



IDENTIFYING DATA

Experimental sciences

Subject	Experimental sciences			
Code	P02G120V01302			
Study programme	(*)Grao en Educación Primaria			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish Galician			
Department	Special Didactics			
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General description Take in consideration the referents that in this moment exist acerca of the trends around the titulación that scores the EEES, how are the study of the specific competitions of training discipline and professional of the White Book (ANECA) of the Title of Degree of Maxisterio in the area of experimental sciences.

It observes that the most valued competitions aluden to aspects vinculados directly with the didactic development of the area, beside the indispensable training in experimental sciences, is the knowledge of the objective of the primary education "Know the fundamental aspects of the sciences of the nature, with special attention to the related and vinculados with Galicia"; as well as the contents curriculares of the area troncais of Sciences of the Nature.

The specific competitions stop the area of Experimental Sciences, pose in have of aims in the proposal of University Title of Degree according to RD 55/2005, of 21 of January of Teacher of Primary Education.

The scientific knowledges integrate in the curriculum to provide to the students the bases of a scientific and technological training that contribute to develop the necessary competitions to understand the reality, develop in the life and interact with the his natural means -the docencia-.

The knowledge competencial integrates a knowledge of conceptual base (know say), a relative knowledge to the destrezas (know do) and a knowledge with big social and cultural influence, that involve a group of values and attitudes (know be).

In this normative context, the universities go to follow being competent in the initial training of the profesorado and go to follow contributing substantially to the professional profile of the profesorado novel of Primary Education.

In this score propose the design and implantation of procedures that inciden in the process of learning (formative evaluation and formadora, in the that the students is *corresponsable) through the following instruments: Questionnaires or forms (Knowledge - Prior - Study - Inventory the KPSI), rúbricas or matriz of assessment and conceptual maps. All they are inserted in the combination go in the work cooperativo and the individual, so well the processes of learning take place socially, the learning is individual. In the case of the conceptual maps also use how proofs of execution or realization.

The initiative of propiciar the field of the designated "education STEM" (science - technology - engineering - mathematics) stop the cualificación for education of the sciences; in the that can refer the reports of the Research Council of the United States (2009), to National Science Foudation USES (2011), to STEM Education Coalition USA (2012) and, in the case of the European Union, the actions in execution of the "Sciecie in society" (2011) and the "European Schoolnet" (2012) of the Directorate General of Research & Innovación of the European Commission, has some repercussions in the university training of the future profesorado.

What is refrendado by the últimas performances of the Department of Cuntural, Education and Ordenación University of the Xunta de Galicia and of the Ministry of Education, Culture and Depose you, how:

The evolution of the educative integration of the TIC in the current moment, with the development of governmental initiatives how the projects "ABALAR" and the "E-DIXGAL" with the dotación of electronic books in tabletas to the students of primary for use in the centre y in the his home.

The resolution of the 13 of June of 2017, by the that summons the participation in the program of educative innovation "Club of Science" for centres docentes publics of teaching no university.

The posto in course in the educative centres Galicians of the program "Creating Code", with the that searches afondar in the digital competitions STEM (Sciences, Technology, Engineering and Mathematical) of the students of Childish, Primary and ESO.

The program of educative innovation pole that enters the "Robotics in Primary" in the that students will work with kits of robótica, in the that objective último is favoured the initiation of the students, already since early ages, in the experience of basic programming, robótica and building. The material will be conformado by six robots of appropriate educative use to the ages of the students; six kits of building, that will allow the realization of one minimum of five different projects; as well as a manual of use and didactic guide.

The Resolution of the 12 of June of 2018, by the that regulates the bacharelato of excellence in Sciences and Technology (STEMbach), of experimental way for the academic course 2018/19.

