COURSE LIST
2009 – 2013 SERIES

Course description	**GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM -GOC**

Course code	TM/DF 3.1.14 TM/DF 3.2.14	Year	III	Number of credits	4+4
		Semester	5,6		

Faculty	Navigation and Naval Transport		The number of hours per semester / activities				
Domain	Naval Engineering and Navigation		Total	C	S	L	P
Specialization	Navigation and Maritime and River Transport		140	70	-	70	-

Approved,
UMC RECTOR
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PROMOTION AND IMO COURSES DEPARTMENT DIRECTOR,
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Course type **DF-**fundamental, **DD**-engineer, domain specific, **DS**-specialized, **DC**-complementary	DD
Course optionality: **DI**-required, **DO**-optional, **DF**- facultative	DI

Previous courses	**Obligations** (conditioned)	Foundations of Electrical Engineering, Electrical and electronic circuits, Mathematical Analysis, Physics, Microprocessors and Data Acquisition, Communications in EMS and SMMS, Communications
	Recommended	Navy and Naval Communications, English Language, Navigation, Navigation Electrical Apparatus

Objectives	Assimilation the fundamental theoretical concepts relating to: terrestrial equipment and systems and GMDSS satellite , communication techniques used in the GMDSS, radio frequencies, radio linkages in

	marine radio communications, GMDSS functions, communications procedures, etc.. Making the practical operation and testing skills of GMDSS equipment and maintenance systems by learning and practicing the operation algorithms, testing, maintenance, performance optimization, etc. Knowing and practical skills training to use in the GMDSS communications procedures.
Content (descriptors)	**Teaching syllabus** **A. Knowing the basic characteristics of the Maritime Mobile Service and Maritime Mobile Satellite Service** **A.1 General principles and basic features of the Maritime Mobile Service** A1.1. Types of communication in the maritime mobile service - Distress, urgency and safety - Public correspondence communication - Relative Communication to the movement of vessels - Communications for port operations services, and ship movement services - ship - ship Communications - Shipboard communications A1.2. Types of station in the maritime mobile service - Ship station - Coastal stations - Pilot stations, etc - Aircraft stations - Stations associated with sea Rescue Coordination Centres (RCC) A1.3. Elementary knowledge of frequencies and frequency bands: - The frequency concept - The relationship between frequency and wavelength - Units of measurement for frequencies - Radio spectrum frequency bands important for maritime communications: MF, HF, VHF, UHF, SHF A1.4. Frequency Characteristics: - Radio wave propagation mechanisms: propagation in free space, surface waves, ionospheric propagation - Spread in MF - Propagation in different frequency bands HF - Propagation in VHF and UHF - SHF propagation of radio waves used for satellite A1.5 General information about different types of communication and their role in marine radio: - DSC (Digital Selectiv Calling) - Radiotelephony, NBDP (Narrow Band Direct Printing), Facsimil - Data transmissions - Morse Telegraphy A1.6 General knowledge about types of emission classes and modulation: - Allocation, assignment, frequency assignment - programs Classes - Assigned frequency and carrier frequency

- Bandwidth
- Official designation of emissions (ex. F1B, J3E, A3E, A1A, etc)
- Unofficial designation of emissions (ex. TLX, SSB, AM, CW, etc

A1.7 Frequencies allocated to the maritime mobile service (SMM):

- Use of MF, HF, VHF, UHF and SHF in SMM frequencies
- The concept of radio channel. Simplex radio channels, half-duplex and duplex
- pairs and unpaired Frequencies
- Frequency plans and allocation of radio channels
- HF Telephony (important regulations of the Radio Regulations)
- HF NBDP (important regulations of the Radio Regulations)
- MF radiotelephony and telex (NBDP) for the I region (Geneva 85 plan)
- Distress and safety frequencies GMDSS
- Frequency of call, call answer and working frequencies

A2. General principles and basic features of the Maritime Mobile Satellite Service

