Course guide
280624 - 280624 - Radio Communications

Last modified: 04/03/2025

Unit in charge: Barcelona School of Nautical Studies
Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering.
707 - ESAII - Department of Automatic Control.

Degree: BACHELOR'S DEGREE IN NAUTICAL SCIENCE AND MARITIME TRANSPORT (Syllabus 2010). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: ROSA M. FERNANDEZ CANTI

Segon quadrimestre:
ROSA M. FERNANDEZ CANTI - Grup: GNTM

Others: Segon quadrimestre:
ROSA M. FERNANDEZ CANTI - Grup: GNTM
MARC JOVÉ BUENO - Grup: GNTM
ÀFRICA UYÀ JUNCADELLA - Grup: GNTM
GINÉS YÁÑEZ SAURA - Grup: GNTM

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Knowledge and expertise in the use and operation of radiocommunication systems. Global Maritime Distress and Safety System (GMDSS), safety procedures, equipment s and communication protocols.

TEACHING METHODOLOGY

Receive, understand and synthesize knowledge
Practice with the Radio Simulator

LEARNING OBJECTIVES OF THE SUBJECT

The main objective is to know the GMDSS devices onboard the ships and the correct utilization in rutine operation and emergency situations.

Competencies
The especific CE.28 and additionally in the chart A-II/1 of the STCW convention: "Respond to a distress signal at sea".

STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	20.00
Self study	90,0	60.00
Hours small group	30,0	20.00

Total learning time: 150 h

CONTENTS

Unit 1 GMDSS/SMSSM

Description:
Introduction. The bases of the SMSSM / GMDSS
The SOLAS (SEVIMAR) Convention of 1974
The SMSSM / GMDSS
Maritime Areas
Maintenance requirements
Radio personnel on board
Devices used in all maritime areas
you listen
Radio Station License
Manuals and publications that must be kept on board
Radio Log (Radio Log)
Test and verification of GMDSS equipment.
. daily tests,
. weekly tests,
. Monthly tests
Time zones (Time Zones). UTC (GMT) or Z (ZULU)
The pricing system for maritime communications
Structure of Salvamento Marítimo de España, E.C., M.R.C.C and C.G.
Equipment and operational availability of communications according to the GMDSS and SOLAS zones

Full-or-part-time: 2h
Theory classes: 2h

Unit 2 RT Procedures

Description:
The Procedures in Radiotelephony
Types of Calls
. DISTRESS (MAYDAY)
. URGENCY (PAN PAN)
. SAFETY (SECURITE)
. ROUTINE
International codes Numerical and Alphabetical

Full-or-part-time: 3h
Theory classes: 3h

Unit 3 Digital Selective Calling DSC, VHF, Radio MF/HF

Description:
Digital Selective Calling (DSC/TSD)
. Types of Calls
. . DISTRESS
. . EMERGENCY
. . SAFETY
. . ROUTINE
. Functions of the DSC/TSD
. MMSI. MMSI type: Vessel, Coastal and Group
. General call procedures in DSC/TSD
. Table of approved words to specify a hazard
. Types of VHF DSC controllers. Class A and Class D

VHF radio (Very High Frequency)
. The Basics of VHF Radio
. Installation of the VHF radio
. VHF antenna location
. Connection with the navigation system
. Portable VHF vs fixed VHF
. Requirements of the SOLAS Convention (SEVIMAR)
. Basic functions of a VHF radio
. The VHF channels
. . Simplex
. . Duplex
. . Full Duplex
. . Half Duplex
. Use of VHF channels
. Table of VHF channels
. VHF DF (Direction Finder) system

MF/HF radio
. The Basics of MF/HF Radio
. Installation of the MF/HF radio
. MF/HF antenna location
. Connection with the navigation system
. Requirements of the SOLAS Convention (SEVIMAR)
. Basic functions of a MF/HF radio
. The MF/HF channels
. . Simple
. . Duplex
. . Full Duplex
. . Semi Duplex (Half Duplex)
. Use of channels and frequencies in MF
. Use of channels and frequencies in HF
. Map of HF coastal stations in the world

Full-or-part-time: 2h
Theory classes: 2h

Unit 4 Radiotèlex, Radiofacsímil, INMARSAT and MSI

Description:
Radiotelex transmission systems
. ARQ (Automatic Repeat on reQuest)
. FEC (Forward Error Correction)
. SELFEC

