



COURSE GUIDE
Master of Secondary Education Training,
Professional Training and Teaching of
Languages

Resources for the teaching of natural
sciences for Secondary Education and High
School

Universidad Católica de Valencia

Course 2023-2024



COURSE GUIDE TO: Resources for the teaching of Natural Sciences for Secondary Education and High School

		ECTS
MODULE Specific		6
Field: Learning and teaching materials		6
Subject: Resources for the teaching of Natural Sciences for Secondary Education and High School		12
Type of Learning¹: Compulsory		CURSE: MOPS
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MODULE ORGANIZATION			Nº ECTS 24	
Field	ECTS	Subject	ECTS	Semester
Complements for the formation to discipline	6	Natural Sciences curriculum for Secondary Education and high School	6	1
Learning and teaching materials	12	Teaching of Natural Sciences	6	1
		Resources for the teaching of Natural Sciences for Secondary Education and High School	6	2
Teaching innovation and introduction to educational research	6	Innovation and research in Science Teaching of Nature	6	2

¹ Basic Training (ordinary matter), Compulsory teaching, optional, external practices, Master's Thesis



COURSE GUIDE: Resources for the teaching of Natural Sciences for Secondary Education and High School
Prerequisites: No prerequisites, except from access to the expertise and knowledge of the languages of the Spanish educational system
GENERAL OBJECTIVES
<ul style="list-style-type: none"> a. Anchoring and experience different teaching resources adapted or characteristic of natural science education . b . To train students in the development of methodologies of natural science education , applicable to real contexts of teaching and learning c . To train students in acquiring adequate resources and proper to work the contents of the natural sciences and secondary school education d. Apply methodologies to certain real situations , developing educational proposals based on the theoretical e. To analyze the impact of different teaching resources applicable to the teaching of natural sciences , the improvement of teaching practice . f . Discover the possibilities of ICT for the teaching of natural sciences . g . Assess the degree of adequacy of teaching resources in different teaching and learning situations . h . To assess the contribution of different specific methodologies for the acquisition of basic skills in secondary education

TRANSVERSAL COMPETENCES ²	Weighting of competences			
Instrumentals	1	2	3	4
G 1 Competence in the application of acquired knowledge and problem solving abilities, encountered in new or unfamiliar environments; and, initiated within broader contexts or multidisciplinary scopes relative to one's field of study.				x
G 2 Capability to integrate knowledge and determine complex judgment calls based on information which incorporates, but is not limited to, reflections on social and ethical responsibilities associated with pertinent knowledge and judgments			x	
G 3 Knowing how to effectively communicate conclusions (sustaining relative rationale or arguments) to specialized and unspecialized audiences, in a clear and unambiguous manner.				X
G4 Having learning skills that enable them to continue studying in a self-directed or autonomous manner within the majority of circumstances				X
G5 To Know the curriculum related to the specialization and the didactics of teaching and learning, as well as a didactic knowledge of the teaching and learning processes, respectively. A knowledge of the different professions will be included for vocational training.		X		

² List sequentially all competitions. Each of them should be weighted 1-4 using as criterion the degree of contribution of the subject / matter in the acquisition and development of competition



G 6 To plan, develop and evaluate the teaching and learning process enhancing educational activities to facilitate the acquisition of the different competences, taking into account the level and previous training of students to guide them, both individually and in collaboration with other teachers and school professionals				x
G7 To research, obtain, process and communicate information (oral, printed, audiovisual, digital, or multimedia), transforming it into knowledge that will be applied in the teaching and learning process				x
Interpersonal	1	2	3	4
G10 To acquire strategies to encourage student effort and enhance their capacity to learn by themselves and with others, and develop thinking skills and decision-making abilities to facilitate autonomy, confidence and personal initiative.			x	
G 11 To know the processes of interaction and communication in the classroom, mastering social skills necessary to promote learning and coexistence together in the classroom, dealing with problems of discipline and conflict resolution			x	
G 15. To inform and advise families about the process of teaching and learning and personal counseling to know the academic and professional development of their children	x			
Sistemics	1	2	3	4
G9. To design and develop learning processes with special attention to equity, education and emotional values, equal rights and opportunities between men and women, civic education and respect for human rights that facilitate life in our society, making decisions and building a sustainable future.			x	
G 8 To set the curriculum that will be established in a school. To develop and implement teaching methodologies, for both groups and individuals, taking into account the diversity of students				x
G12 To design and carry out formal and informal activities that make the centre a place of participation and culture in the environment where it is located. To perform the functions of mentoring and guiding students in a collaborative and coordinated way. To participate in the evaluation, research and innovation of teaching and learning				x
G13. To know the rules and institutional organization of the education system and models of improvement in quality in schools.		x		
G14. To know and analyze the historical characteristics of the teaching profession, its current status, perspectives and interaction with the social reality of the time.	x			