A2.1 Basic knowledge of satellite communications:

- INMARSAT organization (space segment and ground segment)
- INMARSAT Communication Services: telex (direct and „store & forward"), telephone, fax, data communications
- Distress, urgency and safety
- Communication services offered by INMARSAT A,B
- Communication services offered by INMARSAT C,
- INMARSAT: Sistem Enhanced Group Call (EGC)
- Communication services offered by INMARSAT M

A2.2 Types of station in the Maritime Mobile Satellite Service:

- Coast Earth Stations - CES
- Network Coordination Stations - NCS
- Ship Earth Stations – SES

B. Knowledge and practical skills of using GMDSS equipment ship radio stations

B1. Knowledge and skills training to use GMDSS ship stations' radio equipment

B1.1 Watch receivers:

- MF RT 2182 kHz Watch receiver settings and use
- VHF DSC Watch receiver settings and use
- MF/HF DSC and MF DSC Watch receivers settings and use
- B1.2 radio equipment VHF:
- channels
- controls
- use
- DSC VHF

B1.3. MF/HF radio equipments:

- Frequencies
- Typical settings and use:
  - Alimentation
  - Tx Selection of the emission spectrum
  - Rx Selection of the emission spectrum
  - ITU channels selection

- TX tuning
- Select the class of programs
- Volum, squelch
- RF Gain control
- Use automatic AGC gain control
- 2182 kHz DSC MF/HF
- Alarm generator

B1.4 Antennas:
- insulators
- VHF Rod antennas
- MF/HF Rod antennas
- MF/HF antennas
- Antennas for satellite communications

B1.5 Batteries:
- Different types of batteries and their characteristics
- Battery charging
- Battery Maintenance
- UPS systems

B1.6 Equipment for rescue boats:
- Radio beacons - EPIRB
- Radar Transponder SART
- Portable VHF stations

B2. DSC - digital selective calling

B2.1General principles and basic performance of the system:
- DSC messages
- The format of a DSC call
- mono DSC test and multifrequency
- Confirmation tone
- Call of relay

B2.1. Format specifiers and various types of calls:
- distress call
- all ships call
- apel selectiv
- Group call
- Geographical area call
- „direct dial" call (Automated service, semi-automatic)

B2.2. Identification of the DSC stations through MMSI
- Identification number MMSI
- MID figures
- Ship station numbers
- Coastal station numbers
- Numbers of vessel stations group or coast station group

B2.3. Call Priority and Category:
- distress
- urgency
- security
- routine

B2.4 Call traffic information and remote control:

- distress alert
- Other types of calls and messages
- Information about the frequencies and work channels

B2.5 DSC facilities and usage:

- Automatic 70channel selection
- Automatic channel selection 2187,5 kHz
- preprogrammed DSC frequencies
- automatically Agreement on the operating frequency
- Position and time programming
- watch functions, distress and DSC calling
- tone confirmation

B2.6. DSC test call

B3. Knowledge of NBDP basic principles and radio telex systems (TOR). Ability to use NBDP and TOR equipment in sea communications

B3.1. NBDP systems - general principles and operating

- Automatic systems
- Semi-automatic systems
- Manual systems
- ARQ mode
- FEC mode
- SELFEC mode
- master/slave protocol communication
- radio – telex number
- answerback
- Frequency Modulation type used in TOR :*Frequency Shift Keying (FSK)*

B3.2. telex radio equipment (TOR) - general principles and operating

- Operating: adjustments, signs, etc.
- Operating with keypad

B5 Locating and remedy defects

Efficient Fault elementary gauges embedded software systems or diagnosis according to the technical documentation of equipment. Fix simple defects such as replacing fuses, indicator lights, etc..

