UNIVERSITY OF PLYMOUTH MODULE RECORD

SECTION A: DEFINITIVE MODULE RECORD. ***Proposed changes must be submitted via Faculty/AP Quality Procedures for approval and issue of new module code.***

MODULE CODE: EHYD502A **MODULE TITLE: Sensors and Underwater Acoustics**
CREDITS: 20 **FHEQ LEVEL: 7** **HECOS CODE(S): F720**
PRE-REQUISITES: None **CO-REQUISITES: None** **COMPENSATABLE: Yes**
SHORT MODULE DESCRIPTOR:
This module provides a detailed coverage of the nature of sound, and its behaviour and application in the undersea environment as well as a review of the marine environment. Material covered in this module provides the theoretical knowledge required to operate depth sounding equipment effectively whilst afloat

ELEMENTS OF ASSESSMENT					
E1 (Examination)	N/A	**C1** (Coursework)	**100**%	**P1 (**Practical**)**	N/A
E2 (Clinical Examination)	N/A	**A1** (Generic assessment)	N/A		
T1 (Test)	N/A	**O1(online open book assessment)**	N/A		

SUBJECT ASSESSMENT PANEL to which module should be linked: **MLA**

Professional body minimum pass mark requirement: N/A

MODULE AIMS:
This module aims to provide an in-depth knowledge and understanding of sonar systems leading to a full appreciation of the function of depth sounding apparatus.

ASSESSED LEARNING OUTCOMES: (additional guidance below; please refer to the Programme Specification for relevant Programme Intended Learning Outcomes).

At the end of the module the learner will be expected to be able to:

Assessed Module Learning Outcomes (ALOs)	**Programme Intended Learning Outcomes (PILOs) contributed to**
1. Explain the principles of sonar and evaluate performance in a variety of complex oceanographic conditions 2. Discuss the theory of operation of the main sonar systems; including single beam, sidescan and multibeam echo sounders 3. Apply tidal and marine environmental theory to maximise sensor performance 4. Describe and evaluate a variety of non-acoustic techniques including LIDAR	LO1 Explain the principles of sonar and evaluate performance in a variety of complex oceanographic conditions LO2, LO3 & LO4 Discuss the theory of operation of the main sonar systems, including single beam, sidescan and multibeam echo sounders. Apply tidal and marine environmental theory. Evaluate non-acoustic hydrographic survey techniques.

DATE OF APPROVAL: 01/2013	**FACULTY/OFFICE:** Academic Partnerships
DATE OF IMPLEMENTATION: 03/2014	**SCHOOL/PARTNER:** MLA
DATE(S) OF APPROVED CHANGE:03/2022	**SEMESTER:** AY
MODE OF DELIVERY: distance learning	
Notes (for office use only): For delivering institution's HE Operations or Academic Partnerships use if required EHYD502A replaces code EHYD502 to reflect only that this module should be compensatable (R Pomeroy, 3/3/22)	

Additional Guidance for Learning Outcomes:

To ensure that the module is pitched at the right level check your intended learning outcomes against the following nationally agreed standards

- Framework for Higher Education Qualifications http://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf
- Subject benchmark statements https://www.qaa.ac.uk/quality-code/subject-benchmark-statements
- Professional, regulatory and statutory (PSRB) accreditation requirements (where necessary e.g. health and social care, medicine, engineering, psychology, architecture, teaching, law)
- QAA Quality Code https://www.qaa.ac.uk/quality-code

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process. Some parts of this page may be used in the KIS return and published on the extranet as a guide for prospective students. Further details for current students should be provided in module guidance notes.

ACADEMIC YEAR: 2022-23 **NATIONAL COST CENTRE: 111**
MODULE LEADER: Dr Carlos Martins **OTHER MODULE STAFF: Dr Jaimie Cross**

Summary of Module Content:
The nature of sound waves in the sea, the principles of sonar and its range of applications. Background signals and their impact on sonar performance. Sonar system design and signal processing techniques employed. Review of marine environmental considerations. Sonar propagation in deep and shallow waters, the sonar equations, range prediction and other techniques such as LIDAR.

SUMMARY OF TEACHING AND LEARNING ***[Use HESA KIS definitions]***		
Scheduled Activities	**Hours**	**Comments/Additional Information (briefly explain activities, including formative assessment opportunities)**
Lectures (on-line)	35	Off and online study
Practical work (on-line)	10	Including ray tracing, image analysis and range prediction
Tutorials and formative assessment	15	Tutor-led sessions
Directed and self-study	55	Research & preparation
Personal Development Planning	10	
Professional portfolio	75	Building written maths & essay work
Total	**200**	**(NB: 1 credit = 10 hours of learning; 10 credits = 100 hours, etc.)**

SUMMATIVE ASSESSMENT

Element Category	**Component Name**	**Component Weighting**
Written exam	N/A	N/A
Test	N/A	N/A
Coursework	Professional Portfolio	35% 65%
Practical	N/A	N/A
Clinical Examination	N/A	N/A
Generic Assessment	N/A	N/A
Online open book assessment	N/A	N/A

REFERRAL ASSESSMENT

Element Category	Component Name	Component Weighting
Written exam	N/A	N/A
Coursework (in lieu of the original assessment)	Professional Portfolio	35% 65%
Coursework	N/A	N/A
Practical	N/A	N/A
Clinical Examination	N/A	N/A
Generic Assessment	N/A	N/A
Test	N/A	N/A
Online Open Book Assessment	N/A	N/A

To be completed when presented for Minor Change approval and/or annually updated	
Updated by: MLA College **Date:** 3rd March 2022	**Approved by**: Dr Ross Pomeroy **Date:** 3rd March 2022

Recommended Texts and Sources:

Waite, A. D. (2002) Sonar for Practising Engineers. Wiley

Urick, R. J (1983) Principles of Underwater Sound (3rd Edn). McGraw-Hill

Journals:

- Hydrographic Journal
- Hydro International
- Sea Technology