

Polynesian Voyaging Society
Crew, Instructor, and Leadership Training Program

Check Sheet—Level 2: Intermediate
(Revised: Sept. 25, 1998; Will be Revised Further)

NAME OF TRAINING CANDIDATE (NON-TRANSFERRABLE):

Purpose of Training, Level 2:

1. Crew Member Track: to develop safe, competent crew members for Hawai'i's voyaging canoes.

2. Assistant Instructor Track: to develop safe, competent crew members for Hawai'i's voyaging canoes who can assist in instruction in voyaging education programs.

Prerequisites

- completion of Level 1: Basic
- at least 5 coastal or interisland sails on Hōkūle'a

Instructions: As you complete each step, initial and date it to attest that you have completed it. In level 2, you will have to work with a supervisor or supervisors, who will instruct you and test you in some areas. A supervisor must check you out when an item specifies a Supervisor Checkout (boxes).

At level 2, you may choose one of two tracks: (1) Crew and (2) Assistant Instructor.

Crew Certification at Level 2

To get a Crew Certification at Level 2, you must complete the following sections:

- Section 1. Lifeguard, First Aid, and CPR Training
- Section 2. Seamanship II
- Section 3. Serving as Crew

To obtain your American Red Cross Lifeguard Training and Community First Aid and Safety and CPR for the Professional Rescuer Certifications, you will need to study the following two books:

1. American Red Cross. Lifeguarding Today. St. Louis, MO: Mosby Lifeline, 1995.
2. American Red Cross. CPR for the Professional Rescuer. St. Louis, MO: Mosby Lifeline, 1993.

You may wish to purchase these books (about \$30 for both) from the American Red Cross; ten copies of each book are available for borrowing from the PVS office. There is also a fee for life guard instruction (about \$30).

Other sections of Level 2 are optional for those studying for Crew Certification; however, sections on weather, oceanography, geography, and navigation are highly recommended for everyone in the Crew Training Program.

Assistant Instructor Certification

To get an Assistant Instructor Certification, you need to complete all the sections of Level 2.

At level 2, you will again be assigned readings from *The Complete Sailor: Learning the Art of Sailing* by David Seidman. Readings from this book are assigned by the initials “CS” and a page number or numbers (e.g., “CS / 15”). Other readings, provided in your Training Program Reader / Level 2, are indicated by title followed by the initials “TPR”: for example, “Insuring a Safe Crew and Canoe” / TPR.

When you do the readings, have a dictionary on hand to look up words you do not understand. Keep a written list of these words (and symbols) in your notebook and write definitions for them. If a word or symbol is not clear after you have looked it up in a dictionary or glossary, put a star next to the word and make it a point to ask a supervisor to define or explain the word to you. *Do not skip over words* that you do not understand, because *not knowing what words refer to will hinder your mastery of the voyaging process.*

You will continue to use the same three-ring binder or folder from Level 1 to hold your letters, notes, vocabulary lists, diagrams, etc.

Materials:

- American Red Cross. *Lifeguarding Today*. St. Louis, MO: Mosby Lifeline, 1995.
- American Red Cross. *CPR for the Professional Rescuer*. St. Louis, MO: Mosby Lifeline, 1993.
- Seidman, David. *The Complete Sailor: Learning the Art of Sailing*. Camden, Maine: International Marine, 1994. (\$17.95)
- Training Program Reader (TPR) / Level 2
- Three-ring binder for copies of your letters, vocabulary lists, notes and diagrams on sailing procedures you participate in (e.g. raising and lowering sails, tacking, anchoring), and other required writing.

References for Geography Section

- Atlas of Hawaii
- Marine Atlas of the Hawaiian Islands
- Nautical Chart of the Hawaiian Islands (19004—Hawaiian Islands)
- Reference Maps of the Islands of Hawai‘i (Hawai‘i, Kaua‘i, Maui, Moloka‘i and Lāna‘i, O‘ahu)

1. Lifeguard, First Aid, and CPR Training

Initial the first blank and date the second blank for each step after you have completed it.