B4. INMARSAT – general information and use. Ability to use equipment in real and practical simulator

B 4.1 INMARSAT Satellite network

B4.2. (SES) INMARSAT A/B Ship earth stations:

- Satellite positioning
- autotrack
- FDM şi TDM Communication techniques
- Communication channels: common signaling messages
- Telex services
- Telephone services
- Fax and data services

B4.3. *SafetyNet* international service:

- EGC INMARSAT receivers
- *SafetyNet and FleetNet*
- SES Pre programming for receiving messages EGC
- Select operating mode for EGC reception
- Updating position (automatic and manual)

B4.4. INMARSAT – C Ship Earth Station:
- SES INMARSAT C components
- Satellite positioning
- Introduction and update position and time
- Sending and receiving text messages
- *login, logout*, Tx/Rx/EGC – logs
- Programming device functions

C. PRACTICALLY OPERATIONAL PROCEDURES IN DETAIL WITH GMDSS SUBSYSTEMS AND SYSTEMS

C1. General principles of the global maritime distress and safety system (GMDSS)

C1.1. Sea Areas and Master Plan

C1.2. Radio watch on danger frequencies, according to regulations: Radio Regulations, SOLAS Convention and STCW

C1.3. Functional and performance requirements imposed on ship stations

C1.4. Providing ship stations depending on the type of ship and navigation area

C1.5 Sources of energy for ship stations (main supply and backup power sources - emergency)
- C1.6 Means of ensuring availability of ship station equipment:
- Duplication of equipment
- Maintenance Strategies
- Secondary means of alerting

C1.7 Licenses, Certificates (stations and radio operators). Inspection and supervision

C2. Communication systems used in GMDSS

C2.1 Digital Selective Calling

C2.2 VHF radio equipments

C2.3 MF radio equipments

C2.4 HF, MF/HF radio equipments

C2.5 INMARSAT – general information used in GMDSS

C2.5.1(SES) INMARSAT A/B
- Distress Communications
- Use of DISTRESS facilities
- Acquiring satellites
- telex / telephony distress calls
- Procedures for distress calls
- Rescue Operations Coordination Centres (RCC) associated stations coast (CES) INMARSAT

C2.5.2 ship stations (SES) INMARSAT-C

Distress and safety
- distress alert
- Transmitting the message priority DISTRESS
- Safe Services provided byINMARSAT-C
- Safe Services -

C2.5.3 EGC INMARSAT EGC receivers

- EGC Purpose
- General posts (all ships) and INMARSAT messages system
- Types of SES Inmarsa ship stations and t-C EGC messages receivers

C3. NAVTEX

C3.1. NAVTEX system

- The purpose of NAVTEX
- NAVTEX frequencies
- Geographical coverage
- NAVTEX Message format Broadcaster identification, message type, the number message)

C3.2 NAVTEX receiver

- Transmitters selection
- types of messages selection
- Messages that can not be deselected
- Use of additional control keys and change printer paper

C4. EPIRB - *Emergency Position Indicated Radio Beacon* - Distress radio beacons to locate the sinister

C 4.1. EPIRB satelites

- EPIRB COSPAS SARSAT 406 MHz - The basic features and operation
- EPIRB COSPAS SARSAT 121,5 MHz The basic features and operation including the homming
- EPIRB INMARSAT E 1,6 GHz The basic features and operation
- distress alert
- Automatic operation manual operation
- Buoyancy function
  - Routine maintenance
  - test
  - Checking the validity of the battery
  - Checking the validity of the hydrostatic system of self-timer

C 4.2 VHF – DSC radio beacons

The basic characteristics and operations on Channel 70

C5. Search and Rescue Radar Transponder-SART

C5.1 SART Search and Rescue Radar Transponder

- The main technical and operational characteristics
- Coverage of the emitted signal
- SART Routine maintenance
- Checking the battery expiring date

C6. *distress, urgency,and safety communication procedures*

. **Procedures for alerting and search and rescue operations**

Distress Communications:

- DSC distress alert
  - The definition of a distress
  - Transmitting a distress alert
  - Transmitting a distress alert relay *shore to ship*
  - Transmitting a distress alert through - not then a station in distress (relay alert *ship to shore*)

