

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

**Course Outline Cover Page**

**Radar**  
 Course Title

**MM 214**  
 Department and Number

**Course Description:** This course provides the knowledge and skills necessary to enable the student to be able to set up and operate radar sets for pilotage, navigation, collision avoidance, and application of the International Regulations for Prevention of Collision at Sea with respect to advanced collision avoidance on board fishing and merchant vessels.

**Prepared by:** Brent Villiers

**State:** FSM-FMI

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3/6/12/24	16/8/4/2	48	3
Laboratory	3/6/12/24	16/8/4/2	48	1
Total Semester Credits:				4

**Purpose of Course**

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

**Prerequisite Course(s):** MM 174 Basic Radar

\_\_\_\_\_  
 Signature, Chairman, Curriculum Committee

\_\_\_\_\_  
 Date Approved by Committee

\_\_\_\_\_  
 Signature, President, COM-FSM

\_\_\_\_\_  
 Date Approved by the President

**General Objective:** By successfully completing this course, students will have been provided with the knowledge and skills necessary to enable the student to be able to set up and operate radar sets for pilotage, navigation, collision avoidance, and application of the International Regulations for Prevention of Collision at Sea with respect to advanced collision avoidance on board fishing and merchant vessels.

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

1. Turn on and obtain optimum performance from any radar display.
2. Describe the character of a radar transmission as it affects the radar display.
3. Explain the causes of false radar information and its effects.
4. Use radar as an aid to navigation.
5. Use radar to avoid collisions.
6. Apply the information obtained by radar for applying the International Regulations for the Prevention of Collision at Sea.

***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. **Setting up and maintaining displays**
  - Start-up checks
  - Correct use of controls
2. **Radar transmission**
  - Revision of fundamentals
  - Principles of operation
3. **Detection of false information**
  - False echoes
  - Sea return
  - Rain clutter
4. **Using radar for navigation**
  - Range and bearing
  - Identification of critical echoes
  - Passage planning and landfalls
  - Blind pilotage
5. **Using radar for collision avoidance**
  - Acquire course and speed of other vessels

- Time and distance of closest approach
- Detecting course and speed changes

#### 6. Application of International Rules

- Safe speed
- Conduct in poor visibility
- Conduct to prevent collision

**Learning Outcomes:** On completion of this course the learner will be able to:

**Learning Outcome 1** **Turn on and obtain optimum performance from any radar display.**

Assessment criteria

- 1.1 The function of controls fitted to a display is explained.
- 1.2 The appearance of a display with correct adjustment of a particular control is described.
- 1.3 The component parts of a radar installation and how each part interacts are explained.
- 1.4 The advantages and disadvantages of X-band and S-band radar are stated.
- 1.5 The features of an Automatic radar Plotting Aid are outlined.
- 1.6 The advantages and disadvantages of ship's head-up and north-up are compared
- 1.7 The determination of the accuracy of range and bearing measurement is described.
- 1.8 The factors affecting the need to adjust radar controls after setting up are explained.
- 1.9 The ability to turn on, tune and operate a radar display is demonstrated

Conditions and Method of assessment

As specified in the Assessment Strategy listed at the end of this outline and by a combination of:

- Written assessment
- Oral assessment
- Observations during practical sessions on radar equipment.

**Learning Outcome 2****Describe the character of a radar transmission as it affects the radar display.**

## Assessment criteria

- 2.1 The principle by which a radar set produces an echo on a plan position indicator (PPI) is explained.
- 2.2 Characteristics of a radar transmission considering pulse length, beam width (vertical and horizontal, and pulse repetition frequency are described.
- 2.3 The process whereby a radar echo is translated into a target on a radar display is outlined.
- 2.4 External and internal factors that affect the performance and accuracy of a radar picture are listed.
- 2.5 Siting of components of a radar installation and its effect on radar performance is explained.
- 2.6 The meaning of the term radar discrimination and the factors that affect this is explained.
- 2.7 Faults in a radar installation that can be detected by a change in the radar display are identified.

Conditions and  
Method of assessment

As specified in the Assessment Strategy listed at the end of this outline and by a combination of:

- Written assessment
- Oral assessment
- Observations during practical sessions on radar equipment.