_____ Obtain American Red Cross Lifeguard Training and Community First Aid and Safety Certification.

_____ Obtain American Red Cross CPR for the Professional Rescuer Certification.

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:
_____ have completed American Red Cross Lifeguard Training and Community First Aid and Safety and CPR for the Professional Rescuer Certifications.

2. Seamanship II

Sailing

Initial the first blank and date the second blank for each step after you have completed it.

1. _____ Read Captain’s and Watch Captain’s Checklists (TPR); understand how to check each item on the checklist.

2. _____ _____ Able to identify types of rigs and sails. (Read “Rigs” / CS / 92-93; “The Genoa” [a type of jib] / CS / 106; “The Spinnaker” / CS / 107.)
3. _____ _____ Participate in and write down the steps to lowering and raising the two masts.
4. _____ _____ Draw a diagram of where the stays and shrouds go.
5. _____ _____ Participate in replacing halyards, tricing lines, and sheet lines to their proper positions on the spar and boom and draw a diagram of where these lines are attached.
6. _____ _____ Participate in and understand the process of loading the canoe and limiting the weight of the load to below the maximum carrying capacity.
7. _____ _____ Understand the effects on performance and the dangers of too much weight and too many people on the canoe.
8. _____ _____ Understand what windward ability of the canoe refers to. (See “The Windward Ability of the Canoe” / TPR.)
9. _____ _____ Understand what “lee helm” and “weather helm” refer to. (See “Sailing Dynamics / Basic Terms” / TPR; “Weather Helm / Lee Helm” / TPR.)
10. _____ _____ Understand what “center of effort,” “center of lateral resistance and pivot point,” and “balance” refer to. (Read “Preventing Leeway” / CS / 72-73; “Balance” / CS / 94-95.)
11. _____ _____ Demonstrate ability to steer by weight shifts on the canoe. (Read “Effects of Weight Movement on the Canoe” / TPR)
12. _____ _____ Demonstrate ability to trim the sails properly. (Read “Sails” / CS / 98-99; “Sail Shape ” / CS / 100; “Telltails” / CS / 101; “Fault Finder” / CS / 102-103.)
13. _____ _____ Understand how to slow down the canoe, or bring it to a stop. (Read “Heaving To” / CS / 50.)
14. _____ _____ Understand how to bring the canoe out of irons (Read “In Iron” / CS / 45.)
15. _____ _____ Participate in and write down the steps in leaving a mooring or a dock. (Read “Leaving a Mooring or a Dock” / CS / 36-37.)
16. _____ _____ Participate in and write down the steps in returning to a mooring or a dock. (Read “Leaving a Mooring or a Dock” / CS / 54-55.)
17. _____ _____ Participate in and write down the steps in anchoring and leaving an anchorage (Read “Anchoring under Sail” / CS / 132; “Weighing Anchor” / CS / 134.)
18. _____ _____ Review materials on anchors and anchoring (CS / 126-134); draw and turn in a diagram showing (a) how to anchor a canoe using up to two anchors in ten feet of water and a sandy bottom (tidal range 2-3 feet), given that the wind direction is ENE at 10-15 knots, but is predicted to shift to the SW at 20-25 knots the next day when the canoe will still be anchored in the same place. Your diagram should indicate the direction of the wind, the type and position of the anchor(s), the lengths of the anchor line(s), and the position and orientation of the canoe in relationship to the anchor(s) and the wind on day one (ENE wind) and day two (SW wind).

Canoe Repairs and Maintenance

Initial the first blank and date the second blank for each step after you have completed it.

1. _____ _____ Demonstrate ability to tie a sheet, halyard, or tricing line to a spar or boom and seize the line by lashing it down.
2. _____ _____ Demonstrate ability to tie and secure to a ‘iako the end of a line that has a doughnut and eyesplice on the other end.
3. _____ _____ Demonstrate ability to lash a ‘iako to a wae.
4. _____ _____ Demonstrate ability to lash the steering paddle to the deck.
5. _____ _____ Demonstrate ability to lash a splint onto a broken mast.
6. _____ _____ Identify and demonstrate the use of each item in the sail repair kit (Read “Sail Repair Kit” / CS / 140-141.)
7. _____ _____ Demonstrate ability to patch a ripped sail. (Read “Sail Care” / CS / 111.)

