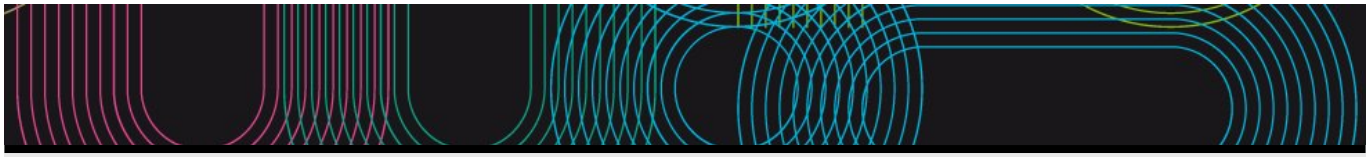

IDENTIFYING DATA				
Biology: Evolution				
Subject	Biology: Evolution			
Code	V02G030V01101			
Study programme	(*)Grao en Bioloxía			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Spanish Galician			
Department				

Coordinator	Rolán Álvarez, Emilio
Lecturers	Arenas Busto, Miguel Díez Ferrer, José Bienvenido Estévez Barcia, Daniel Megías Pacheco, Manuel Navarro Echeverría, Luís Posada González, David Prieto Fernández, Tamara Rodríguez Martín, Bernardo Rolán Álvarez, Emilio Velando Rodríguez, Alberto Luís
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General description	It intends that the students that study this subject purchase a global vision of the evolution and of the his conceptual and methodological bases. The students will owe to arrive to reach the following general objectives: - Learn and apply the *pautas of the scientific methodology and in concrete of the scientific reasoning. Identify interpretations **pseudocientíficas. - Understand the main evolutionary mechanisms, in particular the natural selection. - Understand the main hypotheses envelope to origin of the life and know in bold strokes the history of the life. - Comprise the register fossil how palpable testimony of the history of the life in the our planet (*alternativamente, how proof of the evolution of the be alive from his origins tie the actuality), his meaning and his applications. - Understand the biological processes, climatic and ecological conditioned our appearance how species, as well as his evolutionary history and the consequences that carries our biological inheritance.

Competencies	
Code	
A1	Students should prove understanding and knowledge in this study field that starts in the Secundary Education and with a level that, even though it is suppported 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.
A3	Students should prove ability for information-gathering and interpret important data (usually within their study field) to judge relevant social, scientific or ethical topics.

A4	Students should able to communicate information, ideas, issues and solutions to all audiences (specialist and unskilled audience).
B2	Ability of reading and analizing scientific papers and having critical assessment skills to understand data collection, deducing the main idea from the least relevant ones and basing on the correponding conclusions.
B3	Acquisition of general knowledge about the basic subjects of biology, both at theory and experimental level, without dismissing a higher specialization in subjects that are oriented to a concrete professional area.
B4	Ability in handling experimental tools, both scientific and computer technology equipment that support the search for solutions to problems related to the basic knowledge of biology and with those of a concrete labour context.
B7	Collection of information about issues of biologic interest, analysis and emission of critical opinions and reason them including the reflection about social and/or ethical aspects related to the issue.
B10	Development of analytic and abstraction skills, the intuition and the logical and rigorous thought through the study of biology and its uses.
B11	Ability to communicate in detail and clearly: knowledge, methodology, ideas, issues and solutions to all audiences (not only qualified but unskilled in Biology).
B12	Ability to identify their own educational necessities in the biology field and in concrete labour areas and to organize their learning with a high grade of autonomy in any context.
C1	Obtaining, managing, preserving, describing and identifying current biological organisms and fossils.
C2	Recognizing different levels of Living systems organization. Performing phylogenetic analysis and identifying evidence of evolution.
C10	Analysing and assessing the adaptation of living beings to the environment.
C28	Teaching and sharing knowledge and resources related to Biology
C32	Knowing and handling basic or specific key concepts and terminology
C33	Understanding the social projection of Biology.
D1	Development of capacity of analysis and synthesis
D2	Acquisition of the organization and planning capacity for tasks and time
D3	Development of oral and writting communication abilities
D5	Use of computer resources related to the study field
D6	Research and interpreting of information from different sources
D9	Ability to work in collaboration or creating groups with an interdisciplinary character
D10	Development of the critical thinking
D11	Adquisition of an ethical agreement with the society and the profession
D12	Respectful behaviour to diversity and multiculturalism
D13	Sensitivity for environmental issues
D14	Adquisition of abilities in the interpersonal relationships
D16	Acceptance of a quaility commitment

