College of Micronesia – FSM
P.O. Box 159
Kolonia, Pohnpei

Course Outline Cover Page

Basic Marine Machinery Systems — Course Title
MWD 103 — Department and Number

Course Description: This course is designed to provide the learner with the knowledge and skills to safely perform daily duties and form part of an engine room watch.

Prepared by: Brent Villiers **State:** FSM-FMI

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	2/4/8/16	8/4/2/1	16	1
Laboratory	12/24	12/6	144	3
		Total Semester Credits:		4

Purpose of Course

Degree Requirement	_____
Degree Elective	_____
Advanced Certificate	_____
Certificate	_____XX_____
Remedial	_____
Other (Workshop)	_____

Prerequisite Course(s): Elements of Shipboard safety or one year of service in either fishing or merchant marine service.

_____ _____
Signature, Chairman, Curriculum Committee **Date Approved by Committee**

_____ _____
Signature, President, COM-FSM **Date Approved by the President**

General Objective: This course is designed to provide the learner with the knowledge and skills to safely perform daily duties and form part of an engine room watch.

Learning Outcomes: Upon successful completion of this course the student will be able to:

1. Carry out basic operational checks on the shafting components of a marine propulsion plant in accordance with established procedure and safety requirements.
2. Operate and maintain relevant pumping systems, including the bilge and ballast system in accordance with established procedure and safety/statutory requirements.
3. Carry out relevant operational checks and assist in the maintenance of marine diesel engines and related systems in accordance with established procedure and safety/statutory requirements.
4. Operate and carry out operational checks on relevant hydraulic systems, including steering gear in accordance with established procedure and safety/statutory requirements.
5. Carry out relevant operational checks and assist in the maintenance of marine boilers and related steam systems in accordance with established procedure and safety/statutory requirements.
6. Operate and assist in the maintenance of basic electrical equipment in accordance with established procedure and safety requirements.
7. Safely and effectively perform he lubrication/fuel and record keeping duties of an engine room rating in accordance with established procedure and safety requirements.
8. Operate the on board pollution control machinery and equipment in accordance with safety, statutory, and environmental requirements.
9. Safely operate and carry out supervised maintenance on pneumatic equipment and compressed air systems in accordance with established procedure and safety requirements.

STUDENTS SHOULD BE MADE AWARE OF OCCUPATIONAL HEALTH AND SAFETY ISSUES IN ALL SITUATIONS AND BE EXPECTED TO DEMONSTRATE SAFE WORKING PRACTICES AT ALL TIMES.

Outline of Content: This course contains:

1. Propulsion types, shafting and gearing
   - prime movers
   - gearboxes
   - FPP and CPP
   - thrust and shaft bearings

2. Pumping systems
   - centrifugal and displacement pumps
   - valves
   - freestanding and double bottom tanks
   - strainers and strum boxes
   - plans and pipeline/pumping drawings
   - bilge and ballast pumping systems
   - jointing material

3. Marine Diesel Engines
   - components of a diesel engine
   - diesel engine support systems

4. Hydraulic Systems and Steering Gears
   - hydraulic deck and engine room machinery
   - hydraulic steering systems
   - emergency steering systems
   - hydraulic pumps, rams, valves, coolers, and filters.
   - components of hydraulic systems.

5. Steam Systems
   - marine boiler
   - boiler fittings
   - steam turbines
   - feed water system
   - steam distribution system
   - steam trap

6. Electric Systems
    - electrical switchboard
    - alternators
    - transformers
    - batteries and associated equipment
    - fuses and circuit breakers
    - electrical motors
    - extension cables
    - emergency information

7. Pollution control and the environment
    - oily water separator
    - sewerage plant
    - incinerator
    - garbage compactor
    - pollution control equipment

8. Fuels and Lubricants
    - filters and duplex filters
    - purifiers
    - settling and service tanks
    - lubricating oil schedules
    - lubricating equipment
    - electrical motor driven fire pump
    - lubricating oils, greases and methods of application

9. Compressed air systems
    - air compressors
    - air receives
    - pneumatic tools
    - shipboard compressed air system
    - air start system

Learning Outcomes

On completion of this course the student will be able to:

Learning Outcome 1

Carry out basic operational checks on the shafting components of a marine propulsion plant in accordance with established procedure and safety requirements.