Ropework

Initial the first blank and date the second blank for each step after you have completed it.

1. _____ Demonstrate ability to secure an eye splice around a doughnut. (Read “In Laid Line” / CS / 148-14.9)
2. _____ Demonstrate ability to splice two lines together. (Read “Short Splice” and “Long Splice” / TPR.)

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:

_____ have completed steps 1-18 of Sailing
 _____ have demonstrated the ability to do Canoe Repairs 1-7 and Ropework 1-2.

3. Serving as Crew

To complete level 2 and qualify for the level 3, you must have at least _____ coastal sail and interisland voyages, and _____ long voyages. List your sails and voyages on a separate sheet of paper in the following format.

Sail Log

Date	Sailing Route	Duration (In Days, and/or Hours)	Captain’s Signature
1.			
2.			

4. Weather I (Optional for Crew Certification / Level 2; Required for Assistant Instructor Certification)

Initial the first blank and date the second blank for each step after you have completed it.

1. _____ Understand the seasonal variations in Hawaiian weather and name the months of the trade wind season, the Hurricane season, and the Kona storm season. (Read “The Seasons in Hawai‘i” and “Winds in Hawaiian Waters” / TPR)
2. _____ Understand the average wind speeds and directions of the trade winds, Kona storms winds, and hurricanes. (Read “Winds in Hawaiian Waters” / TPR)
3. _____ Understand how land and sea breezes form and when they occur. (Read “Winds in Hawaiian Waters” / TPR; “Wind Sense” / CS / 10-19.)
4. _____ Understand the affects of geography on winds, e.g. the funneling effects when wind blows through mountain gaps or channels and what happens when winds wrap around headlands. (Read “Winds in Hawaiian Waters” and “Effects of Geography on Winds” / TPR.)
5. _____ Able to estimate the direction and strength of the wind by watching the movement of clouds.
6. _____ Able to estimate the strength of the wind by looking at the sea state. (Read “Wind Sense” / CS / 17-19.)
7. _____ Able to read the ocean surface for gusts of wind.
8. _____ Able to identify basic cloud types (Cirrus, Cirrostratus, Cirrocumulus, Altostratus, Altocumulus, Nimbostratus, Stratus, Stratocumulus, Cumulus, Cumulonimbus) and describe the kind of weather associated with them. (Read “Non-Instrument Weather Prediction” / TPR.)
9. _____ Understand how squalls form and able to recognize an approaching squall or squall line. (Read “Squalls” / CS / 170.)
10. _____ Know the strength, direction, and duration of wind associated with a squall. (Read “Squalls” / CS / 170.)
11. _____ Able to gather current weather and ocean information and weather and ocean forecasts from the National Weather Service. (See “Data Collection Sheet,” “Weather Sentinels of the Sea,” “Locations of NOAA Weather Buoys” / TPR.)
12. _____ Understand international weather symbols and read a weather map. (See “International Weather Symbols” and “Sample Weather Map” / TPR.)

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:

_____ have the ability and knowledge indicated in 1-12 above.

5. Oceanography I (Optional for Crew Certification / Level 2; Required for Assistant Instructor Certification)

Initial the first blank and date the second blank for each step after you have completed it.

1. _____ Able to define “ocean currents” and explain what causes them. (Read “Waves, Tides, and Currents in Hawaiian Waters” / TPR; “Currents” / CS / 171.)
2. _____ Able to describe the movement of surface ocean currents around Hawai‘i, indicating their general speed and direction.
3. _____ Understand how currents can affect a sail plan. (Read “Correcting for Currents” / CS / 199.)
4. _____ Able to define “tides” and explain what causes them. (Read “Tides” / CS / 172-173.)
5. _____ Know the number of high and low tides per day in Hawai‘i and the tidal range between high and low tide.
6. _____ Able to explain why one high tide is higher than the other.

