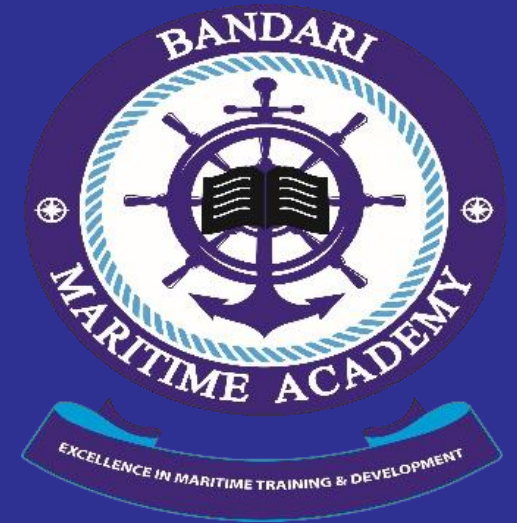


# BANDARI MARITIME ACADEMY

## DIPLOMA IN NAUTICAL SCIENCE MODULE 2

### Workshop Sills Training Record Book



## **Vision Statement**

World Class Centre for Maritime Education and Training

## **Mission Statement**

To Provide Competent Maritime Human Resource for Sustainable Blue Economy

## **Core Values**

The Values guiding the culture and conduct of the Academy in the discharge of its mandate include: -

**a. Excellence:**

The Academy is committed to delivering quality and exceptional services. The Academy strives to achieve constant adaptation, innovation and vigilance to deliver on its mandate;

**b. Public Participation:**

The Academy embraces the contribution of the public, partners and customers towards realization of its mandate. This is achieved through collaborations, partnerships and stakeholders' engagements.

**c. Good Governance:**

The Academy has established structures to effectively and efficiently manage its affairs and resources. The structures facilitate effective decision making process to enable the Academy deliver on its mandate. In addition, the Academy embraces the culture of integrity, transparency, accountability, equity and fairness.

**d. Sustainable development:**

The Academy shall continue to deliver on its mandate, having regard to efficiency and environmental integrity and being mindful of future generations.

**e. National Ethos:**

The Academy is guided by the seventeen (17) national values and principles of governance in accordance with Articles 10 and 232 of the Constitution of Kenya.

**f. Team work:**

The Academy inculcates the culture of working together and motivating each other so as to maximize every member's contribution to the team. The Academy takes full cognizance of everyone's ideas and expertise towards fulfilment of a common goal.

## **Introduction**

This module unit is compulsory for all attachees undertaking technical training programs and is intended to equip the attachee with knowledge, skills and attitude to enable him/her to perform duties in a real working environment. The rationale of the module unit is to:

- a) enhance the practical and communication skills/competences of attachees
- b) strengthen industrial/institution partnership
- c) provide a nation-wide mechanism to address key skill demand
- d) provide employers the opportunity to give back to society
- e) enhance training levels in acquired skills and competences
- f) provide a mechanism for academy's to respond to identified areas of national key skill needs
- g) develop the manual skills of attachees associated with scientific and technological operations
- h) develop the attachees' personality and understanding of individuals and groups in work situations
- i) provide the attachee with background information and experience in career choice

## **Competence**

**The attachee should have the ability to:**

- i) work effectively under supervision
- ii) apply knowledge and skills to solve real time problems
- iii) develop team work and organizational competences

## **General Objectives**

**By the end of the Industrial attachment period, the attachee should be able to:**

- a) comprehend the constraints of working life and functional relationships within and between organizations
- b) recognize the importance of human relationships and work attitudes
- c) develop procedural knowledge towards work processes
- d) apply theoretical concepts and school based skills to practice
- e) develop work attitudes like curiousness, self-confidence, maturity and self-reliance
- f) obtain knowledge of potential careers and develop new areas of interest

**The Industrial attachment scheme will enable academy to:**

- a) establish link with industry for technical development, particularly in the area of product innovation, design and construction
- b) know skill gaps and improve quality of training

- c) obtain materials for teaching and case studies
- d) have a balance assessment of attachees

