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| **Country**  **RO** | **Institution**  **RNA** | **Course title**  **OCEANOGRAPHY** | **ECTS**  **2** |

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| Service  **Navy** | **Minimum Qualification for Lecturers**   * Bachelor/ master degree in Nautical Sciences; * English: Common European Framework of Reference for Languages (CEFR) Level B1 or NATO STANAG Level 2. | |
| Languages  **English** |
| **Prerequisites for international participants:**   * English: Common European Framework of Reference for Languages (CEFR) Level B1 or NATO STANAG Level 2. * Minimal knowledge of the principles of fluid mechanics and physics. | | **Goals of the Module:**   * correctly use of oceanography equipment on board the ship, in order to determine the necessary elements of sea water to knowledge of the situation during navigation; * identify oceanographic features and phenomenon represented on prognosis charts; * identify and prevent dangerous phenomenon for the ship, sensors and crew; * understand acoustic parameters and propagation loss mechanism of sound waves; * optimize sonar performance accordingly to the sound speed profile; * planning sea routes in accordance with METOC information to prevent shipping accidents and other situations affecting safety of mission; * use NATO METOC documents and oceanographic information; |

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| Learning outcomes | Knowledge | * Knowledge of the main topics of general and military oceanography. * Understand the Oceanographic Weather Organization (METOC) within NATO. |
| **Skills** | * Enhancing capabilities in navigation, hydrography and ship manoeuvring at the operational level; * Planning route, executing navigational watch in safe conditions and ship management in order to ensure a good seaworthiness of the ship, even the ship is alone or in a task group or task force. |
| **Competence** | * Collect and manipulate oceanic, atmospheric, and geospatial data sets and rigorously analyse and interpret observational data, in situ experimental data, and model results. * Analyse and interpret flow of operational METOC data, in naval military operations. |