7. _____ _____ Able to explain the relationship of tides to the phases of the moon and to state when and why spring and neap tides occur. (Read "Tides" / CS / 172-173.)
8. _____ _____ Able to describe the movement of flood and ebb tides across the island chain and indicate the speed and direction of flood and ebb currents around the Hawaiian Islands.
9. _____ _____ Understand how tides can affect a sail plan.
10. _____ _____ Able to define "ocean swells" and explain what causes swells.
11. _____ _____ Understand how ocean currents and tidal currents affect the shape of swells. (Read "Currents" / CS / 171.)
12. _____ _____ Able to explain the relationship of the height of swells to the fetch area, wind speed, and duration of wind that generated the swell. (Read "Waves, Tides, and Currents in Hawaiian Waters" / TPR.)
13. _____ _____ Able to explain the relationship of the period of the swell to its speed and its distance from its source.
14. _____ _____ Able to describe the major swell patterns in Hawaiian waters and their seasonal variations.
15. _____ _____ Able to define "tsunami," explain what causes tsunamis, indicate their speed and maximum height, their frequency of occurrence, the time period available for reaction, and the length of time a tsunamis presents a danger for a docked, moored, or anchored canoe.

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:
 _____ have the ability and knowledge indicated in 1-15 above.

6. Geography I (Optional for Crew Certification / Level 2; Required for Assistant Instructor Certification)

Reading Nautical Charts

Initial the first blank and date the second blank for each step after you have completed it.

1. _____ _____ Understand depth markings on a nautical chart.
2. _____ _____ Understand navigation aid symbols on a nautical chart. (Read "Language of the Chart" / CS / 176-177; "Aids to Navigation" / CS / 178-179.)
3. _____ _____ Understand degrees on the compass rose and their relationship to the eight major directions (North, South, East, West, Northeast, Southeast, Southwest, Northwest).
4. _____ _____ Understand latitude and longitude markings (degrees, minutes, and seconds) on the borders of nautical charts and the relationship of latitude and longitude to position and distance on the nautical chart.
5. _____ _____ Understand the conversion of nautical miles to land miles and vice versa; and the conversion of knots (nautical miles per hour) to miles per hour and vice versa.

Hawaiian Islands

Initial the first blank and date the second blank for each step after you have completed it.

1. _____ _____ Able to locate on a nautical chart the following ten Hawaiian Islands: Hawai'i, Maui, Kaho'olawe, Lāna'i, Moloka'i, O'ahu, Kaua'i, Ni'ihau, Ka'ula, Nihoa.
2. _____ _____ Able to locate on a nautical chart the following eight channels: Kaulakahi, Kaua'i or Ka'ie'iewaho, Kaiwi, Pailolo, Kalohi, 'Au'au, Kealaikahiki, 'Alalākeiki, 'Alenuihāhā.
3. _____ _____ Able to locate the three highest points on each island.
4. _____ _____ Able to identify the main harbors and anchorages on each island
5. _____ _____ Know the direction of the other Hawaiian islands from one's home island.

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:

_____ have the ability and knowledge indicated in Reading Nautical Charts 1-5 and Hawaiian Islands 1-5 above

7. Navigation I (Optional for Crew Certification / Level 2; Required for Assistant Instructor Certification)

Initial the first blank and date the second blank for each step after you have completed it.

