Celestial Navigation Concepts Outline

For centuries navigators have used the sun, moon, stars and planets to find their ways across unmarked oceans. That has been done many ways, sometimes with no equipment and other times with equipment of varying sophistication. The root concept in more "modern" celestial navigation is actually quite simple; applying it requires pulling together information from several sources, each of which requires some understanding. In this course, we will first look at the answer…how does this work?...and then explore all of the concepts and information sources required to actually derive the answer, a fixed position.

Of necessity, the course is technical, but it isn't "mathy." If you know how to think about latitude and longitude, you like looking at two-dimensional representations of three-dimensional space, and you understand how one might use the direction of a landmark to help ascertain one's position, you'll be just fine. You will want to study the new concepts between sessions because they build upon one another.

1. The Answer: Comparing the known position of a celestial body and its actual position from assumed location on Earth at the same moment in time can lead to a useful line of position on a chart.

2. Terrestrial coordinates and lines of position
    a. Latitude, longitude (L,Lo)
    b. Lines of position (LOP)

3. Celestial coordinates and time
    a. Greenwich hour angle (GHA), local hour angle (LHA), meridian angle (t)
    b. Declination (d)
    c. Sidereal hour angle (SHA)
    d. Local hour angle (LHA)
    e. Greenwich Mean Time (GMT)
    f. Zone Time (ZT)

g. Local Mean Time (LMT)
h. Standard Time (i.e., EST, discussion only)
i. The time diagram
j. The diagram on the plane of the celestial meridian

4. The Nautical Almanac
    a. Celestial coordinates based on time
    b. Altitude corrections based on body/altitude
    c. The time diagrams

5. The marine sextant
    a. Mechanics/use
    b. Corrections to observations

6. Deriving a fixed position
    a. Deriving intercept (a), azimuth angle (Z), and azimuth (Zn)
    b. Plotting lines of position (LOPs)

The instructor: Harry "Dutch" Dresser has taught pilotage and celestial navigation in various forms to various audiences for nearly 50 years. As an educator in prep school and the university, Dutch used the course to tease students to learn spherical trigonometry. The course was frequently taken by students preparing to go to the US Naval Academy. However, generally the course has been taught to curious, technically minded adults. Dutch has been a sailor for all of his adult life with ~20,000 bluewater miles to his credit as either navigator or captain. He carried a USCG Masters license for 15 years. Dutch and his wife, Elaine, sold, DAWN, the Stevens Custom 42 that they enjoyed for years in waters from Maine to Martinique about a year ago before moving from Maine to The Villages.