



## IDENTIFYING DATA

### Biology: Evolution

Subject	Biology: Evolution			
Code	V02G031V01101			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Rolán Álvarez, Emilio			
Lecturers	Díez Ferrer, José Bienvenido Megías Pacheco, Manuel Navarro Echeverría, Luis Rolán Álvarez, Emilio Velando Rodríguez, Alberto Luís			
E-mail	rolan@uvigo.es			
Web	<a href="http://http://evolucion.webs7.uvigo.es/index.html">http://http://evolucion.webs7.uvigo.es/index.html</a>			
General description	English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

WEB PAGE of divulging where find good part of the contents of the matter

## Training and Learning Results

Code	
A1	Students should prove understanding and knowledge in this study field that starts in the Secondary Education and with a level that, even though it is supported in advanced books, also includes some aspects that involve knowledge from the vanguard of the study field.
A2	Students should know how to apply their knowledge to their work or vocation in a professional way. They also should have the competences that are usually proved through the elaboration and defence of arguments and the resolution of problems within their study field.
B2	Manage scientific-technical information using diverse and reliable sources. Analyze data and documents and interpret them critically and rigorously, including considerations on their social relevance and in the professional field of Biology.
B6	Develop analysis and synthesis, critical reasoning and argumentation skills, applying them in Biology and other scientific-technical disciplines.
C1	Solve problems by applying the scientific method, the concepts and terminology specific to biology, mathematical models and statistical and computer tools.
C2	Identify levels of organisation of living beings through the study of current specimens and fossils. Carry out phylogenetic analyses and study the mechanisms of heredity, evolution and biodiversity.
C6	Understanding and integrate the functioning of living beings (cellular, tissue, organ and individual level), explaining their homeostatic and adaptive responses.
C7	Sampling, characterising, cataloguing and managing natural and biological resources (populations, communities and ecosystems).
D3	Commitment to sustainability and the environment. Equal, sensible and efficient use of resources.

## Expected results from this subject

Expected results from this subject	Training and Learning Results			
Recognise the proofs that confirm the existence of biological evolution.	A1	B2	C7	D3
	A2	B6		
Recognise the mechanisms that determine the biological evolution.	A1	B2	C2	
		B6		
Gather an integral vision of the history of the life and of his moments more determinants by means of the study of the register fossil and the current organisms.		B2	C6	

Recognise the main hypotheses and existent proofs in relation to the evolution of our own species.	A1 A2	B2 B6
Recognise, examine, and identify specimens fossils and his applications.	A1	B2 C7
Identify and give to know the adaptations of the living beings.	A1 A2	C1 C6
Recognise the social projection of the evolution and his repercussion in the professional exercise, as well as know give to know his contents to give teaching and during his divulging.	A1	B6
Recognise and reproduce the concepts and own basic terminology of the evolutionary theory.	A1	B6

