DEPARTMENT OF GEOMATICS ENGINEERING
UNDERGRADUATE PROGRAM IN GEOMATICS ENGINEERING
COURSE SYLLABUS

COURSE	Name	Seabed Imaging and Mapping
	Code	RM184622
	Credits	3 (three)
	Semester	VI (six)

COURSE DESCRIPTION

Seabed imaging and mapping is a compulsory subject in the field of hydrographics which aims to provide continuation regarding hydrographic surveys that have been taken in the previous semester. In this course students will learn about underwater mapping which includes hydrographic surveys and instruments used in conducting hydrographic surveys. In conducting the hydrographic survey, it is referred of utilizing various methods, both sonar, Lidar and altimetry satellites and making good survey designs. The types of positioning both horizontally and vertically in the hydrographic survey will also be explained in the this course. In this course, the resolution produced from one of the hydrographic survey instruments which consist of multibeam echosonder. The resulting resolution consists of two, namely angular resolution and range resolution. from this course will also be explained about vessel movements that occur above the sea, such as pitch, roll and yaw.

EXPECTED LEARNING OUTCOME

A	Able to apply mathematics, science, and engineering in the fields of geodesy, surveying, hydrography, remote sensing, photogrammetry, geographic information systems, and cadastral to gain a thorough. understanding of the principles of
B	Able to design survey and mapping activities using the latest technology in the fields of geodesy, surveying, hydrographic, remote sensing, photogrammetry, and cadastral.
G	Able to plan, perform and evaluate the process of surveying and mapping activities using the latest technology in the fields of geodesy, surveying, hydrographic, remote sensing, photogrammetry, and cadastral.

COURSE LEARNING OUTCOME

1	Able to understand the definition of hydrographic surveys in general and their application.
2	Able to explain the instrument of hidrographyc data collection using single echoounder and its procedures
3	Able to distinguish between angular resolution and range resolution in multibeam echosounders
4	Able to understand the reference frame and the orientation of the vessel during the hydrographic survey or when conducting data processing
5	Able to understand the analysis of the hydrographic survey instrument, namely multibeam echosounder
6	Able to explain the acquisition of vertical and horizontal data in a hydrographic survey
7	Able to understand the basic concepts of data acquisition using Bathy Lidar in a hydrographic survey
8	Able to create a hydrographic survey design in a certain area

COURSE MATERIALS

1	The concept and scope of the hydrographic survey
2	A review of the singlebeam echosounder and its utilization procedures
3	Angle resolution and distance resolution on multibeam echosounder
4	Various kind of vessel movement above sea level
5	Definition, working principle and analysis on multibeam echosounder
6	The basic concept of horizontal and vertical data acquisition
7	The working principle of the lidar bathy and the working principle
8	Making hydrographic survey design

PREREQUISITE

Hidrographic survey

REFERENCES

A.	Main References
1	Lurton, Xavier. An Introduction to Underwater Acoustic: Principles and Applications. Perancis. Praxis Publ. 2002.
2	Hughes-Clarke, J. Toward remote seafloor classification using the angular response of accoustic backscattering: A Case Study for Multiple Overlapping GLORIA Data, IEEE Joural of Oceanic Engineering, 19, 112-127, 1994.
3	Rennard, V. and Allenou, J.P. Sea beam multibeam echosounding on Jean Charcot: Description, evaluation and first results, Int. Hydr. 1979.
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B.	Additional References
1	Wilson, O.B. An introduction to the theory and design of sonar transducer. Washington, DC: Naval Post Graduate School. US Government Printing Office. 1985
2	Lasky, M. Review of underwater acoustic to 1950, Journal of the acoustical society of America. 1977
3	Nielsen, R. O. Sonar Signal Processing. Boston: Artech House, 1991.
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