**The industrial attachment scheme will enable employers to:**

- a) understand future skills availability
- b) improve the training delivered at academy's for industrial relevance
- c) influence the training of future generation of employees

**Suggested roles of the academy, industry and attachees**

**It is the responsibility of the academy to:**

- a) identify attachees who are qualified to go on attachment
- b) conduct an industrial attachment orientation and induction to attachees
- c) identify opportunities from the industry and match them with the number of attachees qualified to go on attachment
- d) prepare a code of conduct to be observed by attaches
- e) provide log books to attaches

**It is the responsibility of the industry to:**

- a) appoint an industry supervisor/mentor for the attachee/attachee
- b) carry out formal introduction/induction to the workplace by the industry supervisor/mentor
- c) design a weekly program of work for the intern to carry out whilst on attachment
- d) develop clear and well communicated expectations of the work program
- e) expose attachee to relevant activities and training opportunities
- f) supervise and assess progress of the attachee
- g) complete and release the log book of the attached attachee

**It is the responsibility of the attached attachee to:**

- a) read and observe the code of conduct applicable to the work place
- b) report to the academy any problems encountered
- c) fill the logbook daily to be completed and endorsed by both the industry and the academy supervisor

**Instructions for the attachee on how to fill the logbook**

- a) Each day, you should note in your logbook the work you have carried out. There are spaces for the dates and space where you should enter the numbers of the items in your industrial attachment training programme completed or partly completed during the period of your report.
- b) You may make sketches, any other exposure apart from the ones in the syllabus and additional comments to illustrate work carried out if you wish to, in the space provided at the back of each page.
- c) It is expected that your course instructor, supervisor or foreman will wish to see your logbook after you have recorded your weekly activities. You are advised to take the logbook to them to see and initial report in the space provided.

- d) Remember, this logbook is your property, and if you look after it, keep it clean, and complete it carefully and conscientiously it will form a valuable record of your training and may well assist you to obtaining employment in years to come.

**(A) Attachee's Personal Details:**

Last Name: .....Other Names: .....Gender: .....

Identity Card No.: ..... Date of Birth: Date: ..... Month: ..... Year: .....

Course: ..... Level: ..... Year/ Module: .....

Home Address: ..... Telephone: .....

Next of Kin (Name): ..... Relationship: .....

Postal Address: ..... Postal Code: ..... Tel. No: .....

**(B) Academy:**

Name of Head of Academy: .....Department: .....

School:.....

Head of School: .....Signature: .....Date: .....

**(C) Details of Attachment Place:**

Name of Organization: .....

Postal Address: ..... Postal Code: .....

Tel: .....Mobile: ..... Email address: .....

Industrial Attachment Supervisor (Name): .....

Position/ Designation: .....Signature: .....Date: .....

**DIPLOMA IN NAUTICAL SCIENCE MODULE NO.2**

PERIOD	COMPETENCES	TASK COMPLETED? (YES /NO)	ATTACHEES REMARKS -Was the activity carried out? -Was it completed on time? -How difficult was it? - What are the learning experiences? - Challenges encountered?	SUPERVISOR'S REMARKS - How did the attachee perform? - What was his/her attitude towards work? - Did attachee receive assistance to perform well?	SUPERVISORS SIGNATURE
1.0 1 <sup>ST</sup> WEEK	<b>WATCHKEEPING AND CHARTWORK PRACTICES</b>				
	<b>a Safe Navigational Watch</b>				
	- Officer of the watch responsibility				
	- Principles of watch keeping				
	- Operational guidance for officers in charge of a navigational watch				
- Duties of the officer of the					

	watch while at anchor				
	- Log book entries				
<b>Keeping an effective deck watch in port under normal circumstances</b>					
	- Arrangements for keeping watch in port				
	- Taking over watch				
	- Information which the officer being relieved should pass to the relieving officer				
	- Matters on which the relieving officer should satisfy themselves before assuming charge of the watch				
	- Keeping a deck watch in port				
	- The points to which attention must be paid				
	- Actions on receiving a storm				



