

ESG 21W.732 PROJECT II OVERVIEW
FALL 2010
CONCEIVE, DESIGN, PROTOTYPE, & EVALUATE A SOLAR HOT WATER HEATING DEVICE

Problem Statement:

As a pilot for an esg solar water heating system, conceive, design, prototype, and evaluate a device to heat hot water with solar radiation. The device requirements:

- heat 100 ml of water as quickly as possible
- be safe to build, operate, and store (please, no broken glass)
- cost < \$125 in materials ; this cost is for three units and excludes materials available at the hobby shop and incidentals (e.g. hanger wire, cardboard) that can be rummaged for free
- when deployed, the device must fit in a 0.5 meter cube
- duct tape may not be used in the construction of the final prototypes

Two further design constraints:

- accuracy—the degree to which the device heats water should match the design prediction
- precision—the performance results from three different units should match closely; the degree of this match should be predicted in the proposal and analyzed in the report.

Design process suggestions:

The intended challenge of this project is to match the analysis to the prototype performance. Include accurate prediction of performance as one of your selection criteria. During the FRDPARRC design phase, dwell on developing a useful model to predict device performance. You are highly encouraged to use the hobby shop facilities to construct your devices.

Team deliverables:

Project II is done as a team and the communication deliverables include individual and collaborative efforts. Document your contributions in your notebook. Address team issues promptly.

Table 2 project II workflow, roughly in order of occurrence

activity	deliverables	due dates
team formation	team roster	Sept. 20 (in class/lab)
team meeting 1	roles who am I presentations (document in notebooks) schedule of when work will occur (email/hardcopy to Dave) team contract (email to Dave & Elizabeth)	Sept. 21 (during class/lab time)
brainstorming (individual)	sketches and scrawlings in your notebook that identify: <ul style="list-style-type: none"> • 3 concepts for solar water heating • 3 design spaces for each concept (9 total spaces) 	Sept. 23 (for class)
FRDPARRC & selection (individual)	rough FRDPARRC table for each design space (in notebook) selection criteria table (in notebook) at least one back of the envelope calculation (in notebook) informal presentation of spaces and designs (in notebook)	Sept. 23 (for class) Sept. 23 (for class) Sept. 23 (for class) Sept. 23 (done in class)
selection (team)	PREP of individual concepts & spaces (evidence in notebook) possible further brainstorming (evidence in notebook) selection of concept (evidence in notebook, formally part of proposal)	Sept. 23 (done in class)
reflection	e-mail memo to Elizabeth about how well the team is working	Sept. 26 (midnight)
reading		Sept. 28 (for class)
propose design	poster (team) poster pitch/preliminary design review (individual) extensive FRDPARRC of design (team) formal, written proposal (team) proposal/design review (semi-formal presentation, team)	Sept. 30 (for class) Sept. 30 (for class) Oct. 5 (for class) Oct. 5 (for class) Oct. 5 (for class)
reading		Oct. 5 (for class)
predict performance	prediction presentation (team) prediction report (team)	Oct. 14 (delivered in class) Oct. 14 (for class)
reading		Oct. 14 (for class)
prototype	product prototype demo prototype documentation of the construction (photos and notebook)	Oct. 19 (for class) Oct. 19 (in class) Oct. 19 (for class)
test	test results in notebooks photo documentation of results	Oct. 21 (during class/lab time)
memo	e-mail memo to Elizabeth about team III roster recommendations	Oct. 24 (midnight)
report	oral presentation (team) written report (team) graphics package (team)	Oct. 26 (for class)
reflection	reflection memo to Neal debrief performance review w/ Dave	Oct. 28 (before class) Oct. 28 (in class) Oct. 28 ± 2
reading		Oct. 28 (for class)

A movie project starts Oct. 7, and its assignments will overlap with project II, especially movie essay drafts due for class on Oct. 14 and Oct. 28.

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