SPECIFIC COMPETENCES ³				
Conceptual skills	1	2	3	4
E1. Knowing the cultural and educational value of the relevant areas of specialization and contents that are taught in the respective teachings	X			
E2. Knowing the history and recent developments and prospects materials to convey a dynamic view.		X		
E3. Knowing contexts and situations in which use or apply the various curricular contents.			x	
E4. Knowing the theoretical and practical aspects of teaching and learning materials				x
Specific abilities	1	2	3	4
E5. Transforming educational curriculum in specific programs				x
E6. Acquire criteria for selection and development of educational materials.				X
E7. Encourage a climate that facilitates learning and put in value the contributions of students			X	
E8. Integrating training with media studies in the teaching-learning process				X
E9. Learn strategies and techniques for assessing and understanding the evaluation as a tool to regulate and encourage the efforts				X
Professional skills	1	2	3	4
E10. Know and apply innovative teaching proposals in the field of specialization Studied.				X
E11. Analyze critically the process of teaching, of good practice and orientation using quality indicators				X
E12. Identify issues related to teaching and learning matters and to propose alternatives and solutions				X
E13. Understand and apply methods and techniques of research and evaluation and to be able to design and develop research, innovation and evaluation.				X

LEARNING RESULTS	COMPETENCES/SKILLS
R1. Know and underlying different teaching resources in appropriate mode to the teaching and learning sciences.	G1, G5, G10,G11, E1, E3, E4, E6, E8, E10,E11, E12, E13
R2. Develops and implements different methodologies depending on the learning context.	G1, G2,G4, G9, G6, G10, G11, G12, G8, G12, E2, E3,E5, E6, E7, E8, E9, E11, E12,E13

³ Follow consecutively with the previous numbering. The specific skills are weighted 1-4 following the same approach as with the transverse



R3. Develops and presents an specific didactic proposal using the theoretical contents and selecting the most appropriate materials and resources.	G1, G2,G3,G4, G5, G6,G7,G8,G9,G10, G11,G12, G9, G8, E3, E4, E5, E6,E7, E8, E9,E10, E13
R4. Understand teaching resources and teaching methods	G1,G2,G5, G6,G8,G11,G12, G13,G14,E1, E2,E3,E4, E7, E8, E9, E10, E11, E12, E13
R5. Meet information sources to extract the materials and resources	G1,G2,G4,G5, G10, G11, E1, E2, E6, E8, E11, E12, E13
R6. Assesses the adequacy of teaching resources based on the context in which to apply	G1,G2, G5,G6,G8, G11, G12, E3, E4, E6, E8, E9, E11,E12, E13

ON-CAMPUS EDUCATIONAL ACTIVITIES			
ACTIVITY	Teaching-Learning Methodology	Relationship With Learning Outcomes for the subject	2,4 ECTS
ON-CAMPUS CLASS	Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.	R1,R4,R5	1
PRACTICAL CLASSES	Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity.Sesiones de trabajo grupal en grupos supervisadas por el profesor.	R1,R2,R3,R4,R6	1,2
GROUP PRESENTATION OF PAPERS	Application of multidisciplinary knowledge.	R1,R2,R3,R5,R6	0,06
OFFICE ASSISTANCE	Personalized and small group attention. Period of instruction and/or orientation carried out by a tutor to review and discuss materials and topics presented in classes, readings, papers, etc.	R1,R2,R3,R4,R5,R6	0,04
ASSESSMENT	Set of oral and/or written tests used in initial, formative or additive assessment of the student	R1,R2,R3,R4,R5,R6	0,10
Total			(2,4*)