Competencies

Code

A1

A2

A3

A4
A5
B1 (*)Coñecer as áreas curriculares da Educación Primaria, a relación interdisciplinar entre elas, os criterios de avaliación e o corpo de coñecementos didácticos ao redor dos procedementos de ensino e aprendizaxe respectivos
B2 (*)Deseñar, planificar e avaliar procesos de ensino e aprendizaxe, tanto individualmente como en colaboración con outros docentes e profesionais do centro
B3 (*)Abordar con eficacia situacións de aprendizaxe de linguas en contextos multiculturais e plurilingües. Fomentar a lectura e o comentario crítico de textos dos diversos dominios científicos e culturais contidos no currículo escolar
B4 (*)Deseñar e regular espazos de aprendizaxe en contextos de diversidade e que atendan á igualdade de xénero, á equidade e ao respecto aos dereitos humanos que conformen os valores da formación cidadá
B5 (*)Fomentar a convivencia na aula e fóra dela, resolver problemas de disciplina e contribuir á resolución pacífica de conflitos. Estimular e valorar o esforzo, a constancia e a disciplina persoal nos estudantes
B6 (*)Coñecer a organización dos colexios de educación primaria e a diversidade de accións que comprende o seu funcionamento. Desempeñar as funcións de titoría e de orientación cos estudantes e as súas familias, atendendo as singulares necesidades educativas dos estudantes. Asumir que o exercicio da función docente ha de ir perfeccionándose e adaptándose aos cambios científicos, pedagóxicos e sociais ao longo da vida
B7 (*)Colaborar cos distintos sectores da comunidade educativa e do contorno social. Asumir a dimensión educadora da función docente e fomentar a educación democrática para unha cidadanía activa
B8 (*)Manter unha relación crítica e autónoma respecto dos saberes, os valores e as institucións sociais públicas e privadas
B9 (*)Valorar a responsabilidade individual e colectiva na consecución dun futuro sustentable
B10 (*)Reflexionar sobre as prácticas de aula para innovar e mellorar o labor docente. Adquirir hábitos e destrezas para a aprendizaxe autónoma e cooperativa e promovela entre os estudantes
B11 (*)Coñecer e aplicar nas aulas as tecnoloxías da información e da comunicación. Discernir selectivamente a información audiovisual que contribúa ás aprendizaxes, á formación cívica e á riqueza cultural
B12 (*)Comprender a función, as posibilidades e os límites da educación na sociedade actual e as competencias fundamentais que afectan aos colexios de educación primaria e aos seus profesionais. Coñecer modelos de mellora da calidade con aplicación aos centros educativos
C25 (*)Comprender os principios básicos e as leis fundamentais das ciencias experimentais (Física, Química, Biología e Xeoloxía)
C26 (*)Coñecer o currículo escolar destas ciencias
C27 (*)Susitar e resolver problemas asociados coas ciencias á vida cotiá
C28 (*)Valorar as ciencias como un feito cultural
C29 (*)Recoñecer a mutua influencia entre ciencia, sociedade e desenvolvemento tecnolóxico, así como as condutas cidadás pertinentes, para procurar un futuro sostenible
C30
D1
D2
D3
D4
D5
D6 (*)Capacidade de xestión da información
D7 (*)Resolución de problemas
D8 (*)Toma de decisións
D9 (*)Traballo en equipo
D10 (*)Traballo nun equipo de carácter interdisciplinar
D11 (*)Traballo nun contexto internacional
D12 (*)Habilidades nas relacións interpersoais
D13
D14 (*)Razoamento crítico
D15 (*)Compromiso ético
D16 (*)Aprendizaxe autónoma
D17 (*)Adaptación a novas situacións
D18 (*)Creatividade
D19 (*)Lideranza
D20 (*)Coñecemento doutras culturas e costumes
D21 (*)Iniciativa e espírito emprendedor
D22 (*)Motivación pola calidade
D23

Learning outcomes

Expected results from this subject

Training and Learning Results

Comprise the basic principles, the fundamental laws, the models, the theoretical frames and the methodologies of the experimental sciences along the history and his current developmental levels.	A1	B1	C25	D1
		B3	C26	D2
		B8	C27	D3
		B9	C28	D4
		B10	C29	D5
		B11	C30	D6
		B12		D7
				D8
				D9
				D12
				D13
				D14

Comprise, analyse and evaluate the current curriculum design of the primary education; identifying the complexity of the educational processes in the learning of the experimental sciences, select and develop appropriate didactic resources for the acquisition of competitions by the student body.	A1	B1	C26	D1
	A2	B2	C27	D2
	A3	B3	C28	D3
		B4	C29	D5
		B5	C30	D6
		B6		D8
		B7		D9
		B8		D10
		B10		D12
		B11		D13
		B12		D14
				D15
				D16
			D17	
			D18	
			D19	
			D20	
			D21	
			D22	
			D23	

Identify and comprise the similarities and differences between the construction of the scientific knowledge-technological and the learning of the science in the school; relating the physical appearances-chemical, biological-geological and technological with the next surroundings and the daily life of the student body.	A1	B1	C25	D1
	A2	B2	C26	D2
	A3	B3	C27	D3
	A4	B4	C28	D4
	A5	B5	C29	D5
		B6	C30	D6
		B7		D7
		B8		D8
		B9		D9
		B10		D10
		B11		D11
		B12		D12
				D13
			D14	
			D15	
			D16	
			D17	
			D18	
			D19	
			D20	
			D21	
			D22	
			D23	