## Contents

Topic	
Introduction (3 hours)	<p>1. Evidences on the evolution. Concept of Evolution. Evidences of the fact of the evolution.</p> <p>2. History of the evolutionary ideas. From the antiquity until the modernity. Charles Darwin and the eclipse of the Darwinism. The modern evolutionary synthesis. The evolution in the century 20. The actuality.</p> <p>3. Evolution and society. Current applications of the evolutionary theory. The evolution and the religion.</p>
The evolutionary mechanisms (10 hours)	<p>4. Introduction to the evolutionary theory. Structure of the theory. Mutations. It derives genetic. Migration. Natural selection.</p> <p>5. Natural selection and adaptation. The characters object of the selection. Some basic concepts: natural selection, biological efficiency and adaptation. *Plasticidad *fenotípica And adaptation. Types of natural selection.</p> <p>6. Measure of the natural selection. The natural selection and his practical decomposition in components. The measure of the selection in qualitative characters. The measure of the selection in quantitative characters. The sexual selection and his measure. Potentiality and limit of the natural selection.</p> <p>7. Cooperation and conflict. The cooperation and the altruism. The study of the evolutionary conflict.</p>
The species and his evolutionary interactions (3 hours)	<p>8. Species and speciation. Concept of species and of reproductive isolation. The measure of the reproductive isolation. The origin of species.</p> <p>9. Coevolution. Interactions between species and natural selection. Negative Coevolution: predation, parasitism and competition. *Positive Coevolution: mutualism and symbiosis.</p> <p>10. Evolution and development. Deveolpment in model organisms. Evo-Devo tools. Evo-Devo example. Canalization and convergence.</p>
I register fossil (4 hours)	<p>11. Nature and meaning of the register fossil. Importance and representativeness of the register fossil.</p> <p>12. Relation between the history of the life and the earth. The main biological events along the geological history.</p>
Origin and diversification of the life (9 hours)	<p>13. The origin of the life. Data theories and problems.</p> <p>14. The tree of the life. Tools and methods of inference.</p> <p>15. Bacteria, arch and eukaryotic. Evolutionary relations.</p> <p>16. Origin and diversification of multicellular organisms. Origin and consequences of the multicellularity.</p> <p>17. Macroevolution. Patterns and explanation of the macroevolution.</p>

Human evolution (6 hours)

18. The human lineage: evolutionary history of primates and hominids. I register fossil and studies of ancient genetic material.

19. Evolution and diversity of human characters. Brain and language, Theory of the mind. Vital strategies: evolutionary commitments, senescence.

20. Social evolution in hominids. Systems of mating and sexual selection. Familiar selection. Cooperation and altruism.

### Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	13	26	39
Studies excursion	3	6	9
Lecturing	36	54	90
Objective questions exam	2	10	12

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

### Methodologies

	Description
Laboratory practical	<p>They will make practices of 3 or 4 hours each one:</p> <ol style="list-style-type: none"><li>1. Recognition and interpretation of the register fossil (3 hours). The students will confront to a real stratigraphic series, with included fossils in his taphonomic environment and will have to learn the keys of his interpretation.</li><li>2. Phylogenetic analysis (3 hours). The main aims of the activity is that the students learn to apply the tools but simple of phylogenetic analysis. For this used a small group of data of different species, and selecting the characters, will expose a phylogenetic hypothesis of this group of organisms, with the end to make the evolutionary interpretations between the groups.</li><li>3. Human evolution (4 hours). One of the main tools of the human evolution is the comparison of skulls of different hominid species. The practice will allow that the students infer the evolutionary relations in the human lineage using a collection of replies of skulls fossils. Besides, it will retort an experiment on social selection in humans with the end to know and interpret the evolutionary studies on the human behaviour.</li><li>4. Practice of visualisation of videos (3 hours). Format of audiovisual communication and evolutionary divulging. Viewing of series of evolutionary videos. Discussion and review of concepts and evolutionary mechanisms. Preparation of report of understanding of the videos visualised by the student. Explanation of the protocol of preparation of scripts to make short videos. Preparation, by part of the student, of a script for an evolutionary video.</li></ol>
Studies excursion	<p>The students displaced to a zone of the intertidal rocky shore (Coast of Cape Estai) with the instruction to observe copulas in situ of one or several species to be able to estimate the component of sexual efficiency for any trait of easy determination as it is the colour of the shell. Also they will study for the same characters the frequency of the same in different stadiums of the cycle of life, with the instruction to estimate the component of feasibility.</p>
Lecturing	<p>The matter of the lecturer will be taught to students by means of magistral classes, prepared with the presentation of some occasional professional video. The students will be presents in shape of an alone face-to-face group. In the educational platform will be able to have of didactic material of support, presentations in pdf, etc. Also will have of the information (still is not complete) explained in shape of text and images in the web page that is developing for the subject: <a href="http://evolucion.webs7.uvigo.es/">http://evolucion.webs7.uvigo.es/</a></p>