Star Compass

1. _____ Understand that the observer and the canoe are always at the center of the circle of the horizon.
2. _____ Understand that a direction is a line or course of movement from the observer to any point on the horizon.
3. _____ Understand that the directional points on a compass refer to points on the circle of the horizon.
4. _____ Understand that there are an infinite number of points on the circle of the horizon and therefore, an infinite number of directions.
5. _____ Understand that there are 360° on a compass rose and on the circle of the horizon, each degree representing a direction, with 0° or 360° representing north.
6. _____ Understand that each degree on the compass can be divided into 60 minutes and each minute can be divided into 60 seconds, so that using degrees, minutes, and seconds, you can define 1,296,000 directional points.
7. _____ Understand that the traditional Western Compass and the Hawaiian Star Compass devised by Nainoa Thompson have names for thirty-two directional points, the directional points equally spaced around the circle of the horizon at 11 degrees 15 minutes from each other. (See “Compass Rose” / TPR.)
8. _____ Understand that a “house” refers to a segment or arc on the circle of the horizon equal to 11 degrees 15 minutes, and the directional point of the same name is at the middle of the segment or arc. (See “A Hawaiian Star Compass” and “Circle of the Horizon” / TPR.)
9. _____ Memorized the names of the directional points and houses of the Hawaiian Star Compass. (See “A Hawaiian Star Compass” / TPR.)
10. _____ Understand that the Hawaiian Star Compass is divided into four quadrants, named after four winds which blow from those general directions: Ko‘olau (NE quadrant), Malanai (SE quadrant), Kona (SW quadrant), and Ho‘olua (NW quadrant).
11. _____ Understand that a wind comes from a directional point or house on the horizon and travels towards a directional point or house 180° away on the compass.
12. _____ Understand that an ocean swell comes from a directional point or house on the compass and travels toward a directional point or house 180° away on the compass.
13. _____ Understand that a celestial body that rises due East (90°) will set 12 hours later due West (270°).
14. _____ Understand that a celestial body that rises from a directional point or house on the compass at a given angular distance North or South of East (e.g. 10° North of East) will travel across the sky and set at a directional point or house at the same angular distance North or South of West (e.g. 10° North of West).
15. _____ Understand that there are 8 marks on each side of the canoe, each mark paired with one of the two marks at the stern of the canoe. (See “Bearings on the Canoe” / TPR.)
16. _____ Understand that each pair of marks gives bearings in two directions, and that the two sets of eight marks give 32 bearings (2 bearings x 8 pairs x 2 sets) to match the 32 directional houses of the Hawaiian star compass.
17. _____ Understand that the navigator stands at one of the two marks at the stern of the canoe to line up forward bearings using the marks along the railings; or stands at one of the marks along the railings to line up aft bearings using one of the two marks at the stern of the canoe.

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:

_____ have the knowledge indicated in 1-17 above.

Movement of the Celestial Sphere

1. _____ Understand what “celestial sphere” refers to. (See “Celestial Sphere” and “Ka Lani Pa‘a” / TPR.)
2. _____ Understand what “meridian” refers to and point it out in the sky. (See “Celestial Sphere” / TPR.)
3. _____ Able to explain the apparent turning of the celestial sphere and the rising and setting of celestial bodies (sun, moon, stars, and planets).
4. _____ Able to tell time by the movement of celestial bodies (e.g., 3, 6, 12, 24 hours intervals).
5. _____ Understand the movement of the sun along the ecliptic and the zodiac during its annual cycle. (See “Earth’s Orbit inside Celestial Sphere” and “The Sun Along the Ecliptic” / TPR.)
6. _____ Understand the annual movement of the rising and setting points of the sun between 23.5° North and 23.5° South and its relationship to the sun’s movement along the ecliptic. (See “The Sun Along the Ecliptic” / TPR.)
7. _____ Know the position of the sun at the equinoxes (Mar. 21 and Sept. 23) and solstices (June 21 and Dec. 23). (See “Rising and Setting Points of the Sun” / TPR.)
8. _____ Understand that Hikina, or East, is defined as the point on the horizon where the sun rises at the equinoxes; and Komohana, or West, is defined as the point on the horizon where the sun sets at the equinoxes. (See “Steering by the Sun” / TPR.)
9. _____ Identify constellations of the zodiac in the night sky. (See “The Ecliptic” / TPR.)
10. _____ Identify what constellation of the zodiac the sun is in at any given time by looking at the sky just before dawn or just after sunset.
11. _____ Able to identify the house in which the sun rises and sets on any given day.
12. _____ Understand what causes the phases of the moon during its 29.5 day cycle from new moon to new moon and back. (See “Cyclic Phases of the Moon” / TPR.)
13. _____ Bonus: Memorized the Hawaiian names for the phases of the moon. (See “The Hawaiian Lunar Month” and “Kamali‘i ‘ike ‘ole I ka helu pō” / TPR.)
14. _____ Able to explain the relationship between the moon’s position in the sky at different phases relative to the sun’s position in the sky. (See “Moon—Position of the Moon Relative to the Setting Sun” / TPR.)
15. _____ Understand why the cut of the moon (the line between light and dark) points more or less north and south.
16. _____ Know the moon’s variance from the ecliptic during its 29.5 day cycle.
17. _____ Identify the five visible planets in the night sky. (See “Hawaiian Names for the Five Visible Planets” / TPR.)
18. _____ Understand the apparently erratic movement of the planets. (See “The Planets” / TPR.)

