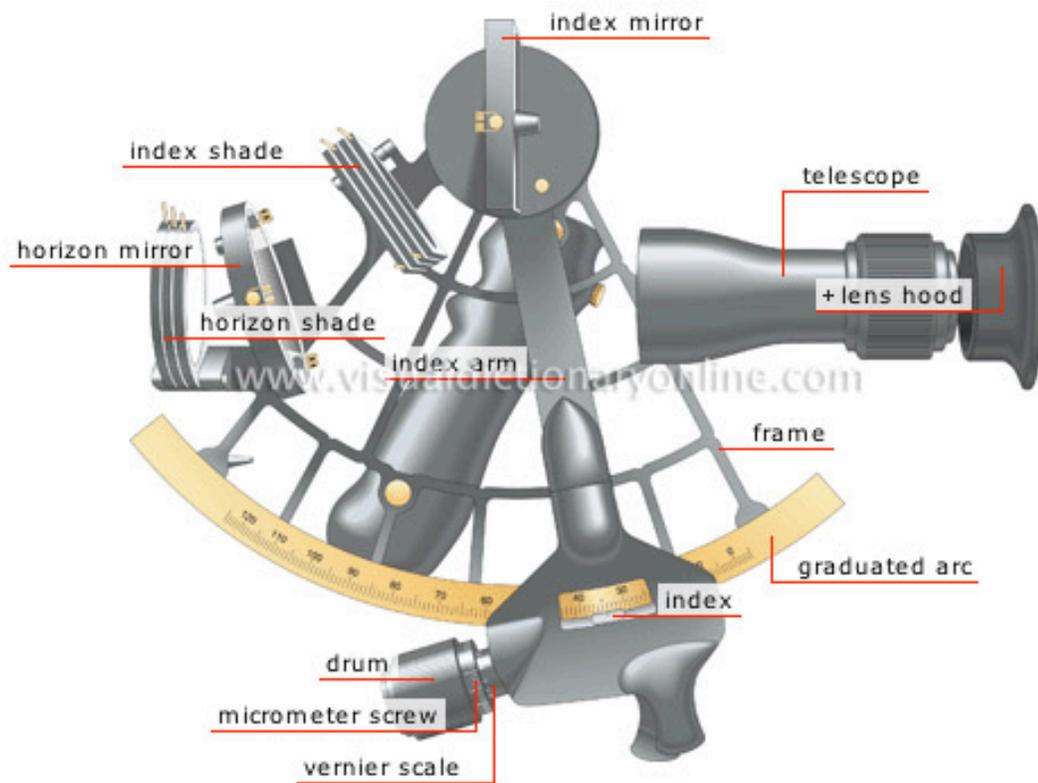


MT 2222

Celestial Navigation



Merriam Webster ©

Massachusetts Maritime Academy

CELESTIAL NAVIGATION

COURSE: MT2222 (CREDITS: 4)

SPRING SEMESTER ACADEMIC YEAR 2014

Instructors:

CAPT David B. Mackey

dmackey@maritime.edu

OFFICE: 307 Bresnahan Hall

CAPT John Carlisle

jcarlisle@maritime.edu

Harrington

COURSE DESCRIPTION

This course will cover the requirements of the 1978 STCW Convention as amended in 1995 and 2010. The course covers the theory and practice of navigation necessary for the effective and safe navigation of a vessel, including the use of charts, position fixing by celestial observations and the extraction of information from relevant navigational publications. It introduces and focuses on the theory and practice of the use of observations of celestial bodies for determining lines of position and checking compass errors.

LEARNING OBJECTIVE

The objective of this course is to introduce and familiarize the student with the necessary knowledge of celestial navigation so as to satisfy the STCW Code Table A-II/1 in the following areas:

- Ability to use celestial bodies to determine the ship's position
- Ability to determine errors of the magnetic and gyro-compasses, using celestial means, and to allow for such errors
- Ability to use celestial navigation in times of need, as second check and as a backup navigational system.

LEARNING OUTCOME

At the completion of the Celestial Navigation Course, the student :

- Will have demonstrated an advanced understanding and knowledge of the principles of celestial navigation
- Will have demonstrated an ability to utilize observations of celestial bodies to fix the vessel's position.
- Will have demonstrated an ability to utilize observations of celestial bodies to determine error of the compasses
- Will have demonstrated ability to obtain detailed information from appropriate navigational publications
- Will have the ability to maintain a safe navigational watch at sea on a vessel.
- Will have the knowledge and ability to successfully complete the USCG Third Mate's License Exam

REQUIRED TEXT:

1. The American Practical Navigator, Bowditch
2. The American Practical Navigator, Bowditch, Vol. II 1995. You may check this out from the library.

