University of Gdańsk

Subject card

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| Subject name and code | Navigational Equipment - ARPA course - laboratory classes , PG_00201142 | | | | | | |
| Field of study | Marine Hydrography | | | | | | |
| Date of commencement of studies | October 2026 | | Academic year of realisation of subject | | 2028/2029 | | |
| Education level | Bachelor's studies | | Subject group | | Obligatory subject group in the field of study<br>Optional subject group<br>Subject group related to practical vocational preparation | | |
| Mode of study | full-time studies | | Mode of delivery | | at the university | | |
| Year of study | 3 | | Language of instruction | | Polish | | |
| Semester of study | 5 | | ECTS credits | | 1.0 | | |
| Learning profile | practical | | Assessment form | | credit | | |
| Conducting unit | | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Artur Makar | | | | |
| | Teachers | | | | | | |
| Lesson types | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 | 8 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 8 | | 1.0 | | 16.0 | 25 |
| Subject objectives | To teach the principles of operation, use, and effective application of ARPA systems, with particular emphasis on their limitations, accuracy, and the specification of navigational information display. | | | | | | |

## Learning outcomes

| Course outcome | Subject outcome | Method of verification |
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| [HML3-W07] knows and understands, at an advanced level, principles of operation and use of measuring instruments used in professional activities related to the field of study, including the principles of their calibration and assessment of accuracy | knows at an advanced level:<br>- the principles of manual operation of navigational radars;<br>- the principles of preparing radar plots;<br>- the principles of operation of ARPA (Automatic Radar Plotting Aids) devices and their capabilities in collision avoidance maneuver planning | [SW4] test/exam - oral or written |
| [HML3-U11] is able to use navigation devices, means of technical observation and communication as well as measuring instruments, as well as apply in practice various techniques of measurement and observation in the field of professional activity related to the field of study | is able to:<br>- optimize radar display settings, correctly interpret radar images, efficiently identify echoes of objects on the screen, and accurately perform radar measurements using available methods while minimizing errors;<br>- obtain information about objects visible on the radar screen, initiate target tracking, correctly interpret data provided by the ARPA system, assess collision situations, plan and execute collision avoidance maneuvers, and evaluate the effectiveness of actions taken;<br>- use ARPA and other navigational devices to ensure safe navigation and collision avoidance in various navigational waters, with particular emphasis on ARPA–AIS–ECDIS data exchange, and take into account the errors and limitations of ARPA systems | [SU4] test/exam - oral or written |
| [HML3-U18] is able to work individually and in team, manage the work of the team, in particular comply with health and safety regulations and ergonomics | is able to use ARPA and other navigational devices to conduct safe navigation and avoid collisions in various navigational areas, with particular attention to the exchange of information between ARPA, AIS, and ECDIS, while also considering the errors and limitations of ARPA systems | [SU4] test/exam - oral or written |
| [HML3-W16] knows and understands engineering standards and norms specific to the field of study, in particular those recommended by IHO and IMO | knows at an advanced level the IMO requirements regarding radar and ARPA devices, the dangers associated with excessive reliance on ARPA data | [SW4] test/exam - oral or written |

## Subject contents

IMO Technical and Operational Requirements for Radar Equipment. Fundamental phenomena and challenges in radar navigation. Structure and operation of marine navigational radar. Interpretation of radar display. Errors and accuracy in radar measurements. Radar performance diagnostics and preliminary fault identification. Digital echo processing and its impact on radar imagery. Devices cooperating with navigational radar. Preparation of radar plotting radar report, planning and monitoring the effectiveness of collision avoidance maneuvers. Use of radar equipment for ship position determination and monitoring. Plotting aids: EPA and ATA principles of operation and applications. ARPA: principles of operation, key functions, and handling. Interpretation of ARPA-derived information. Testing, errors, and limitations of ARPA systems. Integration of ECDISAISARPA systems.Use of radar systems in accordance with COLREGs to prevent collisions and excessive close-quarter situations.

## Prerequisites and co-requisites

## Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| | 51.0% | 100.0% |

## Recommended reading

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| Basic literature | 1. JANUSZEWSKI J., KON W., WIĘCKOWSKI J.: Praktyka radarowa na małych statkach. Tom I i II. Wydawnictwo Trademar, Gdynia 1997.<br>2. KON W.: Wykorzystanie radaru do zapobiegania zderzeniom. 1983.<br>3. WAWRUCH R.: Radar jako pomoc w zapobieganiu zderzeniom na morzu. 1994.<br>4. WRÓBEL F.: Vademecum oficera wachtowego. Trademar, Gdynia 1999. |
| Supplementary literature | 1. BOLE A. G., DINELEY W. O.: Radar and ARPA Manual. 1998.<br>2. COCKCROFT A. N., LAMEIJER J.: Collision Avoidance Rulet (fifth edition). 2001. |
| eResources addresses | |

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| Example issues/ example questions/ tasks being completed | |
| Work placement | Not applicable |

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