INDEPENDENT WORK ACTIVITIES			
ACTIVITY	Teaching-Learning Methodology	Relationship of Course with Learning Outcomes	3,6 ECTS
GROUP WORK	Group preparation of readings, essays, problem solving, seminars, papers, reports, etc. to be presented or submitted in theoretical lectures, practical and/or small-group tutoring sessions.	R2,R3,R4,R5	1,44
INDEPENDENT WORK	Student study: Group Individual preparation of readings, essays, problem solving, seminars, papers, reports, etc. to be presented or submitted in theoretical lectures, practical and/or small-group tutoring sessions.	R1,R2,R3,R4,R5,R6	2,16
Total			(3,6*)

SYSTEM FOR ASSESSING THE ACQUISITION OF THE COMPETENCES AND ASSESSMENT SYSTEM		
Assessment Tool ⁴	RESULTADOS DE APRENDIZAJE EVALUADOS	Allocated Percentage
Marks given to individual and/or group tasks related to the contents of the subject.	R1,R2,R3,R4,R5,R6	80 %
Attitude, attendance and participation in both classroom and virtual activities will be assessed.	R1,R2,R3,R4,R5,R6	20 %

DESCRIPTION OF CONTENTS Content development in Teaching Guides	COMPETENCES
Introduction to educational methodology in natural sciences. Strategies and teaching resources.	G1,G3,G4, G5,G7, G11, G8, E3, E4, E5,E8, E9,E10, E13
Methodological strategies in the classroom. Application to the contents of the natural sciences in secondary education	G1,G2,G3, G6,G7,G8,G9,G10, G11,G12, E1,E2,E3,E4,E6,E7, E8,E10, E13
Analysis, development and evaluation of educational proposals from innovative methodologies developed. The teaching materials and educational resources in the teaching of natural sciences: foundations, analysis and selection applied to different training Situations	G3,G4, G5,G6,G7,G8,G9,G10, G11,G12, E1,E3, E4, E5, E6,E8, E9,E10, E12,E13

⁴ Techniques and instruments of evaluation: exam-oral presentation, written test (objective tests, development, concept maps ...), tutorials, projects, case studies, logbooks, portfolio, etc..



	CONTENT/TEACHING UNIT
1	Introduction to educational methodology in natural sciences. Strategies and teaching resources.
2	Methodological strategies in the classroom. Application to the contents of the natural sciences in secondary education
3	The teaching materials and educational resources in the teaching of natural sciences: foundations, analysis and selection applied to different training situations
4	Analysis, development and evaluation of educational proposals from innovative methodologies developed



BASIC BIBLIOGRAPHY

- CAÑAL P. (coord.) (2011) *Didáctica de la Biología y la Geología* Barcelona: Graó
- CAÑAL P. (coord.) (2011) *Biología y Geología*. Complementos de formación disciplinar Barcelona: Graó
- CAÑAL P. (coord.) (2011) *Biología y Geología Investigación, innovación y buenas prácticas* Barcelona: Graó
- CAÑAS, A., MARTÍN-DÍAZ, M.J. y NIEDA, J. (2007) Competencia en el conocimiento y la interacción con el medio físico. Madrid: Alianza Editorial
- CATALÁ, M. y otros (2002) *Las ciencias en la escuela: teoría y prácticas*. Barcelona: Graó
- DRIVER, R., GUESNE, E. y TIBERGHIE, A. (1992) *Ideas científicas en la infancia y la adolescencia*. Madrid: Morata
- HARLEN, W. (2007) *Enseñanza y aprendizaje de las ciencias*. Madrid: Morata
- JIMÉNEZ, M. P. (Coord.) (2003) *Enseñar ciencias*. Barcelona: Graó
- PEDRINACI (Coord.) (2012) El desarrollo de la competencia científica. 11 ideas clave. Barcelona: Graó
- PUJOL, R. M. (2007) *Didáctica de las ciencias en la educación primaria*. Madrid: Síntesis
- SANMARTÍ, N. (2002) *Didáctica de las ciencias en la educación secundaria*. Madrid: Síntesis
- SANMARTÍ, N. (2007) *Evaluar para aprender. 10 ideas clave*. Barcelona: Graó
- VVAA (2008) *Hacemos ciencia en la escuela: experiencias y descubrimientos*. Barcelona: Graó
- VVAA (2002) *Las ciencias en la escuela. Teoría y prácticas*. Barcelona: Graó

