

| NAME OF THE COURSE  |  | COASTAL OCEANOGRAPHY                     |               |   |                    |    |   |
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| Code  |  | Year of study                            |               | 1., II. semestar  |                    |    |   |
| Course teacher  | Nenad Leder, PhD,<br>Assistant Professor   | Credits (ECTS)                           |               | 5.0   |                    |    |   |
| Associate teachers  |  | Type of instruction<br>(number of hours) |               | L   | S                  | E  | F |
|   |  |  |               | 30  |                    | 15 |   |
| Status of the course  | compulsory   | Percentage of application of e-learning  |               | /   |                    |    |   |
| COURSE DESCRIPTION  |  |  |               |   |                    |    |   |
| Course objectives   | The goal of the course is to acquire knowledge related to the theory of waves, currents and tides, numerical and physical modeling.  |  |               |   |                    |    |   |
| Course enrolment requirements and entry competences required for the course                                       | Undergraduate qualification (6th level of EQF or CROQF).   |  |               |   |                    |    |   |
| Learning outcomes expected at the level of the course (4 to 10 learning outcomes)                                 | <p>The student will:</p> <ul style="list-style-type: none"> <li>- interpret and comment phenomena in the field of physical oceanography of coastal sea.</li> <li>- apply results of observing phenomena in the field of physical oceanography of coastal sea in the design process.</li> <li>- re-examine the impact of these phenomena on the construction of hydraulic structures and facilities.</li> <li>- evaluate the impact of the above issues on the system of environment protection.</li> </ul> |  |               |   |                    |    |   |
| Course content broken down in detail by weekly class schedule (syllabus)  | Introduction. Special topics in physical oceanography: theory of waves, tides and currents. Coastal oceanography. Wind generated surface waves, sea-level oscillations and currents in the Adriatic Sea. Resonant oscillations in the Adriatic Sea. Tsunami. Meteotsunami. Spectral analysis. Theory of extremes. Numerical and physical modelling. Physical oceanography in relation to hydraulics projects in the sea and coast. Instruments. Experimental measurements.                                 |  |               |   |                    |    |   |
| Format of instruction   | <input checked="" type="checkbox"/> <b>lectures</b><br><input checked="" type="checkbox"/> <b>seminars and workshops</b><br><input checked="" type="checkbox"/> <b>exercises</b><br><input type="checkbox"/> <i>on line</i> in entirety<br><input type="checkbox"/> partial e-learning<br><input checked="" type="checkbox"/> <b>field work</b>  |  |               | <input checked="" type="checkbox"/> <b>independent assignments</b><br><input type="checkbox"/> multimedia<br><input type="checkbox"/> laboratory<br><input type="checkbox"/> work with mentor |                    |    |   |
| Student responsibilities  | Regular attendance of classes. Preparation of a written assignment. Oral exam.   |  |               |   |                    |    |   |
| Screening student work ( <i>name the proportion of ECTS credits for each activity so that the total number of</i> | Class attendance   | 1.5                                      | Research      |   | Practical training |    |   |
|   | Experimental work  |  | Report        |   |                    |    |   |
|   | Essay  |  | Seminar essay | 2.0   |                    |    |   |

