Universida_{de}Vigo

Subject Guide 2023 / 2024

IDENTIFYIN	YING DATA		
Marine gen	jenetic resources		
Subject	Marine genetic		
Carla			
Code			
Study	Grado en Ciencias		
programme Descriptors	ne del Mar	Quadmostar	
Descriptors	ris ECTS Credits Choose fedr	Quadmester	
Tapahing	0 Optional 4th	2110	
languago	#EnglishFriendly		
language	Galician		
Department	ent		
Coordinator	or Presa Martínez Pablo		
Lecturers	Presa Martínez, Pablo		
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General	English Friendly subject: International students may request from the teachers:		
description	a) resources and bibliographic references in English, b) tutoring sessions in Eng	lish, c)	
·	exams and assessments in English.		
	The "Marine Resources" appear with frequency in the profile of the Marine Scier	nces Degree. They are thus a	
fundamental object of academic study and of professional management. The central role of the marine has to be dealt from industrial, technological, physical-chemical, oceanographic and biological (Biocher			
	biological resources as much from the natural point of view (genetic conservation view from an intensive production (aquaculture). ¿Where is the point of elabora exploitation on economic feasibility, technical and sociological viability if the resignetic diversity to adapt to environmental challenge, to allow strategies of ger it at its reproductive optimum?. Genetics plays as a central paper in the manag whose knowledge can not be obviated given the actual current easy going anal	a in the management of the on) as from the exploitation ting a complex plan of source lacks the sufficient netic selection or simply to keep ement of living resources, yses of the genomes.	
Training an	and Learning Results		
Code			
A1 Student educati	lents have demonstrated knowledge and understanding in a field of study that build cation, and is typically at a level that, whilst supported by advanced textbooks, inclu med by knowledge of the forefront of their field of study	ls upon their general secondary udes some aspects that will be	

A2 Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study

A3 Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues

- B1 Know and use vocabulary, concepts, principles and theories related to oceanography and apply everything learned in a professional and/or research environment.
- B2 Plan and execute surveys in the field and laboratory work, applying basic tools and techniques for sampling, data acquisition and analysis in the water column, sea bottom and marine substratum.
- B3 Recognize and implement good practices in measurement and experimentation, and work responsibly and safely both in field surveys and in the laboratory.
- B4 Manage, process and interpret the data and information obtained both in the field and in the laboratory.
- c1 know at a general level the fundamental principles of sciences: Mathematics, Physics, Chemistry, Biology and Geology.
- C9 Acquire basic knowledge about the structural and functional organization and the evolution of marine organisms.

C10 Know the biological diversity and functioning of marine ecosystems.

- C11 Apply the knowledge and techniques acquired to the characterization and sustainable use of living resources and marine ecosystems.
- D1 Develop the search, analysis and synthesis of information skills oriented to the identification and resolution of problems.
- D2 Acquire the ability to learn autonomously, continuously and collaboratively, organizing and planning tasks over time.

Expected results from this subject					
Expected results from this subject		Training and Learning			
			Results		
Cognitive (knowledge): comprehension of the concepts and the basic processes of genetic	A1	Β1	C1	D2	
variability, genetic differentiation and evolutionm and divergence of the species in qualitative and quantitative genetic characters.			C9		
Procedures/Instrumental (know-how): to obtain and to organise information; to design experiments A		B2	C10	D1	
and interpreting results; to apply molecular techniques to practical cases of management of		B3	C11		
marine genetic resources; to analyse and tp characterise DNA samples; to perform computational phylogenetic analyses.		B4			
Transversal abilities: Critical reasoning; autonomous work and team work; capacity to carry knowledge into practice; computational analytical solvency; professional interpersonal communication.	A2	B1	C11	D5	

Contents	
Торіс	
INTRODUCTION	Presentation of the subject. Evaluation of the level of genetic knowledge of the students. Analysis of the program. Taking of decisions on the process of learning and the system of evaluation of the course. Review of basic genetic concepts.
CHAPTER I. Genetic variability.	Origin and maintenance of the genetic variability. Mendelian analysis and relations between alleles. Genic interaction. Genetic analysis of the continuous variation and biometric methods of Quantitative Genetics. Genetic improvement in aquaculture.
CHAPTER II. Population genotyping.	Strategies of genotyping for populations. Types of molecular polymorphisms. Register and tabulation of the polymorphism.
CHAPTER III. Populational genetic structure.	The ideal population and the populational equilibrium. Systematic factors of change: mutation, migration, selection. Factors of random change or dispersive: drift and endogamy. Computational basis of populational structures.
CHAPTER IV. Management of marine genetic resources.	Structural genetics in fishery management. Genetic evaluation. Genetics and genomics in the management of fisheries. Genetic management in aquaculture. Genetic management of biological invasions.
PRACTICE 1. Identification of marine species with genetic markers diagnostic.	Amplificacion Of DNA, migration by electroforesis of PCR products, interpretation of genetic patterns. Bioinformatic analysis of interspecific allocation and phylogenetic inference. Scientific and industrial applications of the genetic assignment.
PRACTICE 2. Calculation of populational genetic structures of marine species.	Populational genotyping, tabulation of data. Bioinformatic computation of genetic structures and connectivity between fish stocks with Bayesian methods. Scientific and industrial applications of the genetic structure.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	18	25	43
Practices through ICT	8	4	12
Laboratory practical	12	6	18
Seminars	12	12	24
Problem and/or exercise solving	0	14	14
Report of practices, practicum and external	practices 0	6	6
Presentation	1	10	11
Objective questions exam	2	16	18
Debate	2	2	4
*The information in the planning table is for	guidance only and does no	t take into account the het	erogeneity of the students.