REQUIRED PUBLICATIONS:

1. Sight Reduction Tables for Marine Navigation Volumes II (LAT 15°-30°) (Library)
2. Nautical Almanac, 1981. Check out from library or buy the reprint from ship's store
3. Universal Plotting Sheets (Ships Store)
4. Position Plotting Sheet WOBZP 923,924, Latitudes 23°-30°.

ADDITIONAL TEXTS WHICH MAY BE HELPFUL:

1. Dutton’s Navigation and Piloting, Thomas J. Cutler, Naval Institute Press 15th Edition
2. Marine Navigation, Richard R. Hobbs

CLASSROOM POLICY:

- ATTENDANCE AT ALL CLASSES AND LABORATORIES IS MANDATORY. *Unauthorized* absence will not be tolerated and a grade point reduction will be administered to policy offenders. **FIVE** absences throughout the semester will result in a full letter grade reduction. Laboratory consists of two 50 minute periods therefore each missed laboratory will count as **TWO** individual absences.
- If absences occur due to a **DOCUMENTED** illness, the student must notify the instructor as soon as possible for make-up work or assignments. The instructor must be informed of all special liberty well in advance of the respective date. Special Liberty for unauthorized reasons will be considered an unauthorized absence. Academy sanctioned authorized absences must be reported to the instructor prior to the missed class. Make-up examinations for authorized periods of absence will be scheduled for a mutually agreed upon time.

NOTE: Examinations missed, as a result of an unauthorized absence, will be recorded as a ZERO, no make up exam will be given.

- Each student is responsible for all material given in class, by Electronic Blackboard, Internet or any other means provided.
- Bring all necessary books and resources to each class, NO EXCUSES.

GRADING:

EXAMS:

1. Five hour examinations will be administered throughout the semester in the lecture period. Cadets may be quizzed at any time without notice.
2. If you must be absent during a scheduled exam due to illness or an “Academy authorized” event or some other “Pre-approved” reason, a make-up exam will be scheduled. To qualify for a make-up exam it is the student’s responsibility to arrange for his/her make-up exam **PRIOR** to the date of the scheduled exam. Examinations missed as a result of an unauthorized absence will incur a zero.

FINAL EXAM: A comprehensive final examination will be held during the final exam week in June.

FINAL GRADE:	Exams,	60%
	Final Exam	20%
	Lab work, homework	20%

The following is a breakdown of the final course grading:

A	93.0-100	C	73.0-76.9
A-	90.0-92.9	C-	70.0-72.9
B+	87.0-89.9	D+	67.0-69.9
B	83.0-86.9	D	63-66.9
B-	80.0-82.9	D-	60.0-62.9
C+	77.0-79.9	F	Below 60.0
C	73.0-76.9	C	73.0-76.9

Massachusetts Maritime Academy is committed to providing reasonable accommodations to students with documented disabilities. Students who believe they may need accommodations in this class are required to contact Mrs. Anne Folino, Director of Disability Compliance, within the first two weeks of class. ftischavich@maritime.edu.

SYLLABUS CHANGES: The syllabus and course schedule may be adjusted as required to meet the goals and objectives of the course. Notice of changes will be made to students as soon as possible.

