use graphics "borrowed" from web pages or scanned from books have been requested and received.	Permissions were not requested for several graphics "borrowed" from web pages or scanned from books.	No permissions for all graphics "borrowed" from web pages or scanned from books.
Requirements	All requirements	All requirements	One requirement	More than one	No requirements

	are met and exceeded.	are met.	was not completely met.	requirement was not completely met.	met or project not completed.
Originality	Product shows a large amount of original thought. Ideas are creative and inventive.	Product shows some original thought. Work shows new ideas and insights.	Uses other people's ideas (giving them credit), but there is little evidence of original thinking.	Uses other people's ideas, but does not give them credit.	No originality.

Total points (15 possible): _____

Expert Review of *Energy Efficiency in the Home* Course

NA=Not applicable, 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree

AREA 1 - Course Website Review	
1. This course website (CW) provides learners with a clear knowledge of the program objectives.	N/A 1 2 3 4 5
2. The instructional interactions in this CW are appropriate for the objectives.	N/A 1 2 3 4 5
3. The instructional design of this CW is based on sound learning theory and principles.	N/A 1 2 3 4 5
4. The feedback in this CW is clear.	N/A 1 2 3 4 5
5. The pace of this CW is appropriate.	N/A 1 2 3 4 5
6. The difficulty level of this CW is appropriate.	N/A 1 2 3 4 5
AREA 2 - Cosmetic Design Review	N/A 1 2 3 4 5
7. The website design of this CW follows sound principles.	N/A 1 2 3 4 5
8. Color is appropriately used in this CW.	N/A 1 2 3 4 5
9. The screen displays are easy to understand.	N/A 1 2 3 4 5
	N/A 1 2 3 4 5
AREA 3 - Program Functionality Review	N/A 1 2 3 4 5
10. This course website operated flawlessly.	N/A 1 2 3 4 5