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

1.	**Module Title:** Coastal Flooding Hazards
2.	**Module Code:** (not necessary yet)
3.	**Maximum Number of Students:** 20
4.	**Total ECTS Credits:** 2 ECTS
5.	**Month:** First year, second semester
6.	**Notional Learning Hours (Please fill a number in box)**: **(a) Contact Time - e.g in the classroom, or fieldwork** *14 hours* **(b) Private Study - reading time, preparing and taking assessments** *36 hours* **Format of Teaching:** Lectures 8 Hours (a) Laboratories or practical exercises 4 Hours (a) Oral presentations 2 Hours (a) Other (computer workshops) Hours Other (tutorials) Hours Other (private study) 36 Hours (b) **Teaching Strategy:** Lectures will be given on the main natural agents responsible for flooding in coastal zones, including examples of management procedures. Practical exercises will be done and corrected in the classroom to support the theoretical lectures.
7.	**Convener:** Laura del Río Rodríguez
8.	**Institution:** University of Cádiz
9.	**Level (Please tick Y):** Master Degree
10.	**Language(s) of Tuition**: English
11.	**Pre-requisites:** None
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 focuses on the natural processes that can produce flooding of coastal lowlands. The main objective is that the students understand the main characteristics of these processes, their occurrence and general dynamics, as well as some basic procedures for coastal flooding hazard assessment and risk management.
15.	**Learning Outcomes:** When completing this module the students should: - Identify the general characteristics of storms, tsunamis and astronomical tides as main agents responsible for coastal floods. - Know how other processes such as river flow, subsidence or sea level rise can interact with the above agents. - Know how to elaborate flood hazard maps. - Identify the main management options for dealing with coastal floods.
16.	**Summary of Course Content:** - Definitions and key terms related to risk assessment in coastal zones. - Tsunamis. Wave generation, propagation and effects on the coast. Prevention and mitigation. Indicators of historical tsunamis. - Storm surges. Generation and physical factors involved. Effects on the coast. Surge prediction and modelling. - Tidal flooding. Nature and variability of tides. Extreme tides and synergy factors. - Flooding in estuarine environments. Hydrological behaviour of rivers. Recurrence intervals in fluvial flooding. Flood hazard mapping. - Other related processes. Coastal subsidence. Sea level rise.
17.	**Key Skills Taught:** - Estimation of storm-induced water level height. - Coastal flood hazard mapping.
18.	**Assessment Methods:** - Written report on the practical exercises done in classroom (30%). - Individual oral presentation based on bibliographic research on one specific topic related to module contents (70%).

19.	**Assessment Criteria:** A successful candidate should have or be able to do the following: ***Threshold*** A basic understanding of the appropriate science related to the module contents and their implications. Adequate performance of the written exercises and oral presentation. ***Good*** A good understanding of the science related to the module contents and their implications. Good performance of the written exercises and oral presentation. ***Excellent*** An excellent understanding of the science related to the module contents and their implications. Excellent performance of the written exercises and oral presentation.

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

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

Background books:
Komar, P.D. (1998). Beach processes and sedimentation. Prentice Hall, 544 p.
The Open University (1999). Waves, tides and shallow water processes, 2nd ed. Butterworth-Heinemann, Oxford, 227 p.

Some journal papers:
Bellomo, D., Pajak, M.J. & Sparks, J. (1999). Coastal flood hazards and the National Flood Insurance Program. Journal of Coastal Research SI 28, 21-26.
Church, J.A. & White, N.J. (2006). A 20th century acceleration in global sea-level rise. Geophysical Research Letters 33, L01602.
Ciavola, P., Ferreira, Ó., Haerens, P., Van Koningsvled, M. & Armaroli, C. (2011). Storm impacts along European coastlines. Part 2: lessons learned from the MICORE project. Environmental Science & Policy 14 (7), 924-933.
Danard, M., Munro, A. & Murty, T. (2003). Storm surge hazard in Canada. Natural Hazards 28, 407-431.
Doornkamp, J.C. (1998). Coastal flooding, global warming and environmental management. Journal of Environmental Management 52 (4), 327-333.
Fischetti, M. (2001). Drowning New Orleans. Scientific American.
FitzGerald, D.M., Fenster, M.S., Argow, B.A. & Buynevich, I.V. (2008). Coastal impacts due to sea-level rise. Annual Reviews of Earth Planetary Science 36, 601-647.
Harman, B.P., Heyenga, S., Taylor, B.M. & Fletcher, C.S. (2015). Global lessons for adapting coastal communities to protect against storm surge inundation. Journal of Coastal Research 31(4), 790-801.
Hinton, A.C. (2000). Tidal changes and coastal hazards: past, present and future. Natural Hazards 21, 173-184.
Neumann, B., Vafeidis, A.T., Zimmermann, J., Nicholls, R.J. (2015). Future coastal population growth and exposure to sea-level rise and coastal flooding - A global assessment. PLoS ONE 10 (3), e0118571.
Nicholls, R.J. & Klein, R.J.T. (2005). Climate change and coastal management on Europe's coast. In J.E. Vermaat et al. (Eds.): Managing European Coasts - Past, Present, and Future. Springer-Verlag, p. 199-225.
Perini, L., Calabrese, L., Salerno, G., Ciavola, P. & Armaroli, C. (2016). Evaluation of coastal vulnerability to flooding: comparison of two different methodologies adopted by the Emilia-Romagna region (Italy). Natural Hazards and Earth System Science 16, 181-194.
Wolf, J. (2009). Coastal flooding: impacts of coupled wave-surge-tide models. Natural Hazards 49, 241-260.

Specific Resource Implications for Students: None.

21. **Does this module replace existing provision? If so, please indicate modules to be replaced:**

The 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?**
Yes.