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| **Course** | **Marine invertebrates** | | | | | | | | | | | | | | | | | | | | | **Year** | | | | | 2020/2021 | | | |
| **Study programme** | Sustainable management of aquatic ecosystems | | | | | | | | | | | | | | | | | | | | | **ECTS** | | | | | **5** | | | |
| **Department** | Department of Ecology, Agronomy and Aquaculture | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Level of study programme** | Undergraduate | | | | | | | | Graduate | | | | | | | Integrated | | | | | | Postgraduate | | | | | | | | |
| **Type of study programme** | Single major  Double major | | | | | | | | University | | | | | | | Professional | | | | | | Specialized | | | | | | | | |
| **Year of study** | 1 | | | | | | 2 | | | | | | | 3 | | | | | | 4 | | | | | | | | 5 | | |
| **Semester** | Winter  Summer | | | | I | | | | | | | II | | | | | III | | | | IV | | | | | | | | | V |
| VI | | | | | | | VII | | | | | VIII | | | | IX | | | | | | | | | X |
| **Status of the course** | Compulsory | | | | Elective | | | | | | | Elective course offered to students from other departments | | | | | | | | | **Teaching Competencies** | | | | | | | | | YES  NO |
| **Workload** | **15** | **L** | **15** | | **S** | | | **15** | | **E** | | **Internet sources for e-learning** | | | | | | | | | | | | | | | | | | YES  NO |
| **Location and time of instruction** | **agreement via email** | | | | | | | | | | | **Language(s) in which the course is taught** | | | | | | | | | | | | | | | | | | English |
| **Course start date** | **March 2021** | | | | | | | | | | | **Course end date** | | | | | | | | | | | | | | | | | | **June 2021** |
| **Enrolment requirements** | / | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **Course coordinator** | Bosiljka Mustać | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **E-mail** | bmustac@unizd.hr | | | | | | | | | | | | | | | | | **Consultation hours** | | | | | | | Via email | | | | | |
| **Course instructor** | Bruna Petani | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **E-mail** | bpetani@unizd.hr | | | | | | | | | | | | | | | | | **Consultation hours** | | | | | | | Via email | | | | | |
| **Assistant/Associate** | Ivana Zubak | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **E-mail** | izubak@unizd.hr | | | | | | | | | | | | | | | | | **Consultation hours** | | | | | | | Via email | | | | | |
| **Assistant/Associate** |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **E-mail** |  | | | | | | | | | | | | | | | | | **Consultation hours** | | | | | | |  | | | | | |
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| **Mode of teaching** | Lectures | | | | | | Seminars and workshops | | | | | | | Exercises | | | | | | E-learning | | | | | | | | Field work | | |
| Individual assignments | | | | | | Multimedia and network | | | | | | | Laboratory | | | | | | Mentoring | | | | | | | | Other | | |
| **Learning outcomes** | | | | | | | After completing the course, participants will be able:   1. To compare phylogeny of different marine invertebrate phyla 2. To relate the anatomy and physiology of marine invertebrates 3. To explain the diversity of reproductive methods in marine invertebrates 4. To analyse marine invertebrate adaptations to the environment in which they live 5. Identify the most significant negative anthropogenic impact on complex coralligenous reef/assemblages 6. Explain the purpose of biodiversity conservation of hard-bottom ecosystems 7. Plan measures for preventing aquaculture (fish farm) negative impact on marine wild benthos | | | | | | | | | | | | | | | | | | | | | | | |
| **Learning outcomes at the Programme level** | | | | | | | * - identify the real boundaries that all living organisms and ecosystems have, and what the relationship is to the boundaries of human activity, economy and total growth. * - contribute to the planning of scientific and economic projects related to the aquatic environment, aquaculture, fisheries, protected marine areas, etc. * -critically and with an interdisciplinary approach to contemplate and consider the historical and traditional importance of the management of aquatic resources and coastal zone in the Mediterranean and broader * - manage processes for successful implementation of sustainable management of aquatic organisms in accordance with the latest scientific knowledge and unknown situations * - manage production processes in aquaculture by taking responsibility for strategic decision-making in unpredictable situations * -understand the concept of ecosystem health and ecosystem based management in the marine/coastal and aquatic sector and be familiar with the newest strategies to reach and dynamically adapt the associated management goals | | | | | | | | | | | | | | | | | | | | | | | |
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| **Assessment criteria** | Class attendance | | | | | | Preparation for class | | | | | | | Homework | | | | | | Continuous evaluation | | | | | | | | Research | | |
| Practical work | | | | | | Experimental work | | | | | | | Presentation | | | | | | Project | | | | | | | | Seminar | | |
| Test(s) | | | | | | Written exam | | | | | | | Oral exam | | | | | | Other: | | | | | | | | | | |
| **Conditions for permission to take the exam** | Preparation and presentation of seminars and attendance of laboratory exercises. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Exam periods** | Winter | | | | | | | | | | | | Summer | | | | | | | | | | Autumn­ | | | | | | | |
| **Exam dates** |  | | | | | | | | | | | |  | | | | | | | | | |  | | | | | | | |