. Radiotelex. Manual and automatic connection
. Procedure and call techniques

Radiofacsimile

INMARSAT
. Generic Safety Net operation with NAVTEX and EGC
. V-SAT, Inmarsat, FLEET, INMARSAT C, IRIDIUM, SASS systems
. EGC reception by INMARSAT C
. The Inmarsat System
. . Inmarsat satellite network
. . Satellite Propagation
. . The Space Segment
. . . Oceanic Regions
. . The land segment
. . Coordination of the Inmarsat Network
. . SES (Ship Earth Station)
. The current GMDSS satellite systems
. . Inmarsat C
. . Operation of the Inmarsat C terminal
. . Login and Logout
. . Communications in Inmarsat C
. . . EGC (Enhanced Group Call). SafetyNet. FleetNet
. . . How to create a message
. . . Type of messages: Telex, Fax, Data, E-mail, SMS
. . . Calculation of the cost of a message
. . . Distress button and software option
. . How to cancel a false call
. . Emergency and Security Calls
. . Routine checks on Inmarsat C
. . Fault code table
. . Two-digit special code table
. . Inmarsat Fleet 77 or F77
. . Phone calls on Inmarsat F77
. . End of Fleet 33, 55 and 77 services
. The new satellite systems
. . Fleet One
. . Fleet Broadband 250, 500
. . Fleet Xpress
. Safety on boats
. . Ship Security Systems (SSAS) (anti-piracy security)
. . Long Range Identification and Tracking (LRIT) of ships

MSI Maritime Safety Information (ISM Maritime Safety Information
. The foundation of MSI (ISM) messages
. Navareas
. Type of MSI notifications
. . Navarea
. . Coastal
. . Local
. Metareas
. The NAVTEX system
. . Requirements of the SOLAS Convention (SEVIMAR)
. . NAVTEX Messages
. . . Types of messages
. . . Examples of messages
. EGC (Enhanced Group Call) Services. SafetyNet. FleetNet

Full-or-part-time: 3h
Theory classes: 3h

Unit 5 Modulation, types of emission and propagation of radio waves

Description:
Modulation
. Amplitude Modulation (AM)
. Frequency Modulation (FM)
. Phase Modulation
. Graphic images of Amplitude Modulation (AM)
. Graphic images of Frequency Modulation (FM)

Emission types
. Explanatory table of the meaning of the emission type characters
. Table of the main types of emission
. Ways to use frequency bands in different equipment and scopes

Propagation of Radio Waves
. Frequency, wavelength
. Propagation Type
. . Direct Wave or Line of Sight
. . Earth Wave (Ground Wave)
. . Waves in the Ionosphere (Sky Wave)
. . Waves in Space (Space Wave)
. Direct Ray
. Indirect Ray
. Skip Distance
. Dead Zone or Silence Zone
. Shadow Zone
. The Ionosphere
. Frequency bands and their propagation
. . VLF (Very Low Frequency)
. . LF (Low Frequency)
. . MF (Medium Frequency)
. . VHF (Very High Frequency) and higher bands
. . . Calculation of VHF coverage

Full-or-part-time: 2h
Theory classes: 2h

Unit 6 EPIRB (Emergency Position Indicating Radio Beacon), RLS, SART (Search and Rescue Radar Transponder), GMDSS portable VHF

Description:
EPIRB (Emergency Position Indicating Radio Beacon)
. The Basics of Radio Beacons
. Mandatory registration
. Components of radio beacons
. Radio beacons that are released and activated manually
. Radio beacons that are automatically released and activated
. What happens when a radio beacon is activated?
. Where is the radio beacon placed?
. The requirements of the SOLAS Convention (SEVIMAR)
. COSPAS-SARSAT systems
. . LEOSAR satellites
. . GEOSAR satellites
. . MEOSAR satellites
. COSPAS-SARSAT Ground Tracking
. . LUT (Local Users Terminal) stations
. . MCC (Mission Control Centers) control stations
. How to activate a radio beacon
. How to cancel a false alarm
. Other types of radio beacons
. . VHF radio beacons (VPIRB)
. . 121.5 Mhz Personal Radio Beacons (PLB's)
. . 406 Mhz Personal Radio Beacons (PLB's)