	warning or in an emergency				
	- Log book entries				
	<b>Keeping a Safe Deck Watch in Port When carrying Hazardous Cargo Operations</b>				
	- Hazardous cargo				
	- Personnel requirements when carrying hazardous cargo in bulk				
	- Requirements for special types of ships or cargo				
	- Officer of the watch responsibility				
	- Action in the event of a spillage or fire				
	- Entry into enclosed spaces				
	- Rescue from an enclosed space in an emergency				
<b>2.0 2ND WEEK</b>	<b>Bridge Resource Management</b>				
	- Principles of bridge resource management				

	- Responsibility for safety at all times				
	- Situational leadership				
	- Information exchange with pilot				
	- Relationship between assertiveness and leadership				
	- Importance of challenge and response				
	- Appropriate response to various challenges and situations				
	- Obtaining and maintaining situational awareness				
<b>Weather Routing</b>					
	- Basic routines of weather routing				
	- Climatological information from routing charts				
	- Use of meteorological forecasts and				

	synoptic and forecast charts to modify the route plan				
	- Meteorological information available to personnel ashore				
	- Meteorological information onboard available to the Master				
	- Weather messages received from the routing services				
<b>Visual Pilotage and Blind Pilotage Techniques</b>					
	- Pilotage definition				
	- Pilotage regulations				
	- Items for visual pilotage planning				
	- Items for blind pilotage planning				
	- Route Planning and ETA/ETD				

	- Limiting Danger Line				
	- Planning appraisal, track selection and other factors				
	- Methods of track control				
	- Use of edges of land as headmarks/stern marks				
	- 'No headmark' procedure				
	- Altering course and monitoring terms				
	- Allowing for a current/tidal stream/leeway when altering course				
	- Monitoring turns - Keeping clear of dangers				
	- Blind pilotage preparation and executing techniques				
3.0					

3<sup>RD</sup> WEEK

**Radar Plotting Aids (ARPA)**

- Principle of ARPA

- ARPA display characteristics

- Performance standards

- Over reliance on ARPA

- Methods of target acquisition

**Charts and Publications**

- Navigational chart projections and their use

- Carriage requirement

- Chart compilation and production process

- Organization of charts into folios

- Selection and use of charts

	- Requirement to report hydrographic information				
	- Correction and upkeep of Admiralty paper charts				
	- Admiralty navigational publications				
	<b>Information shown and Symbols used on Admiralty Paper Charts and Publications</b>				
	- <b>Charts symbols</b>				
	- <b>Nomenclature of lights</b>				
<b>4.0 4<sup>TH</sup> WEEK</b>	<b>Buoys, other floating structures and beacons</b>				
	- Buoys, other floating structures and beacons (IALA system)				
	- Buoys and beacons				
	- Use of buoys and other floating structures for navigation				

	<b>Digital Charts and Publications</b>			
	- Legal status of digital charts			
	- International Standards for digital charts			
	- Electronic Chart System			
	- Advantages and disadvantages of RNCs and Vector Charts			
	- Information and symbols used in ENC's			
	- Correction and upkeep of digital charts			
	- Admiralty digital publications and their use			
	<b>Chart work Practices</b>			
	- Definition of terms			
	- Use of compasses			
	- Turning circles			

	- Execution of passage				
	- Plotting a 'running fix'				
	- Positions by running fix in a tidal stream or current				
	- Actual set and rate of tidal stream or current from DR and fixed positions				
5.0 5 <sup>TH</sup> WEEK	<b>ELECTRONIC SYSTEM OF POSITION FIXING AND NAVIGATION; CELESTIAL NAVIGATION.</b>				
	<b>Basic Principles of Hyperbolic Navigation System</b>				
	- Nature of hyperbola				
	- Position of Hyperbolae being position lines				
	- Ambiguity and reduced accuracy in the baseline extension area				