Learning outcomes

Expected results from this subject	Training and Learning Results			
Know the proofs that confirm the existence of biological evolution	A1 A2 A3 A4	B2 B3 B4 B7 B10 B11 B12	C10 C28 C32 C33	D1 D3 D5 D6 D10 D11 D12 D13 D16
Comprise the mechanisms microphone and *macroevolutivos that determine the biological evolution.	A1 A2 A3 A4	B3 B4 B7 B10 B11 B12	C1 C2 C10 C28 C32 C33	D2 D3 D5 D6 D9 D10 D11 D12 D13 D14 D16
Obtain an integral vision of the history of the life and of the his more determinant moments by means of it study of the register fossil and the current organisms	A1 A2 A3 A4	B3 B11	C1 C2 C10 C28 C32 C33	D2 D6 D9 D11 D12

Know the main hypotheses and existing proofs in regard to the evolution of ours @propio species	A1 A2 A3 A4	B3 B4 B10 B11	C1 C2 C10 C28 C32 C33	D5 D11 D12 D13
Apply the knowledges of evolution to obtain, handle, *conservar, describe and identify *especímenes fossils and his applications	A1 A2 A3 A4	B3 B4 B7 B10 B11 B12	C1 C2 C28 C32 C33	D1 D2 D6 D9 D10 D11 D12
#Analyze and interpret the adaptations of the be alive	A1 A2 A3 A4	B2 B3 B4 B10 B11 B12	C1 C2 C10 C28 C32 C33	D1 D2 D5 D6 D9 D10 D13 D14 D16
Comprise the social projection of the evolution and his repercussion in the professional exercise, as well as know use his contents to impart *docencia and the divulging	A1 A2 A3 A4	B2 B3 B11	C28 C32 C33	D3 D11 D12 D13
Know and handle the concepts and own terminology of the evolution	A1 A2 A3 A4	B2 B3 B12	C32	D6

Contents

Topic	
Introduction (3).	1. Evidences envelope to evolution. Concepts of Evolution. Proofs of the evolution. 2. History of the evolutionary ideas. Importance of the historical context. Renaissance and start of the modern science. First evolutionary ideas. Darwin and his context. The rational critique. The *Darwinismo in the actuality. 3. *Darwinismo And society. Foundation of the Biology. Importance of the Biodiversity. Importance of the Artificial Selection. Inference of the biological history. Evolutionary strategy. Application to Engineering *computacional. The fake conflict with the religion. The understanding of the our species.

The evolutionary mechanisms (13).	4. The biological variation. The evolutionary importance. Types of biological variation. Mechanisms of *amplificación. Evolutionary applications. 5. Natural selection and adaptation. . Offspring with modification. The evolutionary factors (mutation, migration and derive). The natural selection. The adaptation. The case of *Biston *betularia. The example of *Littorina *saxatilis. *Plasticidade *fenotípica And adaptation. 6. Measure of the natural selection and his limits. Types of Selection. Measurement of the natural selection. Measurement in qualitative characters (*W). Measurement in quantitative characters (*S). Esteems of selection and evolutionary hypotheses. The selection on characters of #efficacy. You limit of the natural selection. 7. Cooperation and conflict. The problem of the collaboration. Development of new concepts (#efficacy *inclusiva). Real examples and his evolutionary utility. The evolutionary conflict. Development of new methods. The sexual selection: causes and consequences. Measurement of the sexual selection. 8. The species and his training. The problem of the species. The evolution of the reproductive isolation. @Escenario of *Especiación. Mechanisms of *Especiación. 9. *Coevolución. Nature of the *coevolución. *Coevolución Predatory-imprisoned. *Coevolución Competitive. *Mutualismo. *Simbiose. Other interactions.
Register fossil (4).	10. Nature and meaning of the register fossil. Importance and representativeness of the Register Fossil. 11. Relations go in the history of the life and the Earth. The main biological events along the geological history.
Origin and diversification of the life (9).	12. The origin of the life. Data, theories and problems. 13. The tree of the life. Tools and methods of inference. 14. Origin and diversification of bacterium and *archea. Evidences fossils and sequence of appearance. 15. Origin and diversification of organisms *multicelulares. Origin and consequences of the *Multicelularidad. 16. *Macroevolución. Patterns and explanations of the *macroevolución.
Human evolution (6).	17. The human lineage: evolutionary History of the primates and hominids. Register fossil and studies of ancient genetic material. 18. Evolution and diversity of human characters. Brain and Language. Theory of the mind. Vital strategies: evolutionary Commitments, *senescencia. 19. Social evolution in hominids. Systems of *apareamiento and sexual selection. Familiar selection. Cooperation and *altruísmo

