

Main course information	
Academic subject	Biology of Aquatic Plants
Degree course	Environmental Biology
Classe di laurea	LM/6
ECTS credits (CFU)	5
Compulsory attendance	Strongly recommended
Teaching language	Italian
Accademic Year	2019/2020

Docente responsabile	
Name & SURNAME	Antonella Bottalico
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Tutorial time/day	Wednesday 9 am-1pm at the Plant Biology Section of the Department of Biology (2 <sup>nd</sup> floor); further office hours should be planned with the teacher by telephone or by mail.

Course details	Study area	SSD code	Type of class
			BIO/01

Teaching schedule	Year	Semester
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Modalità erogazione	CFU/ECTS	Lessons (hours)	CFU/ECTS lab	Lab hours	CFU/ECTS tutorial/workshop	Tutorial/workshop hours	CFU/ECTS field trip	Field trip Hours
		4.5	36	0.5	6	0	0	0

Time management	Total hours	Teaching hours	Self-study hours
		125	42

Academic Calendar	First lesson	Final lesson

Syllabus	
Course entry requirements	Only basic knowledge of Botany is required,.
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	
<i>Knowledge and understanding</i>	Students are required to know the morphological, ultrastructural and reproductive characteristics of main groups of aquatic plant organisms. They will have to know about plant communities in different aquatic environments, also in relation to the influence of anthropic impact and climatic fluctuations. This knowledge will be acquired through lectures.
<i>Applying knowledge and understanding</i>	Students must be able to apply tools and methodological approaches in order to identify different groups of aquatic plants, understand their main functions and adaptations in relation to the environment. They will also have to acquire tools for the conservation and management of plant communities and for the evaluation of the ecological status of water bodies using macrophytes. These skills will be acquired through lectures and laboratory activities.
<i>Making informed judgements and choices</i>	Students will have to gain autonomy in relation to the ability to: (a) recognize aquatic plant organisms; (b) analyze interactions of aquatic plants with biotic and abiotic factors; (c) interpret their responses to anthropogenic pressures. Guided classroom discussion and both individual and group work in laboratory activities will be encouraged to

	develop judgment autonomy, but also other transversal skills such as communication and learning skills, as well as collaboration among students.
<i>Communicating knowledge and understanding</i>	Students will be able to present the acquired knowledge with a vocabulary and terminology appropriate to the discipline in order to improve the expression ability. During the course, students will be encouraged to exchange information and interact with the teacher and other students.
<i>Capacities to continue learning</i>	Students will be able to understand and critically discuss important aspects of biology and ecology of aquatic plants. They will be able to autonomously extend the acquired knowledge by reading and understanding specific texts. They will also be able to use the newest topics of scientific papers related to the field of interest. The development of this ability will take place through classroom discussion and encouragement to use tools with new digital and information technologies.

<b>Syllabus</b>	
Course content	<p>Plant organisms and the aquatic environment. Phytoplankton, Phytobenthos, Pleuston: composition and ecological meaning. Harmful algal blooms (HABs). Toxic microalgae and main biological contaminations. Non-indigenous and invasive plant species. Mucilages and eutrophication. Fully submerged marine hydrophytes. Partially submerged marine hydrophytes: mangroves and salt marsh grasses. Endosymbiotic microalgae. Plant organisms as bioconstructors. EU legislation about waters: Water Framework Directive and Marine Strategy. Plant communities of marine-coastal waters and transitional waters. Ecological status indices based on macrophytes: CARLIT, Ecological Evaluation Index, Macrophyte Quality Index, PREI Index. Sampling methodologies.</p> <p>Laboratory activities: application of ecological status indices based on macrophytes; identification of main species of marine and brackish angiosperms and seaweeds; morphometric and lepidochronological analysis of <i>Posidonia oceanica</i>.</p>
Course books/Bibliography	G. Pasqua, G. Abbate e C. Forni, Botanica generale e diversità vegetale. IV Edizione. Padova: Piccin Nuova Libreria, 2019.
Notes	Lacking a text which includes all the topics of the course, the teacher suggests the consultation of a general book and provides the lecture material (multimedia presentations).
Teaching methods	<p>The course is structured in lectures and laboratory activities.</p> <p>For lectures, the teacher will use multimedia presentations including video clips. The "flipped classroom" will also be proposed. In a preliminary phase, students will be able to use material provided by the teacher about specific topics of the course; using new digital devices, these topics will be analyzed in depth by using web sites or scientific papers and presented to the classroom as interactive seminars (possibly also in English); the teacher will conduct the discussion based on the material collected by the students, in order to generate new knowledge together with them.</p> <p>Laboratory activities will include individual and/or group work; students will be able to apply the studied methods and develop a critical analysis and self-assessment skills.</p>
Assessment methods (indicate at least the type written, oral, other)	The assessment of students is based on an oral examination that also takes into account the participation in lessons and classroom discussions during the course. The exam consists of a series of three to four questions that require the discussion of a topic linked with other topics in order to evaluate: a) the acquired knowledge, b) reasoning and communication skills, c) the ability to solve practical problems in accordance with the indications of Dublin descriptors. Moreover, students will have to identify some plant specimens analyzed during the lab activities. For the final grade, communication skills, the ability to link different topics and to synthesize will be evaluated.
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement)	<p><b>Knowledge and understanding</b></p> <p>Students must demonstrate to know appropriately, correctly and congruently all the topics of the course, with particular regard to the biology and the ecological role of aquatic plants (algae and phanerogams). They will also have to know methods and techniques of identification for aquatic plants and the biodiversity of plant</p>

<p>there are</p>	<p>communities in coastal environments, with particular reference to the Mediterranean, considering interactions with the environment. Knowledge of these topics is essential for passing the exam.</p> <p><b>Applying knowledge and understanding</b>  Students must be able to identify different taxonomic groups of aquatic plants and apply the acquired knowledge in ecological studies. These skills are essential for passing the exam.</p> <p><b>Making informed judgements and choices</b>  Students must demonstrate to have acquired the ability to interpret and critically assess experimental data and ecological implications, creating logical connections in the exposition and consequentiality in the connection of contents, in addition to the ability to establish a coherent general discourse with appropriate links also with a multidisciplinary connotation. In this way, students will have a very positive evaluation of the exam.</p> <p><b>Communicating knowledge and understanding</b>  The appropriate use of a specific language, the analysis of experimental data and synthesis ability will be positively evaluated. These skills guarantee a very positive assessment of the exam.</p> <p><b>Capacities to continue learning</b>  During the final exam, students will be able to discuss problems in a constructive manner and to solve situations related to the field of aquatic plants, demonstrating an in-depth analysis of the issues carried out autonomously by consulting specific scientific publications and databases. This will determine a highly positive assessment of the final exam.</p>
<p>Further information</p>	