- Reception of an alert and confirmation of DSC distress alert
- Confirmation by radio
- Confirmation by NBDP (telex)
- Acceptance and acknowledgment by a coast station
- Acceptance and acknowledgment by a ship station
- Preparation, typing, data entry distress alert
- Updating and preparation of distress traffic data
- Distress traffic terminology
- DSC Testing distress and safety traffic
- on – scene communication
- SAR operation

C6.2. Emergency communications and security:

- Significance of emergency and security communications
- Procedures for DSC urgency and safety calls
- Emergency Communications
- Medical Radio Services
- Security Communications

C6.3. Maritime Safety Information MSI

- NAVTEX receiver
- INMARSAT EGC receiver
- HF NBDP receiver
- Navigation warning signals of the old distress and safety system:
- warnings signals transmitted by radio navigation

C6.4. Distress frequencies

- Prevent the false alerts
- Tests on distress frequencies
- Transmission during a distress traffic
- Avoid interference
- Preventing unauthorized transmissions
- Guard

C7. Radio communications with stations equipped with the old distress and safety system:

- Radiotelephone alarm
- Distress Signal
- Distress Call
- Distress message
- Acknowledgement of a distress message
- Distress traffic terminology
- Sending a distress message by station not in dangerSemnale de urgenţă
- Medical Advice
- Security

C8. Search and Rescue SAR

C8.1. RCC role

C8.2. Merchant Ship Search and Rescue MERSAR

C8.3. Maritime Rescue Organizations

C8.4. Ship reporting systems

C9. Alerting procedures for distress and satellite traffic

C9.1 INMARSAT – A:

- Distress and safety, priorities
- Telephone alert
- Alert telex
- Procedures for alerting
- Rescue Coordination Centres RCC, Coordination-stations NCS

C 9.2.INMARSAT – C:

- Distress and safety
- Sending a distress alert
- Sending a distress priority message
- INMARSAT – C Security Services

C9.3. Alert by EPIRB:

- Alert by EPIRB COSPAS/SARSAT
- Alert by EPIRB Inmarsat E (banda L)
- Alert by EPIRB VHF DSC Ch. 70
- homing 121,5 MHz

C9.4 Alert by SART:

- Distance and direction
- The radar reflector 3cm

D. General procedures of the Radio Regulations, additional knowledge and training of various skills

D1. Proper use of English (written / spoken) to ensure a satisfactory exchange of communications relevant to saving life at sea

D1.1 IMO Standard Marine Communication Phrases

D.1.2. Recognition of standardized abbreviations and codes most frequently used services

D1.3. Use the International Phonetic Alphabet

D 2. Obligatory procedures and application**.**

D2.1. Effective use of obligatory documents and publications:

- Radio silence
- Radio certification
- Radio journals
- List of Coast Stations
- List of Ship Stations
- List of satellite stations

D2.2. Radio operating proceduresjournal

D2.3. Knowledge of regulations and established sites in EMS agreement, SMMS.

D.3. Theoretical and practical knowledge of general communications procedures:

D3.1. Selecting the most appropriate methods of communication in different situations . Choice frequencies call, answered the call and work in different bands.

D3.2. Traffic lists and periods of listening

D3.3 Radiotelephone call

	- call Method to a coast station in RT - Special features of calls - The end of call - Calling a coast station by DSC - Selection of an automatic radiotelephone call - Radiograms - Preamble - adress - telex - Word count - Service instructions - signature D3.4. Traffic Charges - International tax system - INMARSAT tax system - AAIC Settlement authority - Features and facilities of charge - LL, CC and SC (Land Line, Coast Charge and Ship Sharge) - Automatic and manual toll: value-added services D3.5 Procedures for routine traffic D3.6 Knowledge of world geography, in particular the main navigation courses and main courses of associated communication
Competences	- The ability to send and receive information using GMDSS subsystems and equipment; - Knowledge of GMDSS communications functions; - T he ability to properly use and GMDSS equipment and systems relevant documents so as to meet the requirements of distress communication, Urgency, safety, routine, according to Radio Regulations si International Convention for the Safety of Life at Sea (Solas) 1974 as ammended.
Test and evaluation	Grid Test in each chapter. Assessment in the laboratory / simulator