**Learning Outcome 3****Explain the causes of false radar information and its effects.**

## Assessment criteria

- 3.1 The causes and effects of false radar information are described.
- 3.2 False targets on a radar display are identified.
- 3.3 Methods for minimizing the effects of false targets are explained.
- 3.4 Means of controlling radar interference and its causes are described.
- 3.5 The control of rain and sea clutter and its causes is described.

Conditions and Method of assessment	<p>3.6 The effect of changes in atmospheric (in particular refraction) is described.</p> <p>As specified in the Assessment Strategy listed at the end of this outline and by a combination of:</p> <ul style="list-style-type: none"> <li>• Written assessment</li> <li>• Oral assessment</li> <li>• Observations during practical sessions on radar equipment.</li> </ul>
<b>Learning Outcome 4</b>	<b>Use radar as an aid to navigation.</b>
Assessment criteria	<p>4.1 Factors that affect the accuracy of radar ranges and bearings are described.</p> <p>4.2 Targets taken from a navigational chart and a live or simulated radar picture suitable for position fixing are identified.</p> <p>4.3 The location of a vessel using radar ranges and bearings is shown.</p> <p>4.4 Precautions required when using radar for blind pilotage are stated.</p> <p>4.5 Blind pilotage techniques are demonstrated.</p>
Conditions and Method of assessment	<p>As specified in the Assessment Strategy listed at the end of this outline and by a combination of:</p> <ul style="list-style-type: none"> <li>• Written assessment</li> <li>• Oral assessment</li> <li>• Observations during practical sessions on radar equipment.</li> </ul>
<b>Learning Outcome 5</b>	<b>Use radar to avoid collisions.</b>
Assessment criteria	<p>5.1 Radar plotting methods are demonstrated</p> <p>5.2 A full report of a target from information on a PPI is created.</p> <p>5.3 Dangerous targets from information in a full report are identified.</p> <p>5.4 Appropriate actions based on radar information obtained in clear and restricted visibility are determined.</p> <p>5.5 The effects of collision avoidance actions are predicted on a radar plot.</p> <p>5.6 The earliest time that the original track can be resumed after an alteration of course and/or speed for another vessel is determined.</p>

Conditions and Method of assessment	<p>5.7 The set and rate of a tide or current from radar information is determined.</p> <p>As specified in the Assessment Strategy listed at the end of this outline and by a combination of:</p> <ul style="list-style-type: none"> <li>• Written assessment</li> <li>• Oral assessment</li> <li>• Observations during practical sessions on radar equipment.</li> </ul>
<b>Learning Outcome 6</b>	<b>Apply the information obtained by radar for applying the International Regulations for the Prevention of Collision at Sea.</b>
Assessment criteria	<p>6.1 Risk of collision using radar equipment is determined.</p> <p>6.2 An appropriate course of action is developed when a risk of collision exists according to radar observations.</p>
Conditions and Method of assessment	<p>As specified in the Assessment Strategy listed at the end of this outline and by a combination of:</p> <ul style="list-style-type: none"> <li>• Written assessment</li> <li>• Oral assessment</li> <li>• Observations during practical sessions on radar equipment.</li> </ul>
<u>Delivery strategy</u>	<p>The course provides for delivery by on or off-the-job training and assessment utilizing facilities that simulate conditions found on board merchant and small commercial vessels.</p> <p>Some areas of content may be common to more than one learning outcome, and therefore integration of training and assessment may be appropriate.</p> <p>Methods of instruction include:</p> <ol style="list-style-type: none"> <li>1. Classroom instruction</li> <li>2. Instructor demonstrations</li> <li>3. Participation in practical exercises</li> <li>4. Group work and</li> <li>5. Simulations</li> </ol>
<u>Resource requirements</u>	<p>Delivery of the training will require:</p> <ul style="list-style-type: none"> <li>• Classroom</li> <li>• Overhead projector</li> <li>• Video and monitor</li> </ul>

- Radar set and or simulator
- Radar plotting equipment
- Copies of the International Rules for the Prevention of Collisions at Sea
- Learners guides

### **Assessment Strategy**

#### Assessment Method

Learning outcomes may not be assessed separately. A holistic assessment strategy is proposed that attempts to ensure as much as possible that the assessment replicate conditions that students may encounter in their workplace.

Practical assessment will be undertaken by observing the ability of learners to correctly apply the techniques taught in the course.

#### Condition of Assessment

Assessment may take place on or off-the-job. Where assessment is conducted off-the-job, the environment, where possible will simulate the real work place situation.

### **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.