Island Science

ISCI 2026-2027

- Island Navigation
- ISCI notes
- Island Geology

Island Navigation

What we have learned so far:

- locate yourself on a map using peaks and triangulation with a magnetic compass: https://elab.hpa.edu/wiki/pages/U7x9h9U4B6/Lab_01_navigation_compass_challenge.html
- create an astrolabe to measure the height of objects in the elab: https://elab.hpa.edu/wiki/pages/F6J5D8e4/Lab_03_navigation_astrolabe.html
- determine the altitude of peaks, also part of navigation, using an astrolabe that you create: https://elab.hpa.edu/wiki/pages/U7x9h9U4B6/Lab_01_navigation_compass_challenge.html
- Polynesian sailing compass, using the stars to navigate at night
- learn how to read maps of the island: https://elab.hpa.edu/wiki/pages/x5e2H8S/Lab_02_navigation_reading_maps.html
- use a globe and our noon shadow to determine latitude: https://elab.hpa.edu/wiki/pages/C6S3f6/Lab_06_navigation_globes_and_calculating_latitude.html
- locate evil villains using clues: https://elab.hpa.edu/wiki/pages/d429D3L/Lab_06c_navigation_find_the_evil_villains.html
- learn about the moon phases, and create a diagram: https://elab.hpa.edu/wiki/pages/v155S7g/Lab_07a_moon_seasons_latitude_longitude_challenge.html
- map out the solar system to see the seasons and how our shadow changes with latitude
- create a sundial to measure time: https://elab.hpa.edu/wiki/pages/b9Y4u6U4H/Lab_06a_making_a_sundial.html
- Use the iPads to locate constellations at night:

Next:

1. noon shadow check
2. moon phases-iPads
3. seasons, new map
4. 9.21.26 mapped on solar diagram
5. astronomy and astrology on solar diagram-ipads
6. next unit: volcanoes and geology

ISCI notes

Island Science notes 2026

Semester Plan:

1. **Navigation: mapping and direction finding**
2. **Geology: volcanoes and earthquakes**
3. **Water: Wai and Kai, oceanography**
4. **Air and weather**
5. **Astronomy**
6. **Sustainable design: amazing mystery island project**

9.8.26

- weekend shadow from home
- track noon shadow angle
- ipads-moon phases
- solar circle: seasons, latitude shadow, zodiac
- longitude-local noon
- isci flume soils, native and invasive species

- **8.19 wednesday**
- finish find me
- location challenge-eval-badge **Werkzeichen**
- astrolabe altitude

- 8.17 monday
- finish find-me lab
- badge-find me
- astrolabe: find 22' beam, Mauka Kea

- 8.13.26
- review maps: name all towns and mountains
- take new bearings

- find me bearings
- https://ispdesign.ui.com/#
- challenge——
- kohala 242:62
- mauna kea 303:123
- mlo 340:160cal
- hualalai 1: 181

- Challenges: What is there, why is it important?
- challenge 1 (MLO)
- kohala 166 (346)
- hualalai 134 (314)
- MK 199 (19)
- ML 16 (176)

- challenge 2 (NELHA)
- kohala 220 (40)
- hualalai (254)
- mk 260 (74)
- ml 302 (122)
- challenge 3 (lake waiau)
- MK 217 (37)
- hualalai 83 (263)
- kohala 140 (320)
- ML 18 (176)
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Intros-who, home?

Email bill@hpa.edu

1. where is home besides HPA?
2. what are you most interested in?
3. tell me something few people know about you

Start at the wayfinding compass…

1. note what you can see that is different, at different angles
2. setup your phone as a compass, spyglass app is best for iOS
3. take readings from at least 3 peaks (mauna)

4. create your own big island map using the projectors in the classroom
5. reverse your sightings to converge (hopefully) at our energy lab

grading: on completion of tasks, demonstrate skills

1. compass:
    1. find true north on your phone, add spyglass app (iOS)
    2. sight peaks, or use headings, 180° inversion, triangulation to find elab, small island maps, sight from nav circle above elab, explain compass headings vs Hawaiian names on nav circle
    3. large island maps, replicate elab location from peaks (re-shoot with compass from nav circle), aim for better accuracy
    4. find locations from lists, large map
    5. I'm lost challenge: pick a spot, list headings to peaks, 1 minute cel without GPS
2. astrolabe:
    1. construct: protractor, straw, weight, floss
    2. 45-45-90 challenge
    3. tangent challenge
    4. find altitude of Mauna Kea
    5. 3d location: altitude of peaks, distance to peaks, triangulate
3. earthquakes:
    1. on big map, locate seismic stations

       https://stationview.raspberryshake.org/#/?lat=20.02484&lon=204.32515&zoom=8.000
    2. map out recent quakes, choose one large one, note time and date
    3. go to each station and find same quake, measure P-S time, every second is 10.5 km
    4. triangulate to find epicenter (surface)
    5. if overlap, explain hypocenter vs. epicenter
4. Astronomy
    1. use starwalk on iPads to simulate midnight, look for Polaris (north star, Hoku Pa'a)
    2. measure angle from horizon
    3. compare with our latitude
    4. change location on starwalk app to another part of the globe, look again for Polaris, compare with latitude
5. Globe: seasons and inclination
    1. measure the shadow of a stick at noon at the elab, every day for a week
    2. compare with latitude measured on the globe for HPA
    3. email home or a friend far away, ask for a photo of a stick or chair at noon where they are, and the date of the photo
    4. as we near March 21, what happens to the angle? what does it approach?