National Journals

- Enseñanza de las ciencias (www.ensciencias.uab.es/)
- Alambique (www.alambique.grao.com)
- Eureka (www.apac-eureka.org/revista/Consejo_revista.htm)
- Enseñanza de las Ciencias de la Tierra (www.aepect.org/nuestra_revista)
- REEC (saum.uvigo.es/reec/)
- Investigación en la Escuela (www.diadaeditora.com)

Complementary bibliography

- GARRIDO, J.M., PERALES, F.J. y GALDÓN, M. (2009) *Ciencia para educadores* Madrid: Pearson
- GIL, D., VILCHES, A. (2006) "Educación ciudadana y alfabetización científica: Mitos y realidades" *Revista Iberoamericana de educación* 42, 31-53.
- GONZÁLEZ, M.P. (Coord.) (2003) *Prácticas de laboratorio y de aula. Biología, Ecología, Genética y Geología*. Madrid: Narcea-MEC
- LÓPEZ, J., LOPEZ, R., CARDENETE, S. y CARMONA, J. (1999) *Técnicas experimentales de laboratorio*. Madrid: McGraw Hill
- RAGA, F. (1999) *Matraz. El trabajo en el laboratorio*. Valencia: Tándem
- ROJO, A. (2010) *La física en la vida cotidiana*. Barcelona: RBA

Website addresses

- <http://recursostic.educacion.es/ciencias/biosfera/web/>
- Proyecto Biosfera. Página elaborada por el Ministerio de Educación sobre el área de Ciencias de la Naturaleza (Biología y Geología)
- <http://ntic.educacion.es/v5/web/profesores/asignaturas/>
- Instituto de Tecnologías Educativas. Ministerio de Educación. Recursos educativos clasificados.



Addendum to the Course Guide of the Subject Resources for the teaching of natural sciences for Secondary Education and High School

Master of Secondary Education Training, Professional Training and Teaching of Languages

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject:

Situation 1: Teaching without limited capacity (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

Situation 2: Teaching with limited capacity (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching

method combining onsite teaching in the classroom and synchronous online teaching.

Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:



Microsoft Teams



Kaltura

Situation 3: Confinement due to a new State of Alarm.

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen onsite activities described in this section of the Course Guide, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:



Microsoft Teams



Explanation about the practical sessions:

2. System for Assessing the Acquisition of the competences and Assessment System

ONSITE WORK

Regarding the Assessment Tools:

- ☐ X The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.
- ☐ The following changes will be made to adapt the subject's assessment to the online teaching.

Course guide		Adaptation	
Assessment tool	Allocated Percentage	Description of the suggested changes	Platform to be used



The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

Comments to the Assessment System:

ONLINE WORK

Regarding the Assessment Tools:

- ☐ The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.
- ☒ X The following changes will be made to adapt the subject's assessment to the online teaching.

Course guide		Adaptation	
Assessment tool	Allocated Percentage	Description of the suggested changes	Platform to be used
			Teams
Marks given to individual and/or group tasks related to the contents of the subject.	80%	Group work (Follow-up and oral presentation) 80%	Teams
Attendance and participation in activities	20%	Attendance and participation in activities 20%	

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.