

Data Management (C004368)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)
 Credits 3.0 Study time 90 h Contact hrs 44.0 h

Course offerings and teaching methods in academic year 2020-2021

A (year)	English	Gent	lecture	36.25 h
			practicum	7.5 h

Lecturers in academic year 2020-2021

Huang, Haosheng	WE12	lecturer-in-charge
De Maeyer, Philippe	WE12	co-lecturer

Offered in the following programmes in 2020-2021

Programme	crdts	offering
Postgraduate Hydrography B	3	A

Teaching languages

English

Keywords

Position of the course

Basic knowledge and application of hydrographic data management. Students are given an insight in how they best collect, manage, process, analyse and visualize hydrographic data. The end goal is to produce, correct and publish up-to-date international nautical charts.

Relationship to other courses:

- HB300 – Information technology
- HB310 – navigation
- HB340 – Tides and currents
- HB350 – Geodesy & cartographic systems
- HB360 – Hydrographic surveying
- HB380 – Geology & cartographic systems
- HB390 – Legal aspect
- HB500 – Hydrographic practice

Contents

1. ANALOGUE DATA CAPTURE
 - Manual input of alphanumeric data
 - Raster scanning processes and vector digitisation
 - Description of digitising systems and scanners
 - Georeferencing of paper maps
 - Description of digital data formats
 - Digital data transfer exercises
2. DATA MANAGEMENT, PROCESSING AND ANALYSIS
 - Approximation and estimation
 - Approximation and estimation procedures for survey measurements
 - Spatial data processing & analysis
 - The concepts of Geographical Information Systems (GIS)
 - The properties of spatial databases and Database Management Systems (DBMS)
 - The concepts of raster and vector data, gridded and meshed models (including TINs)
 - Spatial data selection algorithms: filtering, smoothing, approximation, estimation, correlation and analysis
 - Digital Elevation Models (DEMs)
3. MARINE GIS

- The use of Geographical Information Systems (GIS) within the marine environment and their use in areas such as coastal zone management
- Graphic presentation of data from marine data bases
- Data and metadata management and nautical charting
- The electronic charting concept as a special form of GIS

4. DATA PRESENTATION

Visualization and presentation

- Cartographic semiology, colour theory and schemes, shading and illumination techniques
- Manual and automatic plotting and contouring of hydrographic data: resolution, scale and vertical exaggeration
- The use of vector and raster digitising and plotting systems
- Hydrographic applications of 3D modelling and visualisation

5. MARINE CARTOGRAPHY

- Chart compilation process and flow line
- Application in the production flow of the instructions of the General Bathymetric Chart of the Oceans (GEBCO):
- Nautical charting & production; Chart Compilation

The process involved in selecting soundings and features for the nautical chart from a hydrographic survey or other sources

- Assessing and maintaining data quality throughout the compilation process

6. COASTAL TOPOGRAPHY & MAPPING

- GNSS-based and ground survey techniques to delineate coastline and attached cultural features
- Coastline map creation with aerial photographs
- The use of Ground photography in the depiction of coastline topography
- Relation between tidal datums and charted shorelines

7. PUBLICATIONS

- Required hydrographic data for navigational publications (including tide tables, sailing directions, light lists, radio aids to navigation, port guides, and notice to Mariners)

8. CHART PRODUCTION / REPRODUCTION OF ANALOGUE MAPS

- The process of creating chart plates from graphic products and from digital files
- Production of the Chart out of multiple plates

9. DIGITAL MAPS

From digital data to digital maps (on nautical devices and on the web)

10. CORRECTION OF CHARTS

- The importance of updating nautical charts and the dissemination of chart corrections
- The responsibilities of each element in the sequence from surveyor to mariner
- Obtaining latest information and checking for old data

Initial competences

- Bachelor's degree or equivalent
- Good knowledge of mathematics, physics and English

Final competences

- 1 To be able to create the required data types, part of a standard exchange format and to configure systems for secure storage, transfer and backup of survey data.
- 2 To be able to use data cleaning techniques using appropriate software, while distinguishing between noise, outliers and real features as well as assessing propagated errors of survey data.
- 3 Applying procedures used to assess, accept and reject data.
- 4 Being able to apply spatial data processing techniques to create DTMs or gridded surfaces and contouring, as well as applying estimation procedures to assess survey measurements and volume computations.
- 5 To explain the concepts of Spatial Data Infrastructures (SDIs); raster and vector data models.
- 6 To be able to use file types that support the exchange of hydrographic data to transfer data between acquisition, database and GIS environments.
- 7 Explain the concept and use of GIS within the marine environment.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, practicum, online lecture

Learning materials and price

Syllabus

Slides will be available in addition of the following required courses:

- Geographic Information systems notes (by Ph. De Maeyer)
- Cartography notes (Ph. De Maeyer) or Cartography: Visualization of Geospatial Data by M.J. Kraak & F: Ormeling.

References

- Heywood, I., Cornelius, S. & Carver, S., (last edition) An introduction to Geographical Information Systems, Pearson Education Limited.
- Online manuals of GI-software: ESRI, Q-GIS, ...

Course content-related study coaching

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions, written examination with multiple choice questions, written examination

Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions, written examination with multiple choice questions, written examination

Examination methods in case of permanent evaluation

Assignment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

Evaluation form

Written examination, partly with multiple choice, partly with open questions.
Fieldwork – permanent evaluation of the practical exercises

Assessment criteria

Permanent evaluation: this evaluation is based upon the training record book in relation to the number of tasks carried out and the comments of the supervisor(s) expressed in written in the book; workshops: proof of attendance: reports, exercises.
Theory examination: quality of knowledge, insight, relation between subjects, ...

Calculation of the examination mark

The final figure of assessment is composed of:

- 50% (written examination)
- 50% (permanent evaluation)