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:

_____ have the knowledge indicated in 1-18 above.

Navigation—Directions

1. _____ Able to point out the directions of North and South using celestial clues at night (North Star and Southern Cross, when available; meridian pointers to north and south). (See “Meridian Pointers to North and South Celestial Poles” / TPR.)
2. _____ Given one directional point on the circle of the horizon, able to point out the other 31 directions.
3. _____ After determining the directions, (1) point out a star in the direction of each of the Hawaiian islands from where you are standing; (2) point out a star in the direction of

each of the major islands and island groups of Polynesia: Tahiti, the Cook Islands, Samoa, Tonga, Aotearoa, Hiva (Marquesas), Rapa Nui; and (3) point out a star in the direction of each of the following places: Alaska, California, Mexico, South America, Australia, China, Japan, and Russia.

4. _____ Identify stars in the four basic star lines and the zodiac. (See “Four Star Lines / Rising Points of the Brightest Stars” and “Zodiac / Rising Points of the Brightest Stars” / TPR)
5. _____ Memorize the declinations and houses of the stars in the four basic star lines and the Zodiac (See “Four Star Lines / Rising Points of the Brightest Stars” and “Zodiac / Rising Points of the Brightest Stars” / TPR)
6. _____ Understand seasonal changes of the sky (e.g. if Orion is rising at sunset in November; it will be setting at sunset in early May.)
7. _____ Understand the different angles of rising and setting of celestial bodies at different latitudes. (See “Stars Rising from the Eastern Horizon at 20° N / Setting toward the Western Horizon at 20° N” / TPR)
8. _____ Understand how the rising and setting points of celestial bodies north or south of east shift as the observer moves north or south of the equator because of the different angles of rising and setting at different latitudes.

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:

_____ have the knowledge indicated in 1-8 above.

Holding a Course

1. _____ Understand the basic principles of non-instrument navigation. (Read “Hawaiians as Navigators and Seaman” / TPR and “Non-Instrument Navigation” / TPR.)

By the Wind

1. _____ Able to determine the direction of the wind in relationship to the rising or setting sun or other celestial body.
2. _____ Able to hold a desired or given course by keeping the wind coming from a particular bearing on the canoe. (Read “Steering the Winds and Swells” / TPR.)

By the Swells

1. _____ Able to determine the direction of a dominant swell in relationship to the rising or setting sun or other celestial body.
2. _____ Able to hold a desired or given course by keeping the swell coming from a particular bearing on the canoe. (Read “Steering the Winds and Swells” / TPR; see “Holding a Course by Ocean Swells” / TPRs.)

By the Celestial Bodies

1. _____ Able to determine the direction the canoe is headed in by the rising and setting points of the sun, moon, or stars.
2. _____ Able to hold a desired or given course by keeping a celestial body at a particular bearing on the canoe. (Read “Holding a Course by Celestial Bodies” / TPR.)

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:

_____ have the ability to hold a course by the wind, swells, and celestial bodies.

Determining Latitude

1. _____ Identify the north and south celestial poles and zenith on the celestial sphere. (Read “Celestial Sphere” / TPR.)
2. _____ Understand the changes at different latitudes in tilt of the axis between the north and south celestial pole. (Read “Changes in the Tilt of the Celestial Sphere with Latitude” / TPR.)