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practises	13	26	39
Outdoor study / field practices	3	6	9
Master Session	36	54	90
Multiple choice tests	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 practises	They Will realize four practices of 3 or 4 hours of length #each: 1. Recognition of fossils and interpretation of the Register Fossil (3 hours). The students will confront the a series *estratigráfica real, with fossils included in the his environment *tafonómico and will have to learn the keys of the his interpretation. 2. Analysis *filogenético (3 hours). The main objectives of the practice is that the students learn to apply the *herrramientas simpler of the analysis *filogenético. Stop this will use a small group of data of different species and, selecting the characters, will expose a hypothesis *filogenética of that joint of organisms, so as to interpret the evolutionary relations go in the groups. 3. Human evolution (4 hours). Human evolution. One of the main tools stop the study of human evolution is the comparison of fossils of different hominids. The practice will allow that the students confront the a collection of replies of fossils of hominids and that, centering in ones few characters, infer the evolutionary relations go in they. Evaluation of the practical: fill an individual questionnaire at the end of the practical. 4. Practice of visualization of Videos (3 hours). Format of audiovisual communication and evolutionary divulging. *Visionado Of series of evolutionary videos. Discussion and *repaso of concepts and evolutionary mechanisms. Manufacture of report of understanding of the come visualized pole student. Explanation of the protocol of manufacture of scripts to realize come short. Manufacture, by part of the student, of a script stop one come evolutionary. The evaluation of the practice will do in base to the report and to the script elaborated poles students.
Outdoor study / field practices	The students will displace the a zone of the *intermareal rocky, so as to observe *cópulas *in *situ of an or several species or *alternativamente capture exemplary in different stadiums of the his cycle of life. This will allow to obtain estimates of components of selection and of the sexual isolation for qualitative characters (colour of the *cuncha, for example). The practice is designed to do in 3 hours, although it is necessary another hour to displace to the place of *mostraxe. Evaluation: the students will work in groups and each group will be responsible to obtain a series of data, sum them up, #analyze and interpreted in have evolutionary. It Will present *via FEAR a *excel stop each group stop his evaluation.
Master Session	To the students #describe them the *temario main of the course in an only group. The information detailed envelope the content of the kinds will find the disposal of the students in the platform SUBJECT in advance in files *PDF. In the platform SUBJECT be able to be realized any complementary activities to the kinds *maxistrais.

Personalized attention

Methodologies	Description
Master Session	The students *dispondrán of *tiempo of *tutoría of attention customized, with schedules *y location by professor described in SUBJECT *donde be able to be cleared *dudas *surxidas during the kinds
Outdoor study / field practices	The students *dispondrán of time of *tutoría with attention customized to attend the *dudas *surxidas during it *saida of field.

