GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2019-2020

Integrated Offshore Exploration (C003998)

Course size (nominal values; actual values may depend on programme)

Credits	6.0	Study time	150 h
Contact hrs	60.0 h		

Course offerings and teaching methods in academic year 2019-2020

A (semester 2)	English	seminar: practical PC room classes	20.0 h
		lecture	20.0 h
		fieldwork	10.0 h
		project	10.0 h

Lecturers in academic year 2019-2020

Van Rooij, David	WE13	lecturer-in-charge

Offered in the following programmes in 2019-2020	crdts	offering
Master of Science in Geology	6	A
Master of Science in Marine and Lacustrine Science and Management	6	A
Exchange programme in Geology (master's level)	6	A

Teaching languages

English

Keywords

Drilling and coring techniques, site survey, geophysical borehole logging, seismic profiling, multibeam bathymetry, sidescan sonar, visual seabed mapping

Position of the course

The sampling of sedimentary archives through drilling is a common technique for academic and economical goals, both onshore as offshore. The selection of the target site is taking in account many prerequisites, among which a thorough risk analysis. Therefore, a detailed site survey needs to be carried out. This course will zoom in on all aspects of such a site survey as well as the execution of the drilling, with special attention to the geophysical characterisation of the seafloor and the (shallow) subsurface. The objectives of this course contribute to the skill of unravelling the multidisciplinary and integrated exploration strategies of shallow shelf seas down to continental slopes.
Since this is a practical course, there is a limit to the number of participating students (12 max) due to logistical reasons. Students who have this course as obligatory unit in their major, or students of the Master of Science in Geology, Major Basins & Orogens, will get priority.

Contents

1 *Introduction: fundamental scientific and industrial objectives of seafloor research, as well as legal, ethical, logistical and budgetary aspects. Importance of a correct site survey prior to invasive drilling: risk assessment. Aspects of (subsea) navigation.*

2 *Visual & oceanographic observation techniques: ROV, ADCP, CTD*
3 *Basic principles and techniques regarding geophysical seafloor mapping: multibeam bathymetry & backscatter, sidescan sonar, AUV.*
4 *Visual & oceanographic observation techniques: ROV, ADCP, CTD*
5 *Seismic profiling: single- vs. multichannel seismics. Advanced processing & interpretation*
6 *3D-4D seismics: acquisition, processing and interpretation (attributes)*
7 *Sampling techniques: long cores, vibrocoring, drilling*
8 *Geophyiscal characterisation of cores and boreholes*

9 *Integration of drilling and seismics: practical aspects*

Initial competences

Bachelor geology and has followed the course of exploration geophysics

Final competences

1 The student has acquired qualities in the drafting of a multidisciplinary offshore exploration strategy.
2 The student is aware of potential technical and environmental risks and can make a risk assessment for a drilling campaign.
3 The student possesses an overview of the most common marine surveying techniques and knows the basic skills for acquisition, processing and interpretation.
4 The student can integrate geophysical drilling data into a geophysical seabed survey project.
5 The student is familiar with the technical vocabularium and can report and present the technical results of a survey.

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, project, fieldwork, seminar: practical PC room classes

Extra information on the teaching methods

- The research activities are interactive in which the active contact between student and lecturer or instructor is central.
- During the fieldwork on board of RV Simon Stevin and (possibly) RHIB Zeekat, shallow geophysical data will be acquired that will determine where (short) coring will be applied. This also includes a visit to the "Marine Robotics Centre" of the VLIZ is Ostend. The fieldwork will partly be scheduled ad hoc, whereas the Simon Stevin survey will be carried out during the Easter Holidays.
- The PC-class exercises endeavor to learn the students a set of basic software skills in order to process and present the acquired data. This will be performed using both academic as industrial datasets.
- The project includes a critical interpretation, evaluation and presentation of a technical and scientific dataset of an IODP (or other) drilling project and site survey. This will be concluded in writing a paper and a presentation. The evaluation process will use peer-review among the students.

Learning materials and price

Collection of powerpoint slides and a selection of scientific papers and relevant study material. This material is made available as PDF through the UGent Ufora system.

References

Ashcroft, W.A. (2011). A petroleum geologist’s guide to seismic reflection. Wiley-Blackwell, Chichester, 157 pp.
Asquith, G. & Krygowski, D. (2004). Basic well logging analysis. Tulsa, AAPG 244 pp.
Blackbourn (2009). Cores and core logging for geoscientists. Whittles Publishing, Dunbeath, 152 pp.
Blondel, P. (2009). The Handbook of Sidescan Sonar. Chichester, Praxis publishing Ltd., 316 pp.
Chaney, R.C. & Almagor, G. (2016). Seafloor Processes and Geotechnology. Boca Raton, CRS press, 558 pp.
Hyne, N.J. (2001). Non-technical Guide to Petroleum Geology, Exploration, Drilling, and Production. PennWell Books, Tulsa, 598 pp.
Leffler, W.L. et al. (2003). Deepwater Petroleum Exploration & Production: a nontechnical guide. Pennwell Books, Tulsa, 166 pp.
Lurton, X. (2002). An Introduction to Underwater Acoustics. Chichester, Praxis publishing Ltd., 347 pp.
Medwin, H. (2005). Sounds in the Sea: from Ocean Acoustics to Acoustical Oceanography. Cambridge, Cambridge University Press, 643 pp.
Posementier, H.W. et al. (2007). Seismic geomorphology – an overview. Geological Society, London, Special Publications, 277, 1-14.
Reynolds, J.M. (2011). An Introduction to Applied and Environmental Geophysics. Chichester, Wiley-Blackwell, 696 pp.
Wille, P.C. (2005). Sound Images of the Ocean. Heidelberg, Springer, 471 pp.
Wynn, R. et al. (2014). Autonomous Underwater Vehicles. Marine Geology 352, 415-468.

Course content-related study coaching

The study councelling will be directly performed by the lecturers, assisted by post-docs, PhD students and teaching assistants. The survey part will be carried out in collaboration with VLIZ.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Oral examination, assignment

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

Oral examination, assignment

Examination methods in case of permanent evaluation

Participation, assignment, peer assessment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

- Non-Periodical Evaluation project: oral presentation and discussion of the project with fellow students
- Non-Periodical Evaluation participation: active participation to the PC-class exercises. Knowledge of the theorerical basic elements during the field work.
- Periodical Evaluation: the oral examination will interrogate the student about the written part of the project (paper), regarding the content as the aspects of the theory that have been addressed

Calculation of the examination mark

- NPE: active presentation of a project proposal with discussion and (self-)evaluation by lecturer and students (25%), participation (25%).
- PE: oral exam about the project (30% project, 20% oral)