Linnæus University

Jnr: 2017/7836-3.1.2.2

Course syllabus

Faculty of Technology
Kalmar Maritime Academy

1NA94K Astronomisk navigation, tidvatten och distansberäkningar, 7,5 högskolepoäng

Celestial Navigation, Tides and Distance Calculations, 7.5 credits

STCW reference
Sektion A-II/1 och A-II/2

Subject Group
Other Subjects within Technology

Level of classification
First Level

Progression
G1N

Date of Ratification
Approved by Faculty of Technology 2017-12-18
The course syllabus is valid from autumn semester 2018

Prerequisites
General entry requirements and Mathematics 2a / 2b / 2c, Physics 1b1 / 1a or Mathematics B, Physics A (Field-specific entry requirements 7/A7). Physics A Physics 1b1 / 1a can be replaced by Natural Science 2 or equivalent.

Objectives

Proficiency and comprehension
Proficiency and comprehension of the course's scientific foundation regarding the tide and astronomical navigation. By the end of this course, students shall be able to:

- describe the astronomical triangle.
- describe the coordinate system of the celestial bodies.
- explain the tidal origin and characteristics.
- estimate the best route under current conditions with regard to rhumb line, great circle and composite sailing.
- explain the system of time zones and International Date Line.

Skills and abilities
Skills and ability to carry out a trans ocean voyage and during the voyage determine the position of the vessel using astronomical observations, calculate distance and arrival time to the next port, as well as calculate tide and tidal current on arrival. By the end of this course, students shall be able to:

- make use of information given in nautical almanacs
- handle the sextant
- determine the ship's position using astronomical observations

- determine the ship's position using astronomical observations
- calculate compass errors using the sun
- interpret and make use of information given in tide tables, tidal stream atlas and navigational charts
- calculate time and height of tide as well as set and rate for tidal stream.
- calculate distances and courses through rhumb line, great circle and composite sailing
- calculate estimated time of arrival

Evaluation skills and Approach
Evaluation skills and approach to critically review and assess the reasonableness of positions obtained by means of astronomical observations, estimated tidal data and distances. By the end of this course, students shall be able to:

- evaluate the accuracy of the position in an astronomical observation
- determine safe arrival taking into account tides, currents, height and time
- compare distances between different calculation methods

Content
The main course contents are divided into the following areas:

- fundamental principles in astronomical navigation
- the time
- the astronomical triangle
- nautical almanac
- astronomical bearings and positions
- identification of relevant celestial bodies
- compass control using the sun
- sextant's function and handling
- tidal theory
- tide tables, tidal stream atlas and navigational charts
- calculation of tidal heights and times
- rate and direction of tidal streams
- sailing in tidal areas
- rhumb line, great circle and composite sailing

Type of Instruction
Instruction consists of lectures, seminars and exercises. Attendance is mandatory at all exercises.

Examination
The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).
In order to receive the grade Pass with distinction, it must be obtained on the written exam.

Knowledge assessment takes place as follows:
• through individual written exam, and,
• through obligatory exercises.

Course Evaluation
During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed.

Required Reading and Additional Study Material

Witherby Seamanship International (latest edition). *NAVBasics, volume I*. Witherby

Witherby Seamanship International (latest edition). *NAVBasics, volume 1*. Witherby Seamanship International

Witherby Seamanship International (latest edition). *NAVBasics, volume 2, extract from Nautical almanac 2006*. Witherby Seamanship International

Extract from Admiralty Tide Tables, Kalmar Maritime Academy
Extract from The Nautical Almanac. Kalmar Maritime AcademyNautical Chart BA 5052

Reference Literature

Borg, Björn. *Tidvatten och Oceanografi*