Methodologies

	Description
Lecturing	The professor will present the conceptual basis of each subject and the strategies of the corresponding calculation process. The student will apprehend such concepts by means of the bibliographic query and daily exercises.
Practices through ICT	The students will analyse the experimental data of their previous practices in the laboratory, using specific software and on-line servers.

Laboratory practical	The educational guide of the practices will allow to develop several experiments for the genetic traceability of marine products and genotyping the populations for the calculation of the structure of fisheries.
Seminars	Students will solve out practical cases in the classroom, which are associated to each theoretical concept, analytical technique or biological situation of marine genetic resources.

Personalized assistance	
Methodologies	Description
Practices through ICT	There will be a personalised attention according to the needs of each student
Lecturing	The questions or synchronous explanations are part of the participatory class.
Laboratory practical	The personalised guide will apply according to the needs of each student.
Seminars	Seminars allow to identifying the understanding or executive difficulties of each student in real time.
Tests	Description
Problem and/or exercise solving	The face-to-face virtual tutorship will be held syncronously or asyncronously, by email and by the virtual classroom of remote campus UVIGO, respectively.
Report of practices, practicum and external practices	A predesigned protocol will be presented during the lab. practices for the preparation of the final report.
Presentation	The rules of an efficient presentation will be discussed in order to work out an outstanding dissemination of the practical case assigned to each student.

Debate

Assessment						
	Description	Qualification	- Le	Trair arnii	ning a ng Re	nd sults
Problem and/or exercise solving	Daily execution of exercises from each class, for its conceptual apprehension; consists on problems, multiple questions or practical cases with simple mathematical applications.	20	A3	B2 B3	C9 C11	D2
Report of practices, practicum and external practices	Preparation of a report of the practice made, with illustrations of the proofs, statitistical tests performed and the conclusions.	20	A1	B4	C10	D1
Presentation	Presentation and defence in class of the practical case assigned. The teacher will evaluate the effort, the clarity of the presentation, the structure of the work and the argumentative level of the conclusions.	20	A2	B1 B4	C11	D1 D2 D5
Objective questions exam	Written exercise of short practical questions comprising the main phenomena studied in the course.	30	A1 A2 A3	B1 B2	C1 C11	D1
Debate	Active participation in classes, seminars and practices, with reasoning and scientific and ethical position on the exploitation of living marine resources.	10	A1 A3	B1	C10	D5

Other comments on the Evaluation

Continuous evaluation option (regular): the contents taught in the master classes and in the experimental and computer practices, will be evaluated respectively through the daily resolution of homework (electronic correction), the execution and attitude towards the practices (performance face-to-face), the final report of the practices (memory correction) and the oral defense of the practical case (on the established day of the last problems seminar). In addition, an exam of objective questions is proposed for all students with a weight of 30% of the final grade.

Global assessment option: for those students who were unable to follow the subject daily in person for personal or work reasons, an extraordinary written test will be given, coinciding on the date and place with the regular continuous assessment written exam. Given the experimental nature of the practices, attendance at them is mandatory to be eligible for this evaluation option.

Extraordinary evaluation option (2nd opportunity): it is carried out on the second date of July of the academic year and its requirements do not differ from the continuous evaluation or the global evaluation, that is, it is necessary to previously carry out the practices and they are maintained. the marks of the continuous evaluation obtained during the course, except those of the written exam of the first call.

The date, time and place of the evaluation tests will be published on the official website of the Faculty of Marine Sciences: http://mar.uvigo.es/alumnado/examenes/

Sources of information Basic Bibliography

Hedrick, P.W., Genetics of Populations, 4th, Jones & amp; Bartlet Publ, 2011

Avise, J., Molecular Markers: Natural Hist ory and Evolution, 2nd, Sinauer Associates Inc.,U.S., 1994

A. Moya y A. Fontdevila, Introducción a la genética de poblaciones, New edition, Sintesis Editorial, 2018

Matthew Hahn, Molecular Population Genetics, 1st, Oxford University Press Inc, 2018

Andy Beaumont , Pierre Boudry, Kathryn Hoare, **Biotechnology and Genetics in Fisheries and Aquaculture**, 2nd, John Wiley and Sons Ltd, 2010

Complementary Bibliography

Recommendations

Other comments

The students immatriculated in this subject would need to have previous knowledge on the nature of the hereditary material (DNA), i.e. structure, transmission rules and evolution, tackled in the subject Biology of the first course of the Degree. It is advisable to account for basic knowledge of calculation of probabilities, proofs of significance (e.g. the test of chi-square), and the concepts and calculations of regression and analysis of variance. The dynamics of fisheries and the marine biological cycles, are as well essential to understand the connectivity of the exploited fishery stocks.