Radar & ARPA

Basic Course Specification		
Course Title	**Course Code**	**Program on which the course is given**
Radar & ARPA	BS 263	Bachelor
Academic Year	**Specialization** (units of study)	**Pre-Requisites**
2020-2021	Theoretical (2 hrs/week) Application (2 hrs/week) Credit 3 Cr	BA112 N, BS 132

Overall Course Objectives

On completion of this course, students should be competent to select a suitable mode and range setting for the circumstances, set the controls for optimal performance; will be aware of the limitations of the equipment in detecting targets and in terms of accuracy, compare the Radar display with the chart, select suitable conspicuous land targets and use these targets to fix his position, in accordance to STCW 1978convention as amended, Chapter II/1 and Table II/1of the STCW Code.

Course Learning Outcomes. By successful completion of the course each student will be able to:

Topic	Linking to PLOs	Midterm Assessment	12th Week Assessment	Class Activities	Final Exam
1. Understand the Fundamental principles of RADAR and explain how it is used as an anti-collision tool.	a,b,	√			
2. Set up radar picture and operate RADAR in Accordance with Manufacturer's Instructions.	a			√	
3. Interpret the radar and ARPA picture in the correct way and understand the RADAR limitation.	d	√		√	√
4. Demonstrate Manual RADAR plotting of targets, which may pose a potential threat of collision and derive from the plot the necessary information about other ships courses, aspects and nearest approaches to enable action to be taken in ample time.	a,e	√	√	√	√
5. Compare the RADAR display with the chart, select suitable conspicuous land targets and use these targets to find ships position.	a,b, d,		√	√	√
6. Determine action to be taken to avoid close quarters situations in accordance with COLREG by using ARPA, and the subsequent monitoring of such action.	a,b, d,		√	√	√

Course Content

Lec./ Week #	Topic	Hrs. #	Theoretical	Application
1	Basic Theory and Operation of a Marine Radar System - Introduction to the electromagnetic waves, Fundamental principles of radar.	4	2	2
2	Introduction to manual plotting, Construct relative motion triangle, Determine CPA & TCPA.	4	2	2

3	The function and components of radar units, Safe distance from magnetic compass, Radiation hazards and precautions. Perform manual radar plotting - Construct relative motion triangle, Determine targets course, speed and aspect.	4	2	2
4	Set Up and Operate Radar in Accordance with Manufacturer's Instructions - Set up and maintain optimum radar display, Measure ranges and bearings.	4	2	2
5	Different Types of Display Mode. Perform Manual Plotting - Determine set and rate of current from observations of fixed targets.	4	2	2
6	Characteristics of Radar Sets and Factors Affecting Performance and Accuracy with Reference to Detection of Targets.	4	2	2
7	Perform Manual Radar Plotting - Determine course, speed and aspect of other ships, Determine CPA & TCPA. **7th Week Exam**	4	2	2
8	Factors External to the Radar Set Affecting Radar Detection. Factors which might cause faulty interpretation of the radar picture.	4	2	2
9	Use Radar to Ensure Safe Navigation - Fix a vessel's position by radar, Identify aids to radar navigation and safety, Use parallel indexing in radar navigation.	4	2	2
10	Perform Manual Plotting - The effect of course and speed changes. Recognize the effect of course and speed changes.	4	2	2
11	Use Radar to Avoid Collisions or Close Encounters - Apply COLREG to avoid collision or close encounter.	4	2	2
12	Perform Manual Plotting - The effect of changes in own-ship course or speed on the observed movement of targets with performance delay. **12th Week Exam**	4	2	2
13	Describe an ARPA System - ARPA system display characteristics, IMO performance standards for ARPA, Acquisition of targets, Tracking capabilities and limitations, Processing delays. Perform Manual Plotting - Achieve required CPA & TCPA.	4	2	2
14	Describe and Operate an ARPA System – Errors of interpretation of target data, Errors in displayed data.	4	2	2
15	Operate an ARPA system - Risks of over reliance on ARPA system. Perform Manual Plotting - Achieve required CPA, The plot when own ship resumes course and speed.	4	2	2

16	Final Assessment			
	Total Hours	**60**	**30**	**30**

Teaching & Learning Methods	**Facilities Required for Teaching & Learning Methods**
• Explaining and demonstrating the lesson contents – Delivery of experience - discussing and asking questions to interact with students – solving examples.	• White Board & Data Show • Bridge Simulator

Students Assessment Methods

Assessment Schedule

Assessment#1	Week 7
Assessment#2	Week 12
Assessment#3	Week 16

Grading Method

Midterm Assessment	Written exam	**30%**
12th week Assessment	Written exam	**20%**
Class Activities	Participation - Quiz	**10%**
Final Exam	Written exam	**40%**
	Total	**100 %**

Assessment criteria shall meet the standards of the STCW 78 convention "as amended"; and in the light of the related IMO model courses.

Staff Requirements

Master FG/ Ph.D.

List of References

Course Notes	**Essential Books**
Lecturer notes	Radar and ARPA Manual
Recommended Books	**Periodicals and Publications**
• Capt. H Subramanian, Shipborne Radar, Vijaya Publications, Mumbai • Burger, W. Radar Observer's handbook for merchant navy officers, 7th ed. Glasgow, Brown, Son and Ferguson, 1983 (ISBN 0-85174-443-5)	

Others (websites, e-books…etc)

- International Convention on Standards of Training, Certification and Watch keeping for Seafarers 78(STCW), as amended.
- International Convention for the Safety of Life at Sea (SOLAS) Latest Edition, 2020.
- The Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREG 1972) as amended.
- Assembly Resolution A.626 (15) - Amendments to the International Regulations for Preventing Collisions at Sea, 1972
- Assembly Resolution A.615 (15) - Radar Beacons and Transponders

Assembly Resolution A.384 (X) - Performance Standards for Radar Reflectors
Assembly Resolution A.424 (XI) - Performance Standards for Gyro-Compasses
Assembly Resolution A.823(19) - Performance standards for automatic radar plotting aids (ARPAs)
Assembly Resolution A.478(XII) - Performance Standards for devices to indicate speed

Accreditation Bodies
*Egyptian Authority for Maritime Safety (EAMS) *European Commission (EC) *ISO (9001 – 2015) DNV-GL* *Central Evaluation and Accreditation Agency Hanover, Germany (ZEVA) *Ministry of Education (KSA) Ministry of Higher Education (Greece)* *Ministry of Higher Education (Oman) *Commission for Academic Accreditation (CAA), Ministry of higher Education (UAE) *University of Plymouth, United Kingdom (dual degree)

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