Assessment Criteria

1.1 Thrust block, intermediate bearings, shaft gearbox, and stern tube are identified.
1.2 Methods by which astern power is achieved are described.
1.3 Various configurations of propulsion plants are identified.
1.4 Basic operational checks on the shafting and gearbox of a typical propulsion system in accordance with accepted procedure are described.

Conditions

This learning outcome may be assessed on and off-the-job. Competence may be assessed in the following situations: classroom; laboratories; and appropriate vessels.

Assessment Method

Knowledge based criteria will be satisfied through a combination of assignments, written, oral and practical assessments. Skill based criteria will be satisfied through practical exercises.

Assessment will be by a combination of:

- Written assessment
- Assignments
- Oral assessment
- Practical assessment

Learning Outcome 2

As a member of the engine room crew, operate and maintain relevant pumping systems, including the bilge and ballast system in accordance with established procedure and safety/statutory requirements.

Assessment Criteria

2.1 Valve types, pump types, and their basic components are identified.
2.2 Overhauling a valve using the correct jointing and packing is demonstrated.

2.3 Tank components, operational checks, and cleaning requirements are identified.
2.4 Major elements of bilge and ballast systems are identified, and the operation and maintenance relevant to an engine room rating demonstrated.
2.5 Common faults associated with the inability to pump bilges are identified.
2.6 Hazards associated with the operation and maintenance of pumping systems, and the appropriate action to be taken are listed.

Conditions

This section may be assessed on and off-the-job. Competence may be assessed in the following situations: classroom; laboratories; and appropriate vessels.

Assessment Method

Knowledge based criteria will be satisfied through a combination of assignments, written oral and practical assessments. Skill based criteria will be satisfied through practical exercises.

Assessment will be by a combination of:

- Written assessment
- Assignments
- Oral assessment
- Practical assessment

Learning Outcome 3

Carry out relevant operational checks and assist in the maintenance of marine diesel engines and related systems in accordance with established procedure and safety/statutory requirements.

Assessment Criteria

3.1 Types of marine diesel engines are identified.
3.2 2 and 4 stroke-operating cycles are identified.
3.3 The function of basic diesel engine components is described.
3.4 Basic diesel engine fuel oil, fresh water cooling, seawater cooling, lubricating oil, air inlet, and exhaust systems and major components are identified.
3.5 Cleaning requirements of components of a diesel engine during overhaul is explained.

	3.6 Safety requirements and devices as fitted to marine diesel engines are identified.
Conditions	This section may be assessed on and off-the-job. Competence may be assessed in the following situations: classroom; laboratories; and appropriate vessels.
Assessment Method	Knowledge based criteria will be satisfied through a combination of assignments, written oral and practical assessments. Skill based criteria will be satisfied through practical exercises. Assessment will be by a combination of: • Written assessment • Assignments • Oral assessment • Practical assessment
Learning Outcome 4	**Operate and carry out operational checks on relevant hydraulic systems, including steering gear in accordance with established procedure and safety/statutory requirements.**
Assessment Criteria	4.1 The basic components of a hydraulic and steering system are identified. 4.2 Pre-departure and operational checks on a steering system are explained. 4.3 The operation and method of employing the emergency steering is explained. 4.4 Basic care of hydraulic and steering gears are described. 4.5 Safety requirements with the operation of hydraulic equipment are explained.
Conditions	Learning and assessment will take place in a combination of classroom, laboratories, appropriate vessels and other suitable study environments.
Assessment Method	The learning outcomes may be assessed through a combination of: • Written Assessment • Assignments • Oral assessment • Practical assessment

Learning Outcome 5	**Carry out relevant operational checks and assist in the maintenance of marine boilers and related steam systems in accordance with established procedure and safety/statutory requirements.**
Assessment Criteria	5.1 The purpose of a boiler on a vessel is explained. 5.2 Low, medium and high-pressure boilers are identified. 5.3 Major elements of a marine boiler and related systems are identified. 5.4 Safety devices as fitted to a boiler and associated systems are identified. 5.5 Operational, maintenance, and cleaning requirements of a marine boiler and related equipment are explained. 5.6 Hazards of marine boilers and steam systems are identified. 5.7 Information from appropriate local and remote indicators, including boiler water level, are correctly interpreted. 5.8 Actions to be taken by an engine room rating in the event of an emergency in accordance with established procedure are demonstrated.
Conditions	Learning and assessment will take place in a combination of classroom, laboratories, appropriate vessels and other suitable study environments.
Assessment Method	The learning outcomes may be assessed through a combination of: • Written Assessment • Assignments • Oral assessment • Practical assessment
Learning Outcome 6	**As a member of the engine room crew, operate and assist in the maintenance of basic electrical equipment in accordance with established procedure and safety requirements.**
Assessment Criteria	6.1 The safety precautions when working with electrical power supplies, (including

batteries), and possible causes of fatal electrical shock are identified.