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| ECTS credits is equal to the ECTS value of the course)                      | Tests  | 0.5 | Oral exam | 0.5                             |                              |  |
|   | Written exam   |     | Project   |                                 |                              |  |
| Grading and evaluating student work in class and at the final exam          | Attending classes and preparation of written assignment (40%). Oral exam (60%):  |     |           |                                 |                              |  |
| Required literature (available in the library and via other media)          | Title  |     |           | Number of copies in the library | Availability via other media |  |
|   | J.A. Knaus: Introduction to Physical Oceanography, Waveland Press, 2005.   |     |           |                                 |                              |  |
|   | B. Cushman-Roisin et al. (Eds): Physical Oceanography of the Adriatic Sea, Kluwer, Dordrecht, 2001.  |     |           |                                 |                              |  |
|   | B. Johns: Physical Oceanography of Coastal and Shelf Seas, Elsevier Oceanography Series, Vol. 35, 1983.  |     |           |                                 |                              |  |
|   | D.T. Pugh: Changing Sea Levels. Effect of Tides, Weather and Climate, Cambridge University Press, 2004.  |     |           |                                 |                              |  |
|   | W.J. Emery, R.E. Thomson: Data Analysis Methods in Physical Oceanography, Pergamon, 1998.  |     |           |                                 |                              |  |
|   | A.B. Rabinovich: Long Ocean Gravity Waves: Trapping, Resonance and Leaking (in Russian), Gidrometeoizdat, St. Petesburg, 1993.   |     |           |                                 |                              |  |
|   | B. Levin, M. Nosov: Physics of tsunamis. Springer, 2009.   |     |           |                                 |                              |  |
|   | M.Tomczak; Lecture Notes in Oceanography, FlindersUniversity,Adelaide, Australia, <a href="http://www.msi.ttu.ee/~elken/IntroOcean_Tomczak.pdf">http://www.msi.ttu.ee/~elken/IntroOcean_Tomczak.pdf</a> , 2012.  |     |           |                                 |                              |  |
|   | L.H. Holthuijsen: Waves in Oceanic and Coastal Waters, Cambridge University Press, 2007.   |     |           |                                 |                              |  |
| Optional literature (at the time of submission of study programme proposal) | <p>1) N. Leder, A. Smirčić, I. Vilibić: Extreme values of surface wave heights in the northern Adriatic, <i>Geofizika</i>, 15, 1-13, 1998.</p> <p>(2) I. Vilibić, N. Leder, A. Smirčić: Storm surges in the Adriatic Sea: An impact on the coastal infrastructure, <i>Periodicum Biologorum</i>, 102, Suppl. 1, 483-487, 2000.</p> <p>(3) Vilibić, I., Domijan, N., Orlić, M., Leder, N., Pasarić, M., 2004. Resonant coupling of a traveling air-pressure wave with the east Adriatic coastal waters, <i>Journal of Geophysical Research – Oceans</i>, 109, C100001; doi:10.1029/2004JC002279.</p> <p>(4) Lončar, G., Leder, N., Paladin, M., 2012. Numerical modelling of an oil spill in the northern Adriatic, <i>Oceanologia</i>, 54 (2), doi:10.5697/oc.54-2.143.</p> <p>(5) Orlić M., Belušić D., Janeković I., Pasarić M., (2010): Fresh evidence relating the great Adriatic surge of 21 June 1978 to mesoscale atmospheric forcing. <i>Journal of Geophysical Research</i> <b>115</b>, C06011, doi: 10.1029/2009JC005777.</p> <p>(6) Orlić, M., Gačić, M, La Violette, P.E., 1992. The currents and circulation of the</p> |     |           |                                 |                              |  |

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|  | <p>Adriatic Sea, <i>Oceanologica Acta</i>, 15, 109-124.</p> <p>(7) Jenkins, G.M., Watts, D.G.: <i>Spectral Analysis and its Application</i>, Holden-Day, San Francisco, 532 pp, 1968.</p> <p>(8) Gumbel, E. J.: <i>Statistics of Extremes</i>, Columbia University Press, New York, pp.501, 1958.</p> <p>(9) Goda, Y., <i>Random Seas And Design Of Maritime Structures</i>, Word Scientific, pp.444, 2000.</p> <p>(10) Goda, Y.: On the methodology of selecting design wave height, Proc. 21<sup>st</sup> Coastal Engineering Conference, ASCE, Costa del Sol – Malaga, Spain, 899-913, 1988.</p> |
| <p>Quality assurance methods that ensure the acquisition of exit competences</p> | <p>Quality assurance will be performed at three levels:</p> <p>(1) University level, through questionnaires; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.</p>  |
| <p>Other (as the proposer wishes to add)</p>                                     |   |