3. _____ Understand why there are circumpolar stars and unseen portions of the sky at latitudes north and south of the equator. (Read “Northern Circles” and “Southern Arcs” / TPR.)
4. _____ Understand the low arcs of stars above the unseen portions of the sky.
5. _____ Understand how to measure the altitude of a star with using fingers at arm’s length. (See diagram on “Finger Angles at Arm’s Length” in “Distance Off” / CS / 193.)
6. _____ Calibrated hand and fingers to measure angular distances in the sky using known distances between stars or between stars and the horizon.
7. _____ Understand how to estimate latitude from the height of the north star near the north celestial pole. (Read “Estimating Latitude with Hōkūpa‘a (Polaris)” / TPR.)
8. _____ Understand how to estimate latitude from the heights of stars crossing the meridian. (Read “Estimating Latitude—Altitude of a Star Crossing the Meridian” / TPR.)
9. _____ Understand how to estimate latitude from the heights of pairs of stars at the meridian. (Read “Estimating Latitude with Hānaiakamalama (Southern Cross)” / TPR.)
10. _____ Understand how to estimate latitude from the equal distances between a pair of stars at the meridian and between the bottom star of the pair and the horizon. (e.g., the Southern Cross at 21° N) (Read “Using Stars Crossing the Meridian to Estimate Latitude—Hānaiakamalama”) / TPR.)
11. _____ Understand how to estimate latitude from the heights of circumpolar stars on the low axis. (Read “Using stars Crossing the Meridian to Estimate Latitude—Holopuni and Pherkad”) / TPR.)
12. _____ Understand how to estimate latitude from synchronous rising and setting of stars. (Read “Some Setting Pairs of Stars at 20° N Latitude”) / TPR.)
13. _____ Understand how to estimate latitude using zenith stars. (Read “Hōkūle‘a—Hawai‘i’s Zenith Star”) / TPR.)

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:
 _____ have the knowledge indicated in 1-13 above.

Landfinding Techniques

1. _____ Understand the technique of finding an island using land-based seabirds. (Read “Non-Instrument Navigation” / TPR.)
2. _____ Able to identify the two primary seabirds used to find land: noio, or dark tern, and manu-o-Kū, or white tern).
3. _____ Able to identify pelagic seabirds not used to find land: ‘ā, or booby; ‘iwa, or Frigate bird; koa‘e, or tropic bird; shearwater and petrel.
4. _____ Understand the technique of finding an island by recognizing clouds as they are affected by an island.
5. _____ Understand the technique of finding an island by recognizing changes in the swell patterns due to reflection, refraction, and deflection of swells off of islands.
6. _____ Understand the technique of finding an island using marine life.

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:
 _____ have the knowledge indicated in 1-6 above.

8. Serving as a Teacher (Optional for Crew Certification / Level 2; Required for Assistant Instructor Certification)

Your must conduct at least _____ workshops or presentations on some aspect of voyaging or navigation to complete this level and qualify for level 3. List your workshops and presentations on a separate sheet of paper in the following format. Attach your lesson plans and a self-evaluation for each workshop.

Workshop Log

Date / Place / Time / Audience	Topic of Workshop	Supervisor's Signature
--------------------------------	-------------------	------------------------

- 1.
- 2.
- 3.

Supervisor Check—the following blanks must be initialed and dated by a supervisor to certify that you:

_____ _____ turned in lessons plans for each of the workshops conducted.
_____ _____ are able to effectively conduct a workshop.

Certification

Congratulations! You have just completed Level II: Intermediate of the Polynesian Voyaging Society Training Program.

This certification is for (check one):

_____ crew
_____ assistant instructor

Signatures (Print your name in parentheses after the signature if your signature is illegible.)

Supervisor

Date

PVS Voyaging Coordinator

Date

PVS Executive Director

Date

Polynesian Voyaging Society
Crew, Instructor, and Leadership Training Program

Training Program Reader (TPR) / Level 2: Intermediate

Sailing

1. Captain's Checklist
2. Watch Captain's Checklist
3. Windward Ability of the Canoe
4. Sailing Dynamics --Basic Terms
5. Weather Helm / Lee Helm
6. Effects of Weight Movement on the Canoe

