TEACHING MODULES INFORMATION
EMJMD WACOMA (academic year 2018/19)

1.	**Module Title:** Fieldwork skills
2.	**Module Code:** (not necessary yet)
3.	**Maximum Number of Students:** 15
4.	**Total ECTS Credits:** 2 ECTS
5.	**Month:** Second year, first semester
6.	**Notional Learning Hours (Please fill a number in box)**: **(a) Contact Time - e.g in the classroom, or fieldwork** **(b) Private Study - reading time, preparing and taking assessments** **Format of Teaching:** Lectures * Hours (a) Laboratory 9 Hours (a) Other (field work) 5 Hours (a) Other (private study) 36 Hours (b) **Teaching Strategy:** * The theoretical contents will be integrated within the field and laboratory work Practical classes A multidisciplinary fieldwork will be undertaken that will include designing and carrying out a sampling campaign of physical, geological, biological and chemical variables in an intertidal setting, followed by the processing and analysis of the collected samples in the laboratory and the integrated analysis and interpretation of data.
7.	**Convener:** Sokratis Papaspyrou Theocharis Plomaritis José Antonio López López
8.	**Institution:** University of Cádiz
9.	**Level:** Master Degree
10.	**Language(s) of Tuition**: English
11.	**Pre-requisites:** It is unlikely that there will be prerequisites beyond the entrance qualifications for a science-based Masters programme.

12.	**Co-requisites:** None
13.	**Programme(s) for which module is core:** Erasmus Mundus Joint Master Degree in Water and Coastal Management (WACOMA)
14.	**Module Description - The Purpose or Aims:** The objective of this course is to familiarise students with the idea of a multidisciplinary approach to the study of the marine environment and provide them with the background knowledge and tools to be able to design an integrated sampling campaign, collect the appropriate samples, and process and analyse oceanographic data. Furthermore, this course aims to: - Familiarise students with the different field work techniques across disciplines - Understanding the complexity of multidisciplinary sampling strategies - Identify the temporal and spatial variability of physical, geological, biological and chemical variables.
15.	**Learning Outcomes:** On successful completion of this module, students should be able to: - Understand the importance of sampling, design an appropriate collection of samples for the analysis of chemical, biological and geological variables. - Select the appropriate material and equipment and treat them as required per discipline, prior to sampling. - Carry out in-situ measurements of physical-chemical variables (pH, dissolved oxygen, temperature and conductivity), as well as topographic and bathymetric surveys. - Sample water, sediment and biota appropriately and store them for further analysis in the laboratory. - Apply basic standard laboratory analytical techniques to quantify biotic and abiotic environmental variables. - Discuss the validity and errors associated with the measurements made Interpret and integrate the data obtained in an interdisciplinary way

16.	**Summary of Course Content:** 1.- Introduction: Fundamentals of sampling. 2.- Sampling strategies and sample conservation and treatment. 3.- Sampling for chemical monitoring. 4.- Sampling for geomorphological monitoring. 5.- Sampling for physical monitoring 6.- Sampling for sedimentary monitoring. 7. Sampling for macrobenthos, meiobenthos and microbenthos. 8. Sampling for plankton. 9. Processing of chemical, physical, geological and biological samples. 10. Interpretation and integration of data - Practical field work for collection of water, sediments, topographic and biological samples (1 or 2 sessions of 4-5 hours each)
17.	**Key Skills Taught:** • Designing, planning and undertaking collection of samples for marine monitoring. • Carrying out sediment, water and biota sampling, treatment and conservation of samples for analysis. • In-situ monitoring physical-chemical variables in surface waters. • Performing clean techniques for water sampling for determination of ultra-trace pollutants. • Performing multisensing topographic and bathymetric surveys and combining the collected data. • Basic analytical laboratory skills. • Performing relevant analyses of sediment and water variables affecting biota. • Identifying biota present in water and sediments. • Analysis and interpretation of data. • Preparing relevant reports.
18.	**Assessment Methods:** Continuous assessment by interacting with students during lectures. Level of participation during laboratory sessions (questions, discussions, reports), as well as skills in practical design of sample collection and analysis.

