Study Card

Master Geomatik
HCU Hamburg

Module-No.	Semester	Teaching staff	Module-coordinator (designated each sem.)
Geo_M208	2	Prof. Dr.-Ing. Delf Egge, Prof. Dr.-Ing. Volker Böder	Prof. Dr.-Ing. Volker Böder

Module name	Subject areas	Duration/sem.	Frequency of offering	Type (C/CE/E)	Emphasis in overall grade / %
Navigation	Hydrography	1 Semester	each SuSe	C	4,16 %

CP (according to ECTS)	Workload / h.	Self-study / h.	Contact time / h.	Contact hours / week (SWS)	Type of examination
5CP	141	85	56	4 + 0	oral (graded)

Previous knowledge / Conditions for participation (in form and content)

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Educational aims of the module (Learning objectives/results, skills)

Basic understanding for navigation methods and applications at sea and using of electronic charts.

Course contents

Nautical Science :

Positioning at sea: principle, display accuracy, display errors of magnetic and gyro compass, course and depth corrections. Principles of terrestrial positioning: measurement, corrections, construction, connection between ship's position and lines-of-position (LOPs). Nautical signs: principles of light house and buoy placement, lateral and cardinal system, special signs, guidance, direction and cross direction fires. Stream navigation, tides. Contents and use of the most important nautical publications: nautical charts, nautical handbook, collection of light fires, notices to mariners, nautical radio warnings. Orientation at sea and near coast using light and direction fires as well as terrestrial lines-of – position. Working with nautical charts, elaborating tasks related to charts. Navigation on piloting and simulation system (SUSAN). Route following.

Law of marine traffic. Law of coastal traffic: general rules of behavior, principles of giving way, light setting, acoustic warning signals, and travel in fog. Regulations for navigation in waterways.

Radar: as navigational aid and for collision avoidance. Principle of radar positioning, display types, principle of display evaluation.

Seamanship. Maneuver techniques: steering elements and propulsion systems, import and properties in maneuvering, special maneuvers in narrow and flat waterways, in heavy weather, and in man-over-board situation.

Security technology.

Traffic Control Systems :

Fundamentals of technical electronic navigation. Directions, courses, bearings, distances, lines-of-position, depth contours. Technical aids: optics, acoustic and electromagnetic waves, radio waves, classification of waves, operational ranges, propagation, spatial and ground waves.

Bearing sensors: Radio direction finders. Sensors for distance and bearing: Radar: Display types, composition and function, resolution, limitations and display errors, radar as navigational aid, radar as collisions avoidance, ARPA devices.

Course sensors: Magnetic compass, gyro compass, electronic sensors, course information from position sensors, function and limitations.

Sensors for water depth: sounders, echo sounders, function and limitations.

Speed sensors: logs, general, hydro-mechanical logs, electromagnetic logs, Doppler sonar.

Position sensors: hyperbolic (e.g. Loran C and similar), pseudorange methods (GPS), improvement of procedures, differential methods(e.g. DGPS).

Integrating procedures, ECDIS, automatic guidance. Special procedures.

Electronic Chart Display :

An imaginary trip with ECDIS. On-board components of the electronic chart display. Differences between ECDIS, ECS, RCDS. Data: information and data, geo-reference, forms of display, raster and vector map, data structures, display of attribute information, realization of space relationship in vector charts. Hydrographic aspects: quality aspects of hydrographic data, necessity of continuous corrections, source-dependent quality aspects, quality assurance.

Transition from data to chart functions. Integration with other navigation systems.

Visit to the Federal Maritime and Hydrographic Agency of Germany (BSH) and to firms.

Integrated Navigation :

Mathematical fundamentals. Sequential parameter estimation: definitions, linear and non-linear observation equations. Dynamic systems: state variables, system equation, transition equation, time-update of state variables and related covariance matrix. Kalman filtering. Mathematical models for integrated navigation. Application examples.

Teaching and learning methods

Taught seminars

Condition for awarding the ECTS-credits

Oral examination

Additional Information

Latest update: 06/2011