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| **Verification of learning outcomes**   * **Observation**: * Class time is primarily assigned to lecturing. Different materials from the supplementary readings will be used in order to illustrate some of the basic points in the lecture as scheduled for that day, in order to encourage discussions and debates about these focus points. * Methods of teaching/lecturing are: lecturing, heuristic conversation, explanation, discussions/debates, case study, problem-solving, simulation of situations, methods of group work, individual and frontal methods for developing critical thinking, self-study of references. * **Tests**:   a. The ongoing assessment during the seminars and problem-solving tasks will count 50%, as the average of homework evaluation during the seminars.  b. Final exam (written test): 50%.   * **Evaluation**:   + The final exam will consist in: Examination based on a multiple-choice test and applications of the taught subject. The student should pass the final assessment with minimum grade of 5. |
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| **Module details** | | |
| **Main Topic** | **Recom-mended**  **WH** | **Details** |
| Introduction to military Oceanography | 4 | *Lecture/seminar 4/2 hours:*  The object of Oceanography. History of military oceanography.  Physical-chemical properties of the sea water.  General marine topography.  Oceanic data, instruments and collection methods. |
| Dynamics of marine waters. | 6 | *Lecture/seminar 4/2 hours:*  *Waves:* wind waves*,* swell and other forms of movement of marine waters and their influence on navigation.  *Ocean currents flow*, Characteristics of main ocean currents influence against the navigation.  *Ocean waters*  *Fronts*  *Tides*: The tides phenomenon. Applied terminology. |
| **Underwater Acoustics/Sonar** | 6 | *Lecture/seminar 4/2 hours:*  Basic concepts, acoustic parameters.  Propagation loss mechanism. |
| **NATO METOC Structure and Support** | 6 | *Lecture/seminar 2/4 hours:*  AMETOC Series Standards.  ATP 32- Oceanographic Support.  Sonar Range Prediction Software.  OPTASK METOC APP 11. |
| **Using METOC data in route planning** | 4 | *Lecture/seminar 2/2 hours:*  Optimization inroute planning, executing navigational watch in safe conditions and ship management in order to ensure a good seaworthiness of the ship, even the ship is alone or in a task group or task force. |
| Final evaluation | 2 | *Assessment 2 hours:*  Examination based on a multiple-choice test and applications of the taught subject. |
| **Total lecture WH** | **30** |  |
| **Additional hours (WH) to increase the learning outcomes** | | |
| Self-Study | 30 | **References:**   * AMETOCP 2.1. EDB V1 NATO CATALOGUE OF METEOROLOGICAL AND OCEANOGRAPHIC TACTICAL DECISION AIDS * AMETOCP 2EdA – NATO METEOROLOGICAL SUPPORT MANUAL * AMETOCP 4 VOL I ED A NATO METEOROLOGICAL AND OCEANOGRAPHIC CODES MANUAL * APP 11 OPTASK METOC * ATP 32 ED E V2 NATO MILITARY OCEANOGRAPHIC AND RAPID ENVIRONMNETAL ASSESMENT SUPPORT PROCEDURES * \*\*\* FN-14.9 Meteorology Manual in Navy Forces, Romanian Maritime Hydrographic Direction, 2009; * \*\*\* FN-14.6 Military Oceanography Support (STANAG 1171), Romanian Maritime Hydrographic Direction, Constanţa, 2009; * \*\*\* FN-14.5 NATO maritime meteorology procedures and services *(STANAG 6006),* chapter II (Meteorologic services for NATO Navy Forces), chapter III (Navy Forces Meteorology Reports) and chapter IV (Meteorologic Communications), Romanian Maritime Hydrographic Direction, Constanţa, 2008; * \*\*\* *Meteorological Office. Marine Observer΄s Handbook*, 11th edition, London, HMSO, 1995; * \*\*\* *Meteorological Office. Meteorological for Mariners,* 3rd edition, London, HMSO, 1996; * *\*\*\* Maritime Meteorology*, 2nd edition, Thomas Reed Publications, 1997; * \*\*\* *Admiralty List of Radio Signals* , *Maritime Safety Information Servicess,* vol 3, U.K. Hydrographic Office; * \*\*\* *Cloud Sheet*, (revised edition), World Meteorological Organization, Geneva, 1986; * \*\*\* *U.S. Pilot Charts,* Defense Mapping Agency, United States Naval Oceanographic Office, Washington D.C.; * \*\*\* *Routing Charts,* United Kingdom Hydrographic Office, London; * \*\*\* *Admiralty Tide Tables*, Hydrographer of Navy, U.K; * \*\*\* *Admiralty Sailing Directions* (Pilot of maritime regions), UK Hydrographic Office; * \*\*\* *Ocean Passages for the World*, United Kingdom Hydrographic Office, London; |
| **Total WH** | **60** | 30 residential hrs (18 teaching hrs + 10 practical exercises + 2 final assessment);  30 self-study. |

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| **List of Abbreviations:** |
| RO………………………………………………………………………………………Romania  RNA……………..…………………………..…Romanian Naval Academy “Mircea cel Bătrân”  ECTS……………………………………...European Credit Transfer and Accumulation System  NTPRO……………………………………….…………………..…...Navi Trainer Professional  CEFR……………………….……..Common European Framework of Reference for Languages  B1…………………………………...…………………………….…Common Reference Levels  NATO……………………………….………………………North Atlantic Treaty Organisation  STANAG…………………………………………………………....Standardization Agreement  METOC ………………………………………….…………..... [Meteorology and Oceanography](https://www.hydro.gov.au/metoc/metoc.htm)  AMETOC……………………………………………….. Allied meteorology and oceanography  ATP 32…………………………… …………………………………[Allied Tactical Publication](https://archives.nato.int/allied-tactical-publication-atp-1-series)  OPTASK ………………………………………………………………………Operation tasking  APP ………………………………………………………………[Allied Procedures Publication](https://www.allacronyms.com/APP/Allied_Procedures_Publication/military)  WH………………………………………………………………………………..Working Hour |