Evaluation form (**E**-examination, **C**- colloquium/ final test , **LP**-tests)		E
Final grade (percentage)	- answers to exam / colloquium / practical work	60%
	- certified applied activities / lab / practical work / project, etc..	20%
	- Tests during the semester	10%
	- task	10%
Bibliography	1. General operator's Certificate for The Global Maritime Distress and Safety System, Course + Compendium, Model Course IMO 1.25, Printed by PMS UK Ltd London, 2004, ISBN 92-801-1430-1. 2. *GMDSS Manual- Global Maritime Distress and Safety System-Manual,* London , IMO, London, U.K., 2007. 3. European Radiocommunications Committee ERC Decision of 10 March 1999 on the harmonised examination syllabi for General Operator's Certificate (GOC) and Restricted Operator's Certificate (ROC) (ERC	

99(01).
4. Merchant Ship Search and Rescue Manual (MERSAR) , IMO, 1993,
5. IMO Standard Marine Communications Phrases + CD, IMO publication, London, 2005.
6. STCW Convention - International Convention on Standards of Training, Certification and Watchkeeping for Seafarers / STCW Code - Seafarers' Training, Certification and Watchkeeping Code as ammended 1995 & subsequent amendaments to the Convention and Code, IMO, London, 2001.
7. *SOLAS*-International Convention for the Safety of Life at Sea, 2004 consolidated Edition, IMO, London, 2004.
8. SOLAS Amendaments 2003, 2004, &2005.
9. SOLAS Amendaments 2006.
10. *MANUAL FOR THE MARITIME MOBILE AND MARITIME MOBILE SATELLITE SERVICES* – ITU, RADIOCOMMUNICATION BUREAU, Geneva, English Edition 2009.
11. *LIST OF COAST STATIONS, ITU,* Geneva, 2009.
12. *LIST OF SHIP STATIONS, ITU ,* Geneva, 2009.
13. *LIST OF CALL SIGN AND NUMERICAL IDENTITIES,* ITU, Geneva, 2009.
14. *LIST OF RADIODETERMINATON AND SPECIAL SERVICE STATIONS,* ITU, Geneva 2008.
15. RADIO REGULATIONS, ITU, Geneva, 2008, ISBN 92-61-12451-8.
16. *INMARSAT MARITIME COMMUNICATIONS HANDBOOK* - INMARSAT - London, U.K. febr. 2000.
17. Harmonization of GMDSS requirements for radio installations on board SOLAS-ships (ref COMSAR Circ 32 per 02.01-04);
18. ADMIRALTY LIST OF RADIO SIGNALS, *COAST RADIO STATIONS, vo1. 1(1), vo1. 1, 2 NP 281(1-2), 2007/2008, publ by UKHO, London, 2008-2009.*
19. ADMIRALTY LIST OF RADIO SIGNALS, *RADIO AIDS TO NAVIGATION, ELECTRONIC POSITION FIXING SYSTEMS, LEGAL TIME AND RADIO TIME SIGNALS vo1. 2, 20072008 NP 282, publ by UKHO, London, 2009/2010.*
20. ADMIRALTY LIST OF RADIO SIGNALS, Maritime Safety Information Services, *vo1. 3, 2007/2008, NP 283, publ by UKHO, London, 209/2010.*
21. ADMIRALTY LIST OF RADIO SIGNALS, *METEOROLOGICAL OBSERVATION STATIONS, NP 284, vo1.4, 2007/2008 publ by UKHO, London, 2009/2010.*
22. ADMIRALTY LIST OF RADIO SIGNALS, *GMDSS- GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM, vo1. 5, 2007/2008, NP 285, publ by UK Hydrographic Office(UKHO), London, 2008/2009.*
23. ADMIRALTY LIST OF RADIO SIGNALS, *PILOT SERVICES, VESSEL TRAFFIC, SERVICES AND PORT OPERATIONS*, *vo1. 6 (1), (2), (3), 2008/2009, London.*
24. Graham D. Lees, William G.Williamson, *Handbook for Marine Radio*