| **Course description** | This is a course for introducing students to the marine invertebrate biology, primarily at the level of cellular structures, functions and processes that take place in them. In addition, this course will provide information about their role in the marine ecosystem, and particular attention will be payed to understanding the overall evolution of the animal kingdom. Invertebrates make up the majority of animals on Earth and exhibit a wide range of shapes and adaptations to their living conditions. Invertebrates are animals that have been present on Earth for millions of years, inhabiting every known habitat. Aim of this course is to study marine invertebrates and to introduce students the classification, anatomy, physiology, embryological development and ecology of individual invertebrate phyla. Moreover, one of the main objectives of the course is to train students for planning and implementation of measures to prevent the negative aquaculture (e.g., fish farm) impact on overall marine wild benthos. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Course content** | 1. Introduction 2. Taxonomy 3. Protista 4. Spongia (Porifera) 5. Cnidaria and Ctenophora 6. Mollusca 7. Gastropoda and Bivalvia 8. Cephalopoda 9. Aschelminthes and Annelida 10. Arthropoda 11. Crustacea 12. Echinodermata 13. Metazoan meiofauna biodiversity and biomass response to fish-farm impacts 14. Mariculture of marine invertebrates 15. Biodiversity conservation and benthos protection: hard bottom ecosystems | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Required reading** | Sylvia Mader and Michael Windelspecht, Biology, 13th Edition, 2016.  Jerry G. Walls, Encyclopedia of Marine Invertebrates, 1982.  Brusca RC, Brusca GJ. 2003. Invertebrates. Sinauer Associates, Sunderland, Massachusetts. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Additional reading** | Tyler Carrier, Adam Reitzel, and Andreas Heyland, Evolutionary Ecology of Marine Invertebrate Larvae, 2016.  Trainito E. 2011. Atlante di flora e fauna del Mediterranea. Il Castello. Italy.  Rastelli, E., Petani, B., Corinaldesi, C., Dell’Anno, A., Martire, M. L., Cerrano, C., & Danovaro, R. (2020). A high biodiversity mitigates the impact of ocean acidification on hard-bottom ecosystems. Scientific Reports, 10 (1), 1-13.  Pusceddu, A., Carugati, L., Gambi, C., Mienert, J., Petani, B., Sanchez-Vidal, A., ... & Danovaro, R. (2016). Organic matter pools, C turnover and meiofaunal biodiversity in the sediments of the western Spitsbergen deep continental margin, Svalbard Archipelago. Deep Sea Research Part I: Oceanographic Research Papers, 107, 48-58. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Internet sources** | Lectures on Merlin system | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Assessment criteria of learning outcomes** | Final exam only | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | |
| Final written exam | | | | | | | | | | Final oral exam | | | | | | | | Final written and oral exam | | | | | | | Practical work and final exam | | | | |
| Only test/homework | | | | | Test/homework and final exam | | | | | | | | | Seminar paper | | | | Seminar paper and final exam | | | | | Practical work | | | | | other forms | |
| **Calculation of final grade** | 20% seminar and practical work, 80% final exam | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Grading scale** | ≤ 61% | | | % Failure (1) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 61-70% | | | % Satisfactory (2) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 71-80% | | | % Good (3) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 81-90% | | | % Very good (4) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 91-100% | | | % Excellent (5) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Course evaluation procedures** | Student evaluations conducted by the University  Student evaluations conducted by the Department  Internal evaluation of teaching  Department meetings discussing quality of teaching and results of student evaluations  Other | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Note /Other** | In accordance with Art. 6 of the *Code of Ethics* of the Committee for Ethics in Science and Higher Education, “the student is expected to fulfil his/her obligations honestly and ethically, to pursue academic excellence, to be civilized, respectful and free from prejudice.”  According to Art. 14 of the University of Zadar's *Code of Ethics*, students are expected to “fulfil their responsibilities responsibly and conscientiously. […] Students are obligated to safeguard the reputation and dignity of all members of the university community and the University of Zadar as a whole, to promote moral and academic values and principles. […]  Any act constituting a violation of academic honesty is ethically prohibited. This includes, but is not limited to:  - various forms of fraud such as the use or possession of books, notes, data, electronic gadgets or other aids during examinations, except when permitted;  -various forms of forgery such as the use or possession of unauthorised materials during the exam; impersonation and attendance at exams on behalf of other students; fraudulent study documents; forgery of signatures and grades; falsifying exam results.”  All forms of unethical behaviour will result in a negative grade in the course without the possibility of compensation or repair. In case of serious violations the *Rulebook on Disciplinary Responsibility of Students at the University of Zadar* will be applied.  In electronic communications only messages coming from known addresses with a first and a last name, and which are written in the Croatian standard and appropriate academic style, will be responded to.  This course uses the Merlin system for e-learning, so students are required to have an AAI account. /*delete if necessary*/ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |