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

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| **1.** | **Module Title:** Climate change and extreme events effects on flood hazard |
| **2.** | **Module Code:** |
| **3.** | **Maximum Number of Students:** 20 |
| **4.** | **Total ECTS Credits:**<br>2 ECTS |
| **5.** | **Month:**<br>First year, second semester**.** |
| **6.** | **Notional Learning Hours**:<br>**(a) Contact Time - e.g in the classroom, or fieldwork**<br>**(b) Private Study - reading time, preparing and taking assessments**<br><br>**Format of Teaching:**<br>Lectures 6 Hours (a)<br>Laboratories or Practicals 2 Hours (a)<br>Other (computer workshops) 6 Hours (a)<br>Other (private study) 36 Hours (b)<br><br>**Teaching Strategy:**<br>Lectures will be given on the main effects of climate changes on the natural processes that affect flood hazards. Mean and extreme changes will be discussed together with the state-of-the-art methods used to simulate climate change scenarios. Multi-hazards analysis will be discussed. Practical exercised and computer exercises will be interconnected with the theory. Practical work will focus on estimating differences in flooding hazards for different climate change scenarios and for different locations on the globe. |
| **7.** | **Convener:**<br>Theocharis Plomaritis |
| **8.** | **Institution:**<br>University of Cadiz |
| **9.** | **Level (Please tick Y):**<br>Master Degree |
| **10.** | **Language(s) of Tuition**: English |
| **11.** | **Pre-requisites:**<br>Basic knowledge on coastal dynamics, tides and waves. |

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| **12.** | **Co-requisites:**<br>Compulsory that students also enroll in one of the following modules: (a) Coastal Hazards Floodings ; (b) Hydro-meteorological hazards and risks at coastal zones. (Advisable to be enrolled in both) |
| **13.** | **Programme(s) for which module is core:**<br>**Erasmus Mundus Joint Master Degree in Water and Coastal Management (WACOMA)** |
| **14.** | **Module Description - The Purpose or Aims:**<br><br>This course has as main objectives:<br>- Familiarise with the different climate change scenarios used by the IPCC<br>- Understand how the natural processes responsible for the coastal flooding hazards could be altered under climate change conditions;<br>- Identify the temporal and spatial variability of these changes on a global scale;<br>- Understand the complexity of multi-hazard processes and how different climate change agents can affect them.<br>- Develop the ability to understand the statistical nature of climate change prediction and how these can affect the hazard predictions. |
| **15.** | **Learning Outcomes:**<br>At the end of the module the student should know how to:<br>- Understand the difference between the various climate change scenarios<br>- Evaluate the effects of those scenarios on the hazard processes<br>- Correctly compare the current conditions with the Climate change. |
| **16.** | **Summary of Course Content:**<br><br>- Definition of climate change and what the different IPCC scenarios represent.<br>- Identify the natural processes that are affected by the climate change and how they vary on a global and regional scale<br>- Study how the above changes affect the coastal flooding hazard.<br>- Discuss how hazards are translated into risk and which are the possible solution/measures using the concepts of mitigation, protection and adaptation |
| **17.** | **Key Skills Taught:**<br><br>- Climate change perspective on flooding hazards<br>- Spatial and temporal variation of flooding hazards under different Climate change scenarios |

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| **18.** | **Assessment Methods:**<br>- Written report on the practical exercises done in the classroom (30%).<br>- Individual oral presentation based on bibliographic research on one specific topic related to the module contents (70%). |
| **19.** | **Assessment Criteria:**<br>A successful candidate should have or be able to do the following:<br><br>***Threshold***<br>A basic understanding of the appropriate science and modelling approach and a reasonable understanding of the model results and their implications.<br><br>***Good***<br>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.<br><br>***Excellent***<br>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. |

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| **20.** | **Resource Implications of Proposal and Proposed Solutions**:<br><br>Latest IPCC report (http://www.ipcc.ch/ )<br><br>Ferreira, Ó., Plomaritis, T.A., Costas, S., 2017. Process-based indicators to assess storm induced coastal hazards. Earth-Science Reviews 173, 159-167.<br><br>Mentaschi, L., Vousdoukas, M.I., Voukouvalas, E., Dosio, A., Feyen, L., 2017. Global changes of extreme coastal wave energy fluxes triggered by intensified teleconnection patterns. Geophysical Research Letters, 2016GL072488.<br><br>http://www.unisdr.org/we/inform/terminology<br><br>Poelhekke, L., Jäger, W.S., van Dongeren, A., Plomaritis, T.A., McCall, R., Ferreira, Ó., 2016. Predicting coastal hazards for sandy coasts with a Bayesian Network. Coastal Engineering 118, 21-34.<br><br>Shope, J.B., Storlazzi, C.D., Hoeke, R.K., 2017. Projected atoll shoreline and run-up changes in response to sea-level rise and varying large wave conditions at Wake and Midway Atolls, Northwestern Hawaiian Islands. Geomorphology 295, 537-550.<br><br>Vitousek, S., Barnard, P.L., Fletcher, C.H., Frazer, N., Erikson, L., Storlazzi, C.D., 2017. Doubling of coastal flooding frequency within decades due to sea-level rise. Scientific Reports 7, 1399.<br><br>Vitousek, S., Barnard, P.L., Limber, P., 2017. Can beaches survive climate change? Journal of Geophysical Research: Earth Surface, 2017JF004308.<br><br>Vousdoukas, M.I., Mentaschi, L., Voukouvalas, E., Verlaan, M., Feyen, L., 2017. Extreme sea levels on the rise along Europe's coasts. Earth's Future, n/a-n/a.<br><br>Vousdoukas, M.I., Voukouvalas, E., Mentaschi, L., Dottori, F., Giardino, A., Bouziotas, D., Bianchi, A., Salamon, P., Feyen, L., 2016. Developments in large-scale coastal flood hazard mapping. Nat. Hazards Earth Syst. Sci. 16, 1841-1853.<br><br>Xian, S.Y., Yin, J., Lin, N., Oppenheimer, M., 2018. Influence of risk factors and past events on flood resilience in coastal megacities: Comparative analysis of NYC and Shanghai. Sci. Total Environ. 610, 1251-1261.<br><br>**Specific Resource Implications for Students**:<br>Computers with internet access should be available at all classes. Students can use their own laptops. Programmes to use include Matlab and other statistical tools |
| **21.** | **Does this module replace existing provision? If so, please indicate modules to be replaced:**<br><br>The module fits in the area of “Environmental Impact and Management” |
| **22.** | **Start Date:** First year, second semester |
| **23.** | **Is it intended that the module be available every year?** Yes |