	- Combination of two hyperbolic patterns				
	- Loran C				
<b>Radar</b>					
	- Carriage requirement and performance				
	- Terms related to radar				
	- The radar principle and theory				
	- Functions of various radar controls				
	- Radar set up and shut down procedure				
	- Unwanted/false echoes and radar shadows				
	- Radar errors and corrections				
	- Factors affecting radar performance and accuracy				
	- Limitations of radar				

	- Difference between X-band and S-band radar				
	- Use of radar for navigation and watch keeping				
	- Radar transponders				
<b>Automatic Plotting Aids (ARPA)</b>					
	- Radar Plotting Aids				
	- Legal requirement for carriage of ARPA or other plotting aids				
	- Principle of operation of ARPA				
	- Definition of terms related to ARPA				
	- ARPA operation				
	- ARPA processing and display characteristics				

	- Setting up and using ARPA for collision avoidance				
	- ARPA modes of operations				
	- Relative and True Motion Radar - Ground and Sea Stabilization				
	- Capabilities and limitations of ARPA				
	- Dangers of over-reliance of ARPA				
<b>6.0</b> <b>6<sup>TH</sup> WEEK</b>	<b>BEIDOU Navigation Satellite System</b>				
	- Conception and development				
	- operating Principles				
	- Frequencies				
	- Operation				
	- Accuracy				

-	Limitations			
<b>Global Navigation Satellite Systems (GNSS)</b>				
-	Principles of operation of global navigation satellite systems			
-	Continuous world-wide position-fixing capabilities			
-	Accuracy of the system			
-	Regional Satellite Navigation Systems			
<b>Global Positioning Systems (GPS) and Differential GPS (DGPS)</b>				
-	Principles of (GPS)			
-	GPS system configuration			
-	GPS frequencies			
-	C/A and P code			

	- Basic Line measurement				
	- Dilution of Precision (DOP)				
	- Errors of GPS				
	- Accuracy of GPS				
	- Datum shift				
	- WGS 84				
	- Advantages and limitations of GPS				
	- The principle of DGPS				
	- Transmission of corrections by DGPS stations				
	- Limitations of the DGPS receiver				
<b>7.0</b> <b>7<sup>TH</sup> WEEK</b>	<b>Global Navigation Satellite System (GLONASS)</b>				

	- principle on which the GLONASS works				
	- GLONASS and GPS satellite configuration				
	- Combined GPS/GLONASS receiver				
	- limitation of the GLONASS system receiver				
	<b>Galileo</b>				
	- Principle of Galileo				
	- Galileo Satellites and Orbits				
	- Satellite Geometry and Dual Atomic Clocks in the Galileo System				
	- Calculating the position of the receiver using atomic clock signal information				
	- Triangulation of signals from multiple satellite				

	- Limitations of the Galileo System Receiver				
	<b>Automatic Identification System (AIS)</b>				
	- AIS carriage requirements and performance standards				
	- AIS system concept				
	- AIS modes				
	- Function of AIS as a navigational aid				
<b>8.0 8<sup>TH</sup> WEEK</b>	<b>Voyage Data Recorder (VDR)</b>				
	- VDR carriage requirements				
	- IMO Performance standards for VDR				
	- Voyage Data Recorder (VDR) and S-VDR				

- Action following an incident				
<b>Long Range Identification and Tracking of Ship (LRIT)</b>				
- LRIT regulation and performance standards				
- System Operation				
- Evolution of LRIT				
- System component				
<b>Electronic Chart Display Information Systems (ECDIS)</b>				
- Principle types of ECS, carriage requirement and performance standards				
- Vector and raster charts				
- Terms and definitions used in ECDIS				
- Characteristics of ECDIS data				



	- Position reference system				
	- ECDIS display characteristics				
	- Scope and selection of chart data display categories				
	- Safety value available in ECDIS				
	- Automatic and manual functions of ECDIS				
	- Sensors, its accuracy requirement and state proper action to take in case of malfunction				
	- Production and distribution of updates				
	- Route planning in ECDIS				
	- Execution of ECDIS route plan				