Canoe Repair and Ropework

1. Short Splice
2. Long Splice

Weather

1. The Seasons in Hawai'i—Pūku'i
2. Summary Sheet: "Winds in Hawaiian Waters"
3. "Winds in Hawaiian Waters," from Weather in Hawaiian Waters by Paul Haraguchi (Honolulu: Pacific Weather, Inc. 1979)
4. "Effects of Geography on Winds," from "Climate Controls" by Thomas Schroeder in Prevailing Trade Winds: Weather and Climate in Hawai'i. Sanderson, Marie, ed. (Honolulu: UH Press, 1993).
5. "Non-Instrument Weather Prediction"
6. Gathering Weather Information
 - Data Collection Sheet—Direct Observation
 - Wind Speed Tables (from The Complete Sailor)
 - Data Collection Sheet—Coastal Marine Forecast
 - Data Collection Sheet—NOAA Weather Stations and Buoys
 - Weather Sentinels of the Sea
 - Locations of NOAA Weather Buoys
 - International Weather Symbols
 - Sample Weather Map, from Star Bulletin Web-site (<http://www.starbulletin.com>)

Weather Forecasts, Surface Weather Maps, Forecast Models, Data, and answers to Frequently Asked Questions (FAQ) about weather are available at Web-Site: "Hawai'i Meteorology":
<http://lumahai.soest.hawaii.edu/index.html>

Oceanography

1. Hawaiian Terms for Waves, Tides, and Currents
2. Summary Sheet: "Motions in the Ocean"
3. "Waves, Tides, and Currents in Hawaiian Waters," from Weather in Hawaiian Waters by Paul Haraguchi (Honolulu: Pacific Weather, Inc. 1979).
4. "The Ocean Atlas of Hawai'i," produced by the Satellite Oceanography Laboratory, School of Ocean and Earth Science and Technology (SOEST), University of Hawai'i at Mānoa is at <http://www.satlab.hawaii.edu> (A color poster is available from SOEST)

Navigation

1. "Hawaiians as Navigators and Seamen" / Samuel Wilder King
2. "Non-Instrument Navigation"

Star Compass

1. Compass Rose / Directions and Degrees
2. A Hawaiian Star Compass

3. Circle of the Horizon
4. Bearings on the Canoe

Movement of the Celestial Bodies

1. Celestial Sphere
2. Ka Lani Pa'a (Celestial Sphere)—Hawaiian Terms
3. Two Chants of the Heavens
4. Earth Orbit Inside Celestial Sphere
5. The Sun Along the Ecliptic
6. The Ecliptic (with the Zodiac Constellations)
7. Rising and Setting Points of the Sun
8. Steering by the Sun
9. Cyclic Phases of the Moon
10. The Hawaiian Lunar Month
11. Notes on the Full Moon
12. Kamali'i 'ike 'ole i ka helu pō
13. The Moon Along the Ecliptic
14. Moon Relative to the Setting Sun
15. Hawaiian Names for the Five Visible Planets
16. Planets (From David Burch, Emergency Navigation)

Navigation—Directions

1. Meridian Pointers to North and South Celestial Poles
2. Star Map of the Celestial Sphere
3. Rising and Setting Houses of the Stars
4. Four Star Lines / Rising Points of the Brightest Stars
5. Star Compasses for Four Star Lines
6. Glossary of Hawaiian Star Names
7. Zodiac / Rising Points of the Brightest Stars
8. Stars Rising from the Eastern Horizon at 20° N / Setting Toward the Western Horizon at 20° N (Angles)
9. Stars Changing Houses with Changes in Latitude

Navigation—Holding a Course

1. Holding a Course by Swells
2. Holding a Course by Celestial Bodies
3. "Steering by the Winds and Swells" (From David Burch, Emergency Navigation)

Navigation—Determining Latitude

1. Changes in the Tilt of the Celestial Sphere with Latitude
2. Northern Circles
3. Southern Arcs
4. Telling Time at Night with Circumpolar Stars
5. Estimating Latitude with Hōkūpa‘a (North Star)
6. Estimating Latitude—Altitude of a Star Crossing the Meridian
7. Estimating Latitude with Hānaiakamalama (Southern Cross)
8. Using Stars Crossing the Meridain to Estimate Latitude—Hānaiakamalama (Southern Cross)
9. Using Stars Crossing the Meridain to Estimate Latitude—Holopuni and Pherkad (Southern Cross)
10. Some Setting Paris of Stars at 20° N Latitude
11. Hōkūle‘a—Zenith Star of Hawai‘i