

Liverpool John Moores University

Title: ELECTRONIC NAVIGATION AIDS
Status: Definitive
Code: **4024MAR** (105586)
Version Start Date: 01-08-2016

Owning School/Faculty: Maritime and Mechanical Engineering
Teaching School/Faculty: Maritime and Mechanical Engineering

Team	Leader
Farhan Saeed	Y

Academic Level: FHEQ4 **Credit Value:** 12 **Total Delivered Hours:** 44
Total Learning Hours: 120 **Private Study:** 76

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	36
Practical	4
Tutorial	4

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Essay	AS1	Manual Radar Plotting (Time Constrained)	30	
Essay	AS2	Time Constrained Coursework (2hrs)	70	

Aims

To provide a detailed appreciation of the principles and operation of electronic navigation aids used by an Officer of the Watch

Learning Outcomes

After completing the module the student should be able to:

- 1 Understand the principles of the propagation of radio waves.
- 2 Understand the principles and operation of Loran C, GNSS, ECDIS, echo sounders, marine logs, marine radar and target tracking, VDR, IBS.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

CW	2	
CW	1	2

Outline Syllabus

Radio Waves: Propagation of radio waves, frequency, velocity, amplitude, wavelength, cycles, reflection, refraction, diffraction, absorption, polar diagrams, skywaves, skip distance, skip zone, groundwaves, ranges

Hyperbolic Navigation Systems: Properties and construction of hyperbolae, Principles of phase/time difference. Loran-C system: Basic Operational Principles, Principles of time difference measuring systems and the Loran C. operation of receivers. eLORAN

Radar and Target Tracking: Basic operational principles, Sources of Error, Accuracy requirements, Atmospheric and weather effects, Radar Plotting, ARPA, Target Tracking - basic principle, adaptive gain, track plotter, errors and performance standards. Interface of navigational instruments with radar and target tracking. Radar & IRPCS.

Satellite Navigation Systems: Principles of satellite navigation and the GPS. P and C/A codes, Pseudo Ranging, Datum, GDOP and accuracy. Operational principle of DGPS system. Galileo, Glonass, Wide Area DGPS.

The principles and operation of ECDIS Charts: Vector and raster charts, Basic operational principles, standard functions, accuracy and chart correction.

AIS; Principles, data, updating, operational usage,

Underwater Navigation Equipment: The principles and operation of echo sounders and marine logs, Effects of water properties, types of echo sounder; speed/ distance measurement; types of logs.

Integration of navigation equipment.

Voyage Data Recorder; types, data recorded, purpose (VDR & SVDR).

Integrated Bridge systems & Navigation errors

Learning Activities

Lectures and documentary video shows.

Laboratory session and exercises using the navigation laboratory & ship simulator

Notes

Provides a detailed appreciation of the principles of electronic navigational systems and their effective application at sea.