SART (Search and Rescue Radar Transponder) / AIS-SART
. The basics of SART
. . Device operation
. . Correct SART installation
. . SART storage
. AIS-SART
. . Identification of the signal of an AIS-SART
. Requirements of the SOLAS Convention (SEVIMAR)

Portable GMDSS Maritime and Air VHF
. The GMDSS Maritime Portable VHF
. VHF air band emergency

Full-or-part-time: 3h
Theory classes: 3h

Radio Simulator Practice

Description:
Call type
Use of DSC and equipment coverage
VHF, MF/HF and satellites.
Routine communications (B-B, VTS, P.S., P.C., C.E., etc.)
Safety, emergency, radio medical procedures, equipment tests and emergency traffic in each of the equipment
Tests of GMDSS equipment
SAR exercises AIS and RADAR as detection equipment for AIS-MOB, AIS-SART, PLB AIS, EPIRB and SART

Annex
Annex 1: Summary and translation of standardized phrases in English for emergency radio communications.
Annex 2: INTERCO.
Annex 3: Spanish Coastal Stations and Maritime Rescue for zones A1, A2 and A3
Annex 4: Frequency table Servicio Móvil Marítimo
Annex 5: Table of VHF USA maritime frequencies
Annex 6: Table of maritime frequencies VHF INTL
Annex 7: MF/HF maritime frequency table
. Frequencies Distress MF/HF RT/DSC
. Frecuencies MF/HF RT USB Ship to Ship
Annex 8: International list of MIDs by country

Full-or-part-time: 45h
Laboratory classes: 45h

GRADING SYSTEM

The final grade is the sum of partial grades detailed below:

Nfinal = 0.6Nac + 0.4Npf

Nac = Grades from continuous evaluation
Npf = Final test grade

To be entitled to the associate certificate, attendance and completion of all practices is mandatory.

BIBLIOGRAPHY

Basic:
- Del Fante Serra, Josep. GMDSS : manual del operador general. Barcelona: Delfcasini, 2022.
- Huidobro, José Manuel; Luque Ordóñez, Javier. Comunicaciones por radio : tecnologías, redes y servicios de radiocomunicaciones : el espectro electromagnético [on line]. Paracuellos de Jarama, Madrid: Ra-Ma, septiembre de 2014 [Consultation: 30/05/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5758922. ISBN 9788499644295.
- Convenio Internacional sobre Normas de Formación, Titulación y Guardia para la Gente de Mar. STCW : convenio Internacional sobre normas de formación, titulación y guardia para la gente de mar : convenio de formación y código de formación : incluidas las enmiendas de Manila de 2010. Londres: Organización Marítima Internacional, 2018. ISBN 9789280102208 .
- Organització Internacional Marítima. SOLAS : edición refundida de 2020 : texto refundido del Convenio internacional para la seguridad de la vida humana en el mar, 1974, y su protocolo de 1988 : artículos, anexos y certificados. Sexta edición. Londres: IMO, 2020. ISBN 9789280131253.

Complementary:
- Nomenclature des stations côtières : [liste IV]. 16ème ed. Genève: UIT, 1998. ISBN 927110031X.
- GMDSS global maritime distress and safety system manual. 7a ed. London: OMI, 2013. ISBN 9789280115758.

- Unión Internacional de Telecomunicaciones. Oficina de Radiocomunicaciones. Reglamento de radiocomunicaciones. Ginebra: UIT, 2008. ISBN 9261124674.
- Organización Marítima Internacional. Código internacional de señales. 4a ed. Londres: OMI, 2005. ISBN 9280101102.
- Nomenclature des stations de navire [liste V]. 39ème ed. Genève: UIT, 1999. ISBN 9271230337.
- Nomenclature des stations de radiorepérage et des stations effectuant des services spéciaux [liste VI]. 13ème ed. Genève: UIT, 1997. ISBN 9271070378.
- Lista de los distintivos de llamada y de las identidades numéricas de las estaciones utilizadas en los servicios marítimo y móvil marítimo por satélite. 19ème ed. Ginebra: UIT, 1999. ISBN 9271110374.

RESOURCES

Audiovisual material:
- Convenio Internacional sobre Normas de Formación, Titulación y Guardia para la Gente de Mar . Organización Marítima Internacional (OMI). Londres, 2003.

Hyperlink:
- Convenio internacional para la seguridad de la vida humana en el mar (SOLAS)