6.2 Precautions and procedures of isolating an electrical system for maintenance are listed.

6.3 Major components of an electrical distribution system, including circuit breakers, fuses, batteries, and emergency systems, are identified.

6.4 Actions to be taken in case of an electrical fire or the electrocution of a crewmember are demonstrated.

Conditions

Learning and assessment will take place in a combination of classroom, laboratories, appropriate vessels and other suitable study environments.

Assessment Method

The learning outcomes may be assessed through a combination of:

- Written Assessment
- Assignments
- Oral assessment
- Practical assessment

Learning Outcome 7

Operate the on board pollution control machinery and equipment in accordance with safety, statutory, and environmental requirements.

Assessment Criteria

7.1 Requirements of MARPOL and other relevant authorities in regard to the protection of the marine environment are stated.

7.2 Common types of pollution control equipment are identified, and their operation in accordance with established procedure and statutory requirements are demonstrated.

7.3 Dangers of working in machinery spaces are identified.

7.4 Dangers of chemicals in the engine room.

7.5 Information sources regarding chemicals are listed.

Conditions	Learning and assessment will take place in a combination of classroom, laboratories, appropriate vessels and other suitable study environments.
Assessment Method	The learning outcomes may be assessed through a combination of: • Written Assessment • Assignments • Oral assessment • Practical assessment
Learning Outcome 8	**Safely and effectively perform the lubrication/fuel and record keeping duties of an engine room rating in accordance with established procedure and safety requirements.**
Assessment Criteria	8.1 The purpose, importance and use of lubrication schedules are explained. 8.2 The correct and safe method of handling lubricants, fuels and associated cleaning equipment is explained. 8.3 The procedures for cleaning duplex filters and centrifuges are demonstrated. 8.4 The requirements of record keeping are explained.
Conditions	Learning and assessment will take place in a combination of classroom, laboratories, appropriate vessels and other suitable study environments.
Assessment Method	The learning outcomes may be assessed through a combination of: • Written Assessment • Assignments • Oral assessment • Practical assessment
Learning Outcome 9	**Safely operate and carry out supervised maintenance on pneumatic equipment and compressed air systems in accordance with established procedure and safety requirements.**
Assessment Criteria	9.1 The elements of a compressed air distribution system are identified.

9.2 The safety devices that are fitted to each part of a compressed air system are listed.
9.3 The basic operational checks on air compressors, compressed air distribution systems, and air start systems are described.
9.4 Dangers associated with the lack of maintenance of a compressed air system, including the hazards associated with condensate in the system, are described.
9.5 The hazards due to inappropriate use of compressed air and pneumatic equipment are listed.

Conditions — Learning and assessment will take place in a combination of classroom, laboratories, appropriate vessels and other suitable study environments.

Assessment Method — The learning outcomes may be assessed through a combination of:

- Written Assessment
- Assignments
- Oral assessment
- Practical assessment

Resource Requirements:

Access to:

1. Appropriate vessels.
2. Ship and small craft models.
3. Learners guide
4. Items of shipboard equipment.
5. Photos or slides of ships and equipment.
6. Classroom

Method of Instruction:

Learning and assessments will take place in a combination of classroom; laboratories; appropriate vessels; and other suitable study environments using lectures, simulation, demonstrations and/or on-board ship observation.

Assessment Methods

To successfully pass this course, you must complete all events so you can be assessed.
The learning outcomes may be assessed through a combination of:

- written assessment;

- assignments; and
- oral assessment.

Reference Materials:

Training and Assessment Guide SPC 013 Basic Marine Machinery Systems.

Evaluation:

Final Grade for this course will be based on meeting the course requirements at the following percentage rates:

96% - 100%	A – Superior
90% - 95%	B – Above Average
80% - 89%	C – Average
69% - 79%	D – Below Average
0 % - 69%	F – Failure

Attendance:

The COM-FSM attendance policy will apply.