Recognise the mutual influence between science, technology, society and environment; valuing the experimental sciences like a cultural fact, promote attitudes and citizen behaviours to look for a sustainable future in equality of gender.	A1	B1	C25	D1
	A2	B2	C26	D2
	A3	B3	C27	D3
	A4	B4	C28	D4
	A5	B5	C29	D5
		B6	C30	D6
		B7		D7
		B8		D8
		B9		D9
		B10		D10
		B11		D11
		B12		D12
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			D15	
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			D21	
			D22	
			D23	

Contents

Topic	
1. The Experimental Sciences. Origen And development of the science how cultural fact.	<p>The experimental sciences. Science, technology, gender, society and environment.</p> <p>The experimentation in the classroom-laboratory and in the didactic exits to the outline.</p> <p>The correlation of the experimental findings and attach them scientific in the daily life.</p>
2. Scientific methodology and education	<p>Fundamentos Of the teaching of the sciences in the primary education.The school science.</p> <p>The decree of curriculum of the autonomous community stop the primary education. The didactic programming.</p> <p>The practical work in the learning of the experimental sciences.</p> <p>Observation and experimentation.</p> <p>Complementary initiatives: the club of sciences and the bacharelato STEM.</p>
3. The subject and his diversity in the Nature.	<p>The reality macroscópica: properties. Magnitudes cualitativas and cuantitativas. Mass and volume.</p> <p>The states of the subject and the physical changes.</p> <p>The chemical changes: the reactions.</p> <p>Fundamental unities: elements and substances, mixes and compound. (Physical approach, chemical, biological and geological).</p> <p>Natural and artificial substances. Polución And environmental pollution.</p>
4. The fundamental interactions.	<p>Strength, work and potencia.</p> <p>Energy, forms and mechanisms of transfer. Heat and radiation.</p> <p>Sources and sumideiros of energy. Entalpía And entropía.</p> <p>The gravitación universal. The Universe: cosmos and chaos. The evolution of the Universe.</p> <p>The structure submicroscópica of the subject: atoms and molecules, particles and subpartículas.</p> <p>Theories of interpretation and of unification of the sciences. (Physical approach, chemical, biological and geological).</p>
5. Machines and technologies	<p>Elementary machines: mechanical advantage.</p> <p>Devices and technological systems: sensors and actuadores.</p> <p>Control and automatism: robótica and programming.</p> <p>Communications and digital informations: nets and internet.</p> <p>Learning machine, big date and artificial intelligence.</p>

Planning

	Class hours	Hours outside the classroom	Total hours
Scientific events	10	20	30

Classroom jobs	5	7.5	12.5
Laboratory practices	7.5	11.25	18.75
Group tutoring	3	2.25	5.25
Problem based learning	0	22.6	22.6
Lecturing	9	18	27
Debate	14	11.9	25.9
Essay questions exam	4	4	8

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

Methodologies

	Description
Scientific events	Conferences and workshps, View multimedia materials.
Classroom jobs	Works directed by the professor: resolution of questions and situations problem.
Laboratory practices	Group technical participatory: realisation of experimental activities in small group in the classroom-laboratory.
Group tutoring	Resolution of doubts, query and follow-up of works: individual and in small group tutorials.
Problem based learning	Supervised activities: formulation and development of global activities and interactive simulations..
Lecturing	Autonomous activity of the student and of the student, from formulation of questions.
Debate	Group technical participatory in small group and big group.

Personalized attention

Methodologies	Description
Debate	Monitoring interventions for each student and student group discussions in the classroom.
Scientific events	Each student and each student will present a daily event to continue their learning.
Classroom jobs	Each and every student in the classroom virtual mirror your daily sessions, which will include questions on activities.
Laboratory practices	The person student in the small working group to formulate their questions, suggestions and contributions.
Group tutoring	Tutorials will be conducted periodically in a big group to address matters of general interest raised by the students.
Lecturing	From exposición and thematic presentation of class, the students formulate the questions and suggestions of continuity.

Assessment

	Description	Qualification	Training and Learning Results
Classroom jobs	Continuous evaluation through the follow-up of the student and of the student, with the following results of learnings: 1º)- Comprise, analyse and develop, to third level of concretion, the curriculum design current of the primary education; identifying the complexity of the educational processes in learning of the experimental sciences. 2º)-Comprise, analyse and develop, to third level of concretion, the current curriculum design of the primary education; identifying the complexity of the educational processes in learning of the experimental sciences. 3º)- Look for, know and use didactic resources, the technological equipments and the educational methodologies for the education of the sciences in the primary education; designing and evaluating the put in practice of activities in the classroom-laboratory and in the next surroundings of the educational centre.	20	A1 B1 C25 D1 A2 B2 C26 D2 A3 B3 C27 D3 A4 B4 C28 D4 A5 B5 C29 D5 B6 C30 D6 B7 D7 B8 D8 B9 D9 B10 D12 B11 D13 B12 D14 D15 D16 D17 D18 D20 D22 D23