### Personalized assistance

Methodologies	Description
Studies excursion	<p>The students will have of time of *tutoría of skilled attention, with schedules and location described for each professor in the educational platform, where will be able to clear doubts arisen during the realisation of the exit of study.</p>
Lecturing	<p>The students will have of time of *tutoría of skilled attention, with schedules and location described for each professor in the educational platform, where will be able to clear doubts arisen during the masterclasses.</p>

### Assessment

	Description	Qualification	Training and Learning Results		
Laboratory practical	The responsible professor will evaluate each practice by means of report written, survey or practical work depending on each case.	20	B2 B6	C1 C2 C6 C7	
Studies excursion	The evaluation will make by means of an individual survey made in the corresponding educational platform	5	B2 B6	C1 C2 C7	D3
Lecturing	At the end of course will make a type test prove (preferably) but that also can carry any practical problem.	40	A1 A2	B2 B6	C1 C2 C6
Objective questions exam	You will make 2 partial, to half of course and at the end (before the final proof type test (see Lecturing). In this case they will do questions, preferably, of concept and of short answer.	35	B2 B6	C1 C2 C6	

### Other comments on the Evaluation

#### CONTINUOS EVALUATION:

This is the normal way of evaluation and the system has been designed to obtain the better qualifications. The assistance to Laboratory practice (field excursion as well) and to the Objective question exam is COMPULSORY, lose some practice or partial without justification. It could be sufficient reason to fail the final evaluation of the same.

The model of normal evaluation goes through to present to:

1. Practices (including gone out of study) and his corresponding method of evaluation.
2. Partials (Objective question exams). These are two exams from different contents of the lecture.
3. Lecturing Final (including all contents of the lecture).

To pass the lecture any student may get a minimum qualification of 5 in average and larger than 3 in any part.

#### SECOND OPORTUNITY:

The second oportunity exam is a new final test exam, while the rest of qualifications (Practice, Partials) will be hold during the same course.

#### GLOBAL EXAM:

Nevertheless, It may be possible to do just a final writting exam for the whole former activities. However, this may be agreed with the lecture coordinator at the beginning of the course (before the deadline existing in the faculty). This final alternative consist in a single written exam that included evaluatioon of all the former parts: laboratory practices, studies excursion, lecturers, Objetcive question exams, etc). This exam will be presented in the same dates than the final exam dates (first and second option). To pass the student may get larger than 5 in average and alrger than 3 in any part.

#### EXAM DATES AND TIMES:

The times of the course activities can be obtained from the Faculty WEB page: <https://bioloxia.uvigo.es/es/docencia/horarios/>

The dates and classrooms of the examinations will appear in the following WEB direction from the start of the course: <http://bioloxia.uvigo.es/es/docencia/examenes/>

#### Sources of information

##### Basic Bibliography

Megias, Gefaell y Rolán-Alvarez, **Evolución**: <http://evolucion.webs7.uvigo.es/index.html>, Universidade de Vigo, actualización contin

##### Complementary Bibliography

Freeman y Herron, **Análisis evolutivo**, 2 edición, Pearson Educación, 2002

Futuyma, **Evolution**, 2 Edición, Sinauer associates, 2009

Boyd y Silk, **How Humans Evolved?**, 4 Edición, Norton and co., 2005

Fontdevila y Moya, **Evolución: origen, adaptación y divergencia de las especies**, 1 Edición, Síntesis, 2003

Dopazo y Navarro, **Evolución y adaptación: 150 años después del origen de las especies**, Obra propia (difusión gratuita), 2009

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**Recommendations**

**Subjects that continue the syllabus**

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Genetics I/V02G031V01209

Zoology 1: Non-arthropod invertebrates/V02G031V01205

Zoology 2: Arthropod invertebrates and chordates/V02G031V01210

Ecology II/V02G031V01306

Genetics II/V02G031V01304

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