19.	**Assessment Criteria:** A successful candidate should have or be able to do the following: ***Threshold*** A basic understanding of the appropriate science and modelling approach and a reasonable understanding of the model results and their implications. ***Good*** A good understanding of the science and correct model results which are presented and interpreted to a good standard, with some reference to independent literature data and results. ***Excellent*** A good to excellent understanding of the science and correct model results which are presented and interpreted to a high standard, with plenty of references used for comparisons and to critically evaluate the results.

20. **Resource Implications of Proposal and Proposed Solutions**:

(Recommended Bibliography: compulsory, optional, other sources of information)

Specific Resource Implications for Students:

Aery, N.C. 2010. Manual of Environmenal Analysis. CRC Press, Boca Ratón, Taylor and Francis.

Araújo, C.V.M.; Diz, F.R.; Laiz, L.; Lubián, L.M.; Blasco, J.; Moreno-Garrido, I. 2009. Sediment integrative assessment of the Bay of Cádiz (Spain): an ecotoxicological and chemical approach *Environment International*, 35: 831-841.

ASTM. Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates. American Society for Testing and Materials, 11.05 : E 1706-95b; 1997.

Benavente, J., Del Río, L., Anfuso, G., Gracia, F.J. and Reyes, J.L., 2002. Utility of morphodynamic characterization in the prediction of beach damage by storms. Journal of Coastal Research, SI36,: 56-64

Benavente, J. et al., 2014. Differential short- and medium-term behavior of two sections of an urban beach. Journal of Coastal Research: 621-626.

Beiras, R. & His, E. 1995. Toxicity of fresh and freeze-dried hydrocarbon-polluted sediments to Crassostrea gigas embryos. *Marine Pollution Bulletin* 30: 47-49.

Blasco, J.; Sáenz, V. & Gómez-Parra, A. 2000. heavy metal fluxes at the sediment-water interface of the coastal ecosystems from south-west of the Iberian Peninsula. *The Science of the Total Environment*, 247: 189-199.

Champan, P.M. and Wang, F. 2001. Assessing sediment contamination in estuaries. Environmental Toxicology and Chemistry 20(1): 3-22.

Crane, J.L. & MacDonald, D.D. 2003. Applications of numerical sediment quality targets for assessing sediment quality conditions in a US Great Lakes area of concern. *Environmental Management* 32(1): 128-140.

Fernández-Gómez, C.; López-López, J.A.; Matamoros, V.; Díez, S.; García-Vargas, M.; Moreno, C. 2013 Atmospheric influence on the distribution of organic pollutants in the Guadalquivir River estuary, SW Spain. Environmetnal Monitoring and Assessment, 185:3209-3218.

Fletcher, R.; Reynoldson, T.B. & Taylor, W.D. 2001. The use of benthic mesocosms for the assessment of sediment contamination. *Environmental Pollution* 115: 173-182.

López-López, J.A.; García-Vargas, M.; Moreno, C. 2011. A chemometric approach to the evaluation of atmospheric and fluvial pollutant inputs in aquatic systems: The Guadalquivir River estuary as a case study. *Environmental Pollution*, 159:1136-1143.

McManus, J.P., 1988. Grain size determination and interpretation. In: M. Tucker (Editor), Techniques in sedimentology. Blackwell Scientific, Oxford, pp. 63-85.

Newman, M.C. & Unger, M.A., Ed. 2003. Fundamentals of ecotoxicology, 2nd edition. CRC Press, Boca Ratón. Lewis Publishers.

Nollet, L.M.L. 2007 Hanbook of water analysis 2nd edition. CRC Press, Boca Ratón, Taylor and Francis.

Plomaritis, T.A., Paphitis, D. and Collins, M., 2008. The use of grain size trend analysis in macrotidal areas with breakwaters: Implications of settling velocity and spatial sampling density. Marine Geology, 253(3-4): 132-148.

Sasson-Brickson, G. & Burton, G.A. 1991. In situ and laboratory sediment toxicity testing with *Ceriodaphnia dubia. Environmental Toxicology and Chemistry* 10: 201-207.

SETAC (Society of Environmental Toxicology and Chemistry - Europe). 1993.

Zhang, G.L.2007 Fundamentals of environmental sampling and analysis. Wiley-Interscience, New Jersey.

21.	**Does this module replace existing provision? If so, please indicate modules to be replaced:** The module fits in the area of “Transferable soft skills”
22.	**Start Date:** Second year, first semester
23.	**Is it intended that the module be available every year?** Yes