FORM FOR SUBMISSION OF MODULE FOR A EUROPEAN JOINT MASTERS

1.	**Module Title:** Quarrying and mining activities impacts on water quality
2.	**Module Code:** (not necessary yet)
3.	**Maximum Number of Students:** 22
4.	**Total ECTS Credits:** 2 ECTS
5.	**Month:** First year, second semester; May-June
6.	**Notional Learning Hours (Please fill a number in box):** **(a) Contact Time - in the classroom and fieldwork** **(b) Private Study - reading time, preparing and taking assessments** **Format of Teaching:** Lectures 5 Hours (a) Laboratories or Practicals Hours Other (computer workshops) Hours Other (field work) 9 Hours (a) Other (private study) 36 Hours (b) **Teaching Strategy:** Lectures – 14 Workshops – Tutorials –
7.	**Convener:** José Miguel Nieto Liñán M Dolores Basallote Sánchez Carlos Ruiz Cánovas
8.	**Institution:** University of Huelva
9.	**Level (Please tick Y):** 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:** This module describes the case of river basin management in catchment areas with sulphide or coal mining. The module deals with water characterization, assessment and remediation of freshwater bodies affected by Acid Mine Drainage (AMD).
15.	**Learning Outcomes:** After completing the module, the student should know: the processes leading to the formation of AMD and the main strategies for remediation and to identify AMD processes in the field and define the most suitable treatment strategy.
16.	**Summary of Course Content:** Exploitation and processing of mineral resources Sulphide oxidation and Acid Mine Drainage formation Prediction of acid mine drainage Treatment and monitoring strategies for AMD Case study (field trip): Metal pollution in the Tinto and Odiel rivers
17.	**Key Skills Taught:** Improving the knowledge in field based studies of river pollution, and capability to interact with transversal disciplines (geology, chemistry, and engineering) in the evaluation of environmental effects of mining. Updating skills in making up field reports and written discussions of scientific papers.
18.	**Assessment Methods:** The assessment of this module it will take into account the participation in the lectures and filed trip, together with a written report of the field excursion, and a written essay of a scientific paper in a related topic. It will be accepted in Spanish, Italian or English.
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)*** – http://technology.infomine.com/enviromine//ard/home.htm – Hudson-Edwards, K.A. (2003). Sources, mineralogy, chemistry and fate of heary meta-bearing particles in mining-affected river systems. Mineralogical Magazine, 67, 205-217. – Johnson, D.B. & Hallberg, K.B. (2005). Acid mine drainage remediation options: a review. Science of the Total Environment, 338, 3-14 – M. Olías, J.M. Nieto, A.M. Sarmiento, J.C. Cerón & C.R. Cánovas (2004). Seasonal water quality variations in a river affected by acid mine drainage: the Odiel River (South West Spain). Science of the Total Environment, 333, 267-281. – J.M. Nieto, A.M. Sarmiento, M. Olías, C.R. Cánovas, I. Riba, J. Kalman & T.A. DelValls (2007). Acid mine drainage pollution in the Tinto and Odiel rivers (Iberian Pyrite Belt, SW Spain) and bioavailability of the transported metals to the Huelva Estuary.Environment International, 33, 445-455. – R. Pérez-López, J.M.Nieto & G.R. Almodórvar (2007). Immobilization of toxic elements in mine residues derived from the mining activities in the Iberian Pyrite Belt (SW Spain): laboratory experiments. Applied Geochemistry, 22, 1919-1935.
21.	**Does this module replace existing provision? If so, please indicate modules to be replaced:** This module fits in the area of "Geochemistry"
22.	**Start Date:** First year, second semester
23.	**Is it intended that the module be available every year?** Possibly