5. on a globe, imagine what the shadow angle will be for a list of locations around the globe, N and S hemispheres
6. find me challenge: ransom note with time stamp and shadow-locate the kidnappers
7. what is the connection between GMT, clocks and English spoken around the world?

6. Geology
    1. using the huge magnifiers, and welding masks, melt some igneous rocks downstairs (don't try with coral or concrete, they explode)
    2. using the high temp thermometer, find the temp of the magma
    3. look up the magma at Kilauea and compare
    4. why are there so many gases coming out of Kilauea, and how are they dissolved in the magma? compare to carbonated drinks.
    5. why are the vapor/gases from Kilauea harmful?
    6. how do we know what they are made of? (spectroscopes)
    7. could we use the same tools to find exoplanets?
    8. using purpleair.com, find the air quality around the state
    9. using elab.hpa.edu, look for the vog flume
7. Biomes
    1. back to the big maps, map out the biomes on the big island
    2. map out the last major eruptions and lava flows, including speed
    3. compare the biomes on this island with those on the other islands
    4. on a small map of the island chain, map out the biomes
    5. using google earth, extend this to include the ocean floor-why does the line change?
    6. look up the Nu'uanu Slide and link this to the calving of basaltic volcanoes
    7. compare with andesitic volcanoes
8. Weather
    1. track the weather on all islands in our chain
    2. look for major influences across the Pacific: H and L centers, how they rotate
    3. explain why the wind on Mauna Kea is often the reverse of surface wind
    4. why is Waimea so windy and rainy? Think of the mountains
    5. look on elab.hpa.edu for the weather today, using the windy app
    6. repeat using the tempest app
    7. go to weather.hawaii.edu to compare with these
    8. how do clouds form?
    9. follow the evolution of hurricanes
9. Oceanography
    1. look up the tide chart and the moon phases-how are these connected?
    2. track the moon phases for two weeks, be able to tell from the shape and time of month where the moon should be
    3. using google earth, explain why the surfing in some spots in Hawai'i are better than others
    4. same for fishing
    5. why does OTEC/NELHA have a pipe offshore from Kona?
    6. Look up the NADW and explain why Koyo bottles water for $40 per bottle

7. look for coral beds around the chain, and explain why they are found only in these places
8. what threatens corals globally?
9. look up the e.coli numbers for the shore water at Puako-why are these so high?
10. what is the connection between cold murky water at Hapuna and the golf course there?
11. what is eutrophication, and how do golf courses impact this?
12. look up tsunamis and what causes them-why are they called harbor waves?
13. why were so many people killed in the 1946 and 1960 tsunamis?
14. where did they come from?
15. how have these changed Hilo?
16. what makes a great surf spot?
17. where?
18. what will the ocean level be when you are 90 years old?
19. rogue waves: https://www.youtube.com/watch?v=sCUGLSFvJnE

10. Astronomy
    1. what do each of the telescopes on Mauna Kea do?
    2. what about the observatory on Mauna Loa?
    3. why is having two telescopes together at Keck better than one?
    4. how are these used to detect exoplanets?
    5. how are they looking for life on exoplanets?
    6. Keck guest speaker——
    7. what is red shift and who cares?
11. Severe weather
    1. look up the biggest hurricanes to hit Hawai'i including the one in 1871
    2. where do they start, and how to they move?
    3. look up the surface water temperature between Mexico and Hawai'i-why is this important?
    4. what is an El Nino year, and a La nina year and why should you care?
    5. which direction do hurricanes rotate in the northern hemisphere? southern hemisphere?
12. Sustainability
    1. look up our energy sources on this island
    2. find out how much energy we use daily, and where most of this comes from
    3. map on your large map these sources (pv, wind, hydro, geothermal, oil, coal, natural gas)
    4. who is the largest customer of HELCO?
    5. where does our food come from: what is local and what not local
    6. if we had a tsunami that wiped out the harbors and airports, how many days of water, food and electricity would you have?
    7. what next?
13. Culture
    1. Ahupua'a system
    2. boundaries, fishing, ag, water
    3. sustainable social and ecological system

4. map out on a few islands: river, ridges, shoreline

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create seismic sensor:

https://www.snexplores.org/article/build-seismograph-earthquake

Island Geology

- Melt our island! Using a large magnifier on a clear day, melt any rock on our island that is not coral or concrete
- Volcanoes!
- Lava flows around our island
- Mapping earthquakes on our island with your own island map!
- Biome map and geoguesser
- Biomes in Hawaii

Next: Island water