Comunication, ed. LLOYD S OF LONDON PRESSLTD., 2004, ISBN 978 1 84311 368 3.
25. GMDSS Course for General Operator's Certificate- Instructor's Guide (4th edition), Poseidon Education, Leknes, Norway, ISBN 82-91839-03-4.
26. Tor R Kristensen, GMDSS Course for General Operator's Certificate- Student's WorkBook, (6th edition), Poseidon Education, Leknes, Norway, ISBN 89-91839-08-5, 2003.
27. Tor R Kristensen, AN INTRODUCTION TO GMDSS General Operator's Certificate- GOC (7th edition - revised GOC edition), Poseidon ((Kristensen Marine Communications), Leknes, Norway, ISBN 978-82-92035-21-4, 2008.
28. INSTRUCTOR'S PACK GMDSS/ GOC (INCLUDING SEARCH AND RESCUE SAR EXERCISES ON CD), Poseidon Education, Leknes, Norway, 2008.
29. Codruţa Pricop, GMDSS – GOC *Tehnici de Instruire*, *(GMDSS GOC Training* Techniques) Editura NAUTICA, Constanţa, ISBN 973-7872-01-0, 2005.
30. Codruţa Pricop, GMDSS – GOC *Tehnici de Instruire editia a 2a, (GMDSS GOC Training* Techniques 2 th edition) Editura NAUTICA, Constanţa, 2009, ISBN 978-973-7872-94-4.
31. Dan Popa *Tehnici si Echipamente GMDSS*, Editura NAUTICA, Constanţa, 2009, ISBN 978-973-7872-95-1.
32. IMO Search and Rescue Manual (IMOSAR), Consolidated Edition ,1993- include amend. adopt. Incl 1993.

List of needed materials

A1	General operator's Certificate for The Global Maritime Distress and Safety System, Course + Compendium, Model Course IMO 1.25, Printed by PMS UK Ltd London, 2004.
A2	NORCONTROL CAPELLA 5.1 GMDSS SIMULATOR and PC programs, including documentation, for the simulation of terrestrial and satellite communication and distress alerting systems and equipments. Real consola SEA 3.
A3	User manuals for all installed GMDSS equipment (printed or and video, audio files).
A4	Radio Log-book
A5	Real terrestrial and satellite communication and distress alerting systems and equipments, adapted for training and assessment. (Demonstration equipment (SARTs, portable GMDSS VHFs, EPIRBs, and so on)).
A6	Real equipment as VHF, **VHF-DSC,** MF/HF including NBDP and DSC and Inmarsat-C, Navtex, AIS, and so an.
A7	INSTRUCTOR'S PACK GMDSS/ GOC (INCLUDING SEARCH AND RESCUE SAR EXERCISES ON CD), Poseidon Education, Leknes, Norway, 2008.

Balance of spent hours

Chapter nr.	Course	Seminar	Laboratory	Project

	Hours	Hours	Hours	Hours
Evaluation				
Total hours	**140**			

Lecturer Position, title, first name, name	Signature
Associate Prof. Codruta PRICOP, Ph.D.	
Head of chair Position, title, first name, name	Signature
Associate Prof. Paulica ARSENIE, Ph.D.	
Head of IMO Department Position, title, first name, name	Signature
Sen.lect.Dr.eng. Liviu Stan	

Legend: C-course, S-seminar, L- Laboratory or simulator activities, P- project or practical work