LECTURE SCHEDULE

Class	Topic
1	Introduction and scope of course, <i>The Marine Sextant</i> : Sextant Principles
2	<i>The Marine Sextant</i> : Sextant Altitude Errors
3	<i>The Marine Sextant</i> : Sextant Altitude Corrections for True Altitude. 2
4	<i>The System of Celestial Coordinates</i> : The Celestial Equator (Equinoctial) System of Coordinates.
5	<i>The System of Celestial Coordinates</i> : The Celestial Horizon System of Coordinates.
6	<i>The System of Celestial Coordinates</i> : The Navigation Triangle
7	EXAM 1 (3/20/2013) – The Marine Sextant
8	Exam Review, <i>The System of Celestial Coordinates</i> : The Navigation Triangle
9	<i>Navigational Astronomy</i> : The universe and preliminary considerations.
10	<i>Navigational Astronomy</i> : Real motions of the earth in solar system; The "Celestial Sphere" and Apparent Motion
11	<i>Navigational Astronomy</i> : Apparent Motion of the Sun, Moon, and Planets; Lunar and Planetary Configurations.
12	<i>Time</i> : Introduction, Basic Concepts, Time Scales, Expressions of Time.
13	EXAM 2 (4/3/2013) – The System of Celestial Coordinates, Nautical Astronomy,
14	Exam Review, <i>Time</i> : Solar Time -- Apparent Time, Mean Time, and the "Equation of Time".
15	<i>Time</i> : The Relationship between Time, Longitude and Hour Angle; Standard Time and Time Zones; Watch Time and Chronometer Time; Sidereal Time.
16	<i>Time and The Nautical Almanac</i> : Determination of Positions of Celestial Bodies of the Celestial Sphere; Finding Greenwich Hour Angle, (GHA) and Declination of the Sun and Moon.
17	<i>Time</i> : Time Zones, Dateline and ETA Determination
18	<i>Rising and Setting Phenomena</i> : Calculating the Time of Sunrise, Sunset, and Twilight's.
19	<i>Rising and Setting Phenomena</i> : Calculating the Time of Sunrise, Sunset, and Twilight's.
20	EXAM 3 (4/24/2013) - Time
21	Exam review, <i>Time of meridian Transit</i> : Computations for Zone Time of Meridian Transit (Local Apparent Noon).
22	<i>Time of meridian Transit</i> : Computations for Zone Time of Meridian Transit (Local Apparent Noon).
23	<i>Observations for Latitude</i> : Meridian Altitudes of the sun at Lower Transit, Determination of Latitude.
24	<i>Observations for Latitude</i> : Meridian Altitudes of the sun at Lower Transit, Determination of Latitude.
25	<i>Celestial Lines of Position</i> : Sight Reduction Methods, Use of H.O. 229 Sight Reduction Tables for Marine Navigation.
26	EXAM 4 (5/8/2013) – Time, Calculation of Sunrise, Sunset, Twilights
27	Exam Review, Sight Reduction, Use of H.O. 229 Sight Reduction Tables for Marine Navigation - SUN
28	Sight Reduction, Use of H.O. 229 Sight Reduction Tables for Marine Navigation - SUN
29	Sight Reduction, Use of H.O. 229 Sight Reduction Tables for Marine Navigation – Stars and Planets
30	Sight Reduction, Use of H.O. 229 Sight Reduction Tables for Marine Navigation for Determination of Compass Error - SUN
31	Sight Reduction, Use of H.O. 229 Sight Reduction Tables for Marine Navigation for Determination of Compass Error - SUN
32	EXAM 5 (5/22/2013) - Time, Calculation for Zone Time of LAN and Determination of Latitude at Meridian Transit
33	Sight Reduction, Use of H.O. 229 Sight Reduction Tables for Marine Navigation for Determination of Compass Error – Stars and Planets

LECTURE SCHEDULE -- Continued

34	<i>Celestial Lines of Position</i> : Altitude Intercept Plotting Method
35	<i>Celestial Lines of Position</i> : Altitude Intercept Plotting Method
36	Determination of Compass Error – Amplitude
37	Determination of Compass Error – Amplitude
38	Determination of Latitude by use of Polaris
39	Determination of Latitude by use of Polaris
40	Review for Final Exam

LABORATORY SCHEDULE

Date	Day	Lab	Subject
11-Mar	Mon	1	Sextant Principles, Correct Sextant - on Ship
7-Mar	Thurs	1	Sextant Principles, Correct Sextant - on Ship
18-Mar	Mon	2	Sextant Altitude Corrections
14-Mar	Thurs	2	Sextant Altitude Corrections
25-Mar	Mon	3	Nautical Astronomy, Coordinate Systems
21-Mar	Thurs	3	Nautical Astronomy, Coordinate Systems
1-Apr	Mon	4	Nautical Astronomy, Navigation Triangle
28-Mar	Thurs	4	Nautical Astronomy, Navigation Triangle
8-Apr	Mon	5	Time 1 - Almanac, Part I
4-Apr	Thurs	5	Time 1 - Almanac, Part I
22-Apr	Mon	6	Time 2 - Almanac, Part II
18-Apr	Thurs	6	Time 2 - Almanac, Part II
29-Apr	Mon	7	Time 3 - Almanac, sunrise, Sunset, Twilight
25-Apr	Thurs	7	Time 3 - Almanac, sunrise, Sunset, Twilight
6-May	Mon	8	Time 4 - Almanac, Time of LAN, LAT LAN
2-May	Thurs	8	Time 4 - Almanac, Time of LAN, LAT LAN
13-May	Mon	9	Sight Reduction 1 -Use of H.O. 229
9-May	Thurs	9	Sight Reduction 1 -Use of H.O. 229
20-May	Mon	10	Sight Reduction 2 - Full Sight Reduction SUN
16-May	Thurs	10	Sight Reduction 2 - Full Sight Reduction SUN
28-May	Mon	11	Sight Reduction 2 - Full Sight Reduction Stars and Planets
23-May	Thurs	11	Sight Reduction 2 - Full Sight Reduction Stars and Planets
3-June	Mon	12	Compass Error - Azimuth
30-May	Thurs	12	Compass Error - Azimuth
10-Jun	Mon	13	Altitude Intercept Plotting
6-Jun	Thurs	13	Altitude Intercept Plotting

LAB POLICY: All lab assignments are due one (1) week after they are assigned. Labs handed in after the due date **WILL NOT** be accepted and a grade of zero (0) will be assigned.

It is the responsibility of the student to bring all necessary navigation publications and equipment.