

Syllabus

Course	Course Code	Course Credits	Course Year
MARINE MOLECULAR BIOLOGY	F7502Q019	6	2
Lecturers: Dott. Boeger Walter - Dott. Orlandi Ivan			
Contents: Principles and applications of molecular tools (including genomics, transcriptomics and proteomics) for the study of marine ecology.			
References: Teaching materials prepared by the Lecturer and specialised books suggested at the beginning of the course.			
Aims: This course introduces the basic aspects of the molecular and cellular biology of marine organisms. Topics include the methodology and applications of basic molecular biological as a means of examining ecosystem-wide biological processes.			
Recommended a priori knowledge:			
Teaching form: - Lessons: 3+3 credits Period: first semester			
More information: Website: www.marinesciences.unimib.it			
Examination type: - Oral examination - Written and Oral examination Mark range: 18-30/30			
Syllabus: <ul style="list-style-type: none"> Introduction <ul style="list-style-type: none"> • Organization and structure of genomes. • Principles of molecular evolution of genes. • Relationship between gene regulation and biological functions. • Phylogenetic relationships among marine organisms 			

Molecular tools for marine biology and ecology

- Marine ecological genomics:
 - Genome sequencing methods: dideoxy procedure, primer walking, pyrosequencing, use of reversible chain terminators, sequencing by ligation, large-scale DNA sequencing methods: shot-gunning strategy for sequencing genomes, cyclic array
 - sequencing whole genome sequencing of key organisms, genome comparison for phylogeny, genomic analysis of natural communities, genomic analysis of communities (genome ecology),
 - Polymerase Chain Reaction (PCR): principles and application in marine ecology
 - Species identification by barcoding.

- Transcriptomic:
 - Quantitative real-time polymerase chain reaction (QPCR): principles and probes;
 - Absolute and quantitative analyses
 - RNase protection-based assays
 - cDNA suppression subtractive hybridization (SSH)
 - DNA arrays: cDNA and oligonucleotide arrays
 - Comparative approaches to cellular functions based on molecular analyses.

- Proteomic:
 - Preparation of protein samples from bacteria, plants and animal tissues.
 - SDS PAGE and protein detection by Western analysis.
 - 2D gel electrophoresis: 2D protein patterns, mass spectrometry and comparative analyses.

- Lessons: 1 credits = 7 hours

- Tutorials: 1 credits = 12 hours

- Field activities: 1 credits = 10 hours