Laboratory practices	Continuous evaluation through the exhibition of works realised, individually and in small group: design of simulations and realisation of experimental activities; with the following results of learnings: 1º)- Comprise, analyse and develop, to third level of concretion, the current curriculum design of the primary education; identifying the complexity of the educational processes in learning of the experimental sciences. 2º)- Identify and comprise the similarities and differences between the construction of the scientific knowledge-technological and the learning of the science in the school; relating the physical appearances-chemical, biological-geological and technological with the next surroundings and the daily life of the student body. 3º)-Look for, know and use didactic resources, the technological equipments and the educational methodologies for the education of the sciences in the primary education; designing and evaluating the put in practice of activities in the classroom-laboratory and in the next surroundings of the educational centre.	20	A1 B1 C25 D1 A2 B2 C26 D2 A3 B3 C27 D3 A4 B4 C28 D4 A5 B5 C29 D5 B6 C30 D6 B7 D7 B8 D8 B9 D9 B10 D12 B11 D13 B12 D14 D15 D16 D17 D18 D20 D22 D23
Essay questions exam	Global evaluation of the process of learning and acquisition of competitions and knowledges: individual realisation of two proofs written face-to-face, one on contents and to another on experimental activities, with the following results of learnings: 1º)- Comprise the basic principles, the fundamental laws and the methodologies of the experimental sciences along the history and his levels of current development. 2º)- Identify and comprise the similarities and differences between the construction of the scientific knowledge-technological and the learning of the science in the school; relating the physical appearances-chemical, biological-geological and technological with the next surroundings and the daily life of the student body.	60	A2 B1 C25 D1 A3 B2 C26 D2 A4 B3 C27 D3 B4 C28 D4 B5 C29 D5 B6 C30 D6 B7 D7 B8 D8 B9 D9 B10 D12 B11 D13 B12 D14 D15 D16 D17 D18 D20 D22 D23

Other comments on the Evaluation

- In the bibliography includes the complete reference of the book titled Science for educators. The use of this book is a documentary source to realise an important part of the activities and works that will be object of evaluation.
- To be able to receive to the continuous evaluation through activities in the virtual classroom is precise to assist to the collective session of classroom and of classroom-laboratory in 80% of the face-to-face time, with a ideal benefit.
- The documents and archives of the works and tasks of the course will be willing, in time and form according to the terms programmed, by each student and each student in his respective personal space in the virtual classroom of the course in FAITIC, in formats of open source or of free finders.
- To obtain a positive evaluation is precise to obtain the qualification of approved in each one of the sections established in the proofs of evaluation and observe a correct behaviour in the face-to-face sessions, since it will value like indispensable condition that the take advantage and the participation are accommodated.
- **1ª ANNOUNCEMENT:**The final qualification (note) will be obtained, by continuous evaluation, by means of the percentage accumulation to face proofs, realised along the course. Anyway it will be necessary reaches a minimum qualification of approved (5 on 10) in each one of the sections established of: Works of classroom, Practices of laboratory and individual face-to-face Proof.
- **2ª ANNOUNCEMENT:** they will save all the partial qualifications (notes) positive of the works of annual and of the practices of laboratory, obtained by the student or by the student during all the course, that second weighted the aforementioned percentages (40% and 40%, respectively) will be summative accumulated in an only qualification (note), the one who will average to the 20 % with the qualification (note) of test them face-to-face writings of this announcement.
- If the student or the self-evident student on purpose, by writing in the head of the first leaf of examination of this second announcement, his wish that they are not taken into account these notes, his final qualification will be only the derivative note of the correction of this proof.

Sources of information

Basic Bibliography

GARRIDO, J.M.; PERALES, F.J.; GALDÓN. M., **Ciencia para educadores** ., 1ª, Pearson Educación, 2008

CAÑAS, A.; MARTÍN-DÍAZ, M.J. & NIEDA, J., **Competencia en el conocimiento y la interacción con el mundo físico.**, 1ª, Alianza Editorial., 2009

ONTORIA, A. et al., **Mapas Conceptuales. Una técnica para aprender.**, 1ª, Narcea Ediciones, 2011

GONZÁLEZ GARCÍA, F.M., **El Mapa Conceptual y el Diagrama UVE.**, 1ª, Narcea Ediciones, 2008

Complementary Bibliography

Recommendations

Subjects that continue the syllabus

Experimental sciences teaching 1/P02G120V01402

Experimental sciences teaching 2/P02G120V01502