	- Status Indications, Indicators and Alarms				
	- Typical errors of interpretation and proper action to avoid these errors				
	- Voyage recording				
	- Over-reliance and complacency on ECDIS				
	<b>Echo Sounders</b>				
	- Principles of marine echo sounding equipment				
	- Factors affecting accuracy of a marine echo sounder				
	- Errors				
	- Minimizing errors				

	- Types of echo sounders in use				
<b>9.0</b> <b>9<sup>TH</sup> WEEK</b>	<b>Speed Logs</b>				
	- Basic principles of electro-magnetic speed log				
	- Comparison of acoustic correlation and the Doppler speed log				
	- Errors of speed logs				
	- 'Janus' configuration				
	- Calibration				
	<b>Steering and Control System</b>				
	- Principle of an automatic pilot system				
	- Function of the manual settings				

	- Procedures of change over				
	- Alarms				
	- Regulatory requirements				
	- Factors to consider				
<b>Sextant, Altitude Corrections and chronometer</b>					
	- Terms used in sextant work				
	- Parts of a sextant				
	- Index error of the sextant by the sun				
	- Altitude correction				
	- Visible, sensible and rational horizons				
	- Observed altitude and true altitude				
	- Common errors				

	- Use of chronometers				
	- Limitations and performance criteria of a chronometer				
	- Significance of time signals				
	- Time signals				
10.0 10 <sup>TH</sup> WEEK	<b>SHIP STABILITY; CARGO HANDLING AND STORAGE.</b>				
	<b>Displacement</b>				
	- Terminologies				
	- Archimedes principle				
	- Simpson's Rule				
	- Relationship between ship displacement and mean draught				
	- Relationship between Tones				

	Per Centimeter (TPC) immersion and draught				
	- Displacement curves and deadweight scale				
<b>Buoyancy</b>					
	- Terminologies				
	- Buoyancy force				
	- Relationship between reserve buoyancy and freeboard				
	- Significance of reserve buoyancy				
	- Purpose of Load lines				
	- Requirements for maintenance of watertight integrity				
	- Damage stability requirement				

<b>Fresh Water Allowance</b>				
- Terminologies				
- Behavior of ship as it passes through water of different densities				
- Formula for fresh water allowance				
- Effect of changes of tide and rain on dock water				
- Hydrometer				
<b>Curves of statically Stability</b>				
- Features of a ship curve of Statically stability				
- GZ formula for large angles				
- KN Cross Curves				
- Effect of lowering ship centre of gravity on the righting lever				

	<ul style="list-style-type: none"> <li>- Limiting the range of stability of practical interest at less than 400</li> </ul>				
<b>Trim</b>					
	<ul style="list-style-type: none"> <li>- Terms related to trim</li> </ul>				
	<ul style="list-style-type: none"> <li>- Centre of Floatation</li> </ul>				
	<ul style="list-style-type: none"> <li>- Causes of trimming</li> </ul>				
	<ul style="list-style-type: none"> <li>- Forces acting on the ship during trim conditions</li> </ul>				
	<ul style="list-style-type: none"> <li>- Trimming table or curves</li> </ul>				
	<ul style="list-style-type: none"> <li>- Limitation of calculation and trimming table</li> </ul>				
	<ul style="list-style-type: none"> <li>- Methods of determining ship trimming condition</li> </ul>				



	<b>Ship Stress Table and Calculating equipment</b>				
	- Feature of a loading manual				
	- Purpose of a loading manual				
	- Stress calculating equipment				
	- Requirement for provision of stress calculating equipment and loading manual				
	- Stress tables				
	- Bulk carrier hull structure overstressing				
<b>11.0 11<sup>TH</sup> WEEK</b>	<b>Draught, trim and stability</b>				
	- Definitions				
	- The load line				
	- Initial GM for a cargo ship				

	- Ship's hydrostatic particulars				
	- Deadweight scale				
<b>Cargo Handling Safety</b>					
	- Visual inspection of all cargo gear				
	- Cargo gear test certificates and registration				
	- Safe working load				
	- Certificate of properties for ropes and wires				
	- Inspection requirements				
	- Replacing cargo runner				
	- Working with hatch covers				
	- Safe working practices				
	- Potentially dangerous spaces				