Assessment

	Description	Qualification	Training and Learning Results
Laboratory practises	In each practice the responsible professor will evaluate the knowledges by means of report written of the practical, *questionario type test, developmental question, or any another activity developed in the platform SUBJECT.	20	A1 B4 C1 D1 A2 B10 C2 D2 A3 C10 D3 A4 D5 D6 D9
Outdoor study / field practices	This part will evaluate how part of the practices of laboratory. The professor will describe the process of *evaluación the *prinicipio of course, that can be well a brief report envelope to practice the well a *análisis of the handsome esteems during the same.	5	A1 B4 C2 D1 A2 B10 C10 D2 A3 C32 D3 A4 D5 D6 D9 D10 D14 D16

Master Session	*reaizarán Two control when finishing the *prinicpais theoretical sections. *Primeriro After finishing the *seccions *I, II *and III, and afterwards *al finalize the subject. It Will evaluate by means of a control writing that will be able to be of type test, short questions or long questions and problems to criterion of the responsible professor of each section.	30	A1 A2 A3 A4	B2 B3 B7 B11 B12	C2 C10 C28 C32 C33	D11 D12 D13 D16
Multiple choice tests	At the end of the course will realize a global examination that will encompass all the subject seen in the course by means of any of the teaching procedures employees. The examination will last two hours how maximum and will feature mainly of questions type test.	45	A1 A2 A3 A4	B2 B3	C2 C10 C32 C33	

Other comments on the Evaluation

The rules of evaluation are the following: 1. For it test needs to reach a minimum of 5 in the global qualification of the subject. 2. But *además it will be MANDATORY to approve: 2.1) Attain a minimum note of 5 in the evaluation of it *lo less 4 of the 5 practices (foul of assistance in more of a practice is *suspenso)&*nbsp; 2.2) Obtain a minimum of 3 in the *evaluación of the *examen final type test (in January the *xuno) .3. They Will keep the notes of all activities obtained in the announcement of *febrero stop the announcement of July, except it of the *examen final that be able to be repeated (always with one weigh of 45%). Equally during two courses, the students *repetidores will be able to follow saving the notes of control and practical, but with *posterioridad will owe to go back to study all wools activities *u opt pole mechanism described in the point 5.4. To The hour to cover the notes (and only for approved), the student with better *cualificiación could *rescalar his note tie the possible maximum the *cercano it he (to the criterion of the coordinator of the *asignatura).5. Exceptionally, the students that by causes reasoned/justified no *podar opt it the process of *avaluación previous, *poderan request by writing to the coordinator a *sóa *evaluación global in the announcement of July. In this case a *examen writing *evaluará all the activities realized in the previous procedure (Control, *examen type have and proof written stop each practical, with the corresponding weighting). #Say it to you option in the exempts of the *obligatoriedad to assist the 4 of the 5 practices.

Sources of information

Basic Bibliography

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

Simpson, **Fósiles e historia de la vida**, 1985,

Edgar, B & D. Johanson, **From Lucy to language**, 2006,

Complementary Bibliography

Freeman y Herron, **Análisis evolutivo**, 2002,

Anguita, **Biografía de la tierra. Historia de un planeta singular.**, 2002,

Editorial Investigación y Ciencia, **El origen de la vida**, 2008,

Boyd, R. & J.B. silk, **How humans evolved**, 2015,

Futuyma, **Evolution**, 2013,

Hernán Dopazo y Arcadi Navarro, **Evolución y Adaptación: 150 años después del Origen de las Especies**, 2009,

Recommendations

Subjects that continue the syllabus

Botany I: Algae and fungi/V02G030V01302
Botany II: Archegonia/V02G030V01402
Animal and plant histology and cytology I/V02G030V01303
Animal and plant histology and cytology II/V02G030V01403
Genetics I/V02G030V01404
Microbiology I/V02G030V01304
Zoology I: Invertebrates in arthropods/V02G030V01305
Zoology II: Arthropods invertebrates and chordates/V02G030V01405
Ecology I/V02G030V01501
Ecology II/V02G030V01601
Animal physiology I/V02G030V01502
Plant physiology I/V02G030V01503
Genetics II/V02G030V01505
Animal production/V02G030V01907
Vegetable production/V02G030V01909

Subjects that are recommended to be taken simultaneously

Biology: Soil, aquatic environment and climate/V02G030V01201
Geology: Geology/V02G030V01105

Other comments

Stop the correct tracking of the subject the student will owe to enrolled to principle of course in the platform SUBJECT. In the registration, is important that include the direction of post-and that use usually, for power receive information of the his teaching staff of form customized.