	- Entering enclosed spaces				
	- Definition of terms				
	- Safe working practices				
<b>Securing cargoes</b>					
	- Solid stow and securing of all cargoes				
	- Stowing of cargo liable to sliding				
	- Cargo stowage methods				
	- Securing cargo spaces				
	- Securing heavy loads				
	- Stowing and securing vehicles and trailers				
	- Cargo securing manual				
	- Passenger operations				

	- Precautions for heavy lift				
	<b>Deck cargo</b>				
	- Cargo commonly carried on deck other than container cargo				
	- Stowage of deck cargo				
	- Spreading effects of a concentrated load over a wider area				
	- Effect of deck cargo on stability				
	- IMO Code of safe practice for ships carrying timber deck cargoes				
	- Guard lines or rails				
	- Access provisions between the deck and the top of the stow				
	- Stowage and securing of containers on deck				

	- Loading/discharging of Ro-Ro cargoes				
<b>Container cargo</b>					
	- Arrangement of a container ship				
	- Position of a particular container				
	- Sequence of operations at a terminal				
	- Planning a container stow				
	- Securing containers on deck				
	- Types and sizes of container				
<b>Bulk cargo (other than grain)</b>					
	- Definition of terms				
	- IMBSC Code				

	- Preparation of cargo holds				
	- Separation between certain bulk cargoes				
	- Hazards of solid cargoes				
	- Entry into cargo holds				
	- Hazards associated with coal cargoes				
	- Monitoring the temperature of the holds				
	- Precautions to take during loading and discharging coal				
	- Ventilation of coal cargo				
<b>Bulk grain cargo</b>					
	- Definition of terms				
	- Cleaning and preparation of holds and decks				

	- Insect or rodent infestation				
	- Dangers associated with using insecticide in cargo holds				
	- Importance of trimming				
	- Fitting of shifting boards				
	- Reduction of heeling moments resulting from a shift of grain				
	- Securing the surface of a partly filled compartment				
	- Separation of two different bulk grain cargoes loaded into the same compartment				
<b>12.0</b> <b>12<sup>TH</sup> WEEK</b>	<b>Cargo care</b>				
	- Inspection and preparation of holds				

	- Segregation and separation of cargoes				
	- Ventilation and control				
	- Refrigerated cargo				
	<b>Dangerous, hazardous and harmful cargoes</b>				
	- Different types of containment				
	- Classification of IMDG Code				
	- Substances, materials and articles covered by the 9 classes of the IMDG Code				
	- Information on dangerous goods				
	- Handling dangerous goods				
	- Damage and defects				
- Packing requirements					



	- Fire precautions when carrying dangerous goods				
	- Precautions while loading or discharging explosives				
	<b>Cargo Handling Equipment</b>				
	- Care and maintenance of riggings and fittings				
	- Rigging of derricks				
	- Setting up guys and preventers				
	- Limitations and effect of angles between runners				
	- Changing the rig from single runners to gun tackles				
	- Topping and lowering derricks safely				
	- Securing derricks for sea				

	- Use of slings and hooks				
	- Lifting bales				
	- Handling of common unitized and pre-slung loads				
	- Cranes and derricks				
	- Fork-lift trucks use in the 'tween-decks or holds				
	<b>Oil tanker piping and plumbing arrangements</b>				
	- General tanker arrangement for crude carriers and product tankers				
	- Cargo piping system				
	- Cargo pumps				

<b>Cargo Calculations and Cargo Plans</b>				
- Definition of terms				
- Bale capacity and grain capacity				
- Allowance for broken stowage				
- Tank calibration tables				
<b>Cargo spaces, Hatch covers and Ballast tanks</b>				
- General layout of cargo space				
- Cargo space inspection				
- Hatch covers inspection				
- Ballast tanks inspection				
- Preparation of a damage report				
- Enhanced survey programme				

ADDITIONAL REMARKS

Students Name.....Signature..... Date.....

Supervisor's Name ..... Signature..... Date.....



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