



COURSE GUIDE

Official Master's Degree in Teacher Training for Secondary Education,
Bachelor, Vocational Training and Language Teaching

RESOURCES FOR THE TEACHING OF MATHEMATICS

Specific Module of Mathematics

Universidad Católica de Valencia

Year 2023/24



COURSE GUIDE

RESOURCES FOR THE TEACHING OF MATHEMATICS

		ECTS
MODULE: Resources for the teaching of Mathematics		6
Field: Learning and teaching Mathematics		12
Subject: Specific module Mathematics		24
Type of learning: Compulsory	Year: 2023/24 Semester: 2nd	
Teacher: Ana Isabel Cárcelos Medina Elena Moreno Gálvez	Department: Matemáticas, Ciencias Naturales y Ciencias Sociales aplicadas a la Educación	
	E-mail: anaisabel.carceles@ucv.es elena.moreno@ucv.es	

SUBJECT ORGANIZATION

Specific module Mathematics	24 ECTS
<p>Duration and temporal location within the curriculum:</p> <p>The course is taught in the second semester, within the area of "Learning and teaching of the related subjects (<i>Mathematics</i>)" when the students have already taken other modules and begun the Prácticum. This course, in the specific module aims to introduce teachers in the understanding and management of teaching resources for the teaching-learning process in the area of Mathematics, emphasizing the need for teachers to have their own resources, to develop materials own teaching expertise and critical analysis of teaching materials and resources to achieve properly the objectives of the area on their students.</p> <p>This approach to the teaching resources is made specifically from the point of view of ICT, promoting the use of information technology and communication on the part of teachers, including towards new frameworks of education (e-learning), teachers entering the world of virtual classrooms as a resource for teaching and learning processes.</p>	



By this course equally relevant to teachers about the organization and management of Mathematics area workshops, favouring practice that every teacher must make in advance on workshop projects before taking them to their subject.

The course *Resources for the teaching of Mathematics* intended to address the following contents:

- *Definition, functions and selection criteria for teaching resources.*
- *Didactic materials for teaching mathematics.*
- *ICT resources for teaching mathematics.*

Subjects and Courses

Subject	ECTS	COURSES	ECTS	Course / Semester
Complements for the disciplinary training	6	Mathematics in the Secondary Education	6	1/1
Learning and teaching of the related subjects	12	Mathematics Teaching	6	1/1
		Resources for the teaching of Mathematics	6	1/2
Teaching innovation and introduction to educational research	6	Innovation and Research in Teaching Mathematics	6	1/2

COURSE GUIDE TO THE SUBJECT: Resources for the teaching of Mathematics

Prerequisites: No prerequisites, except from access to the expertise and knowledge of the languages of the Spanish educational system.

GENERAL GOALS

- a. Know and recognize materials and resources for the teaching-learning process in the area of Mathematics.
- b. Critically analyze teaching materials and resources to adapt to the needs in the teaching task.
- c. Create specific teaching materials and resources in the area, individual and group mode.
- d. Use ICT resources to the area of Mathematics.
- e. Know different models of the Mathematics project.
- f. Analyze and develop resources and materials for the project of Mathematics.
- g. Knowing the characteristics of Mathematics materials and tools.
- h. Acquire concepts and basic skills in the use of virtual classrooms through the *Moodle* platform.

CROSS-SECTIONAL COMPETENCES	Competence measuring scale			
Instrumentales	1	2	3	4



PI-02-F-16 ED. 00

G1 Ability to apply knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.			X	
G2 Being able to integrate knowledge and handle complexity, and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.			X	
G3 ability to communicate their findings (and the knowledge and rationale underpinning these,) to specialists and non-specialists in a clear and unambiguous.				X
G4 Possessing learning skills to enable them to continue studying in a way that will be largely self-directed or autonomous.			X	
G5 Know the curriculum of the matters relating to the corresponding teaching specialization, and the body of didactic knowledge around teaching and learning processes concerned. For vocational training will include knowledge of the respective professions.				X
G6 plan, develop and evaluate the teaching and learning process enhancing educational processes that facilitate the acquisition of the competences of the respective teachings, based on the level and previous training of the students and guiding them, both individually and in collaboration with other teachers and school professionals.				X
G7 Search for, obtain, process and communicate information (oral, print, visual, digital or multimedia), transform it into knowledge and apply it in the teaching and learning materials Studied own specialization.				X
Interpersonal	1	2	3	4
G10. Acquire strategies to encourage student effort and promote their ability to learn for yourself and others, and develop thinking skills and decision-making to facilitate autonomy, confidence and personal initiative.				X
G11. Know the processes of interaction and communication in the classroom, mastering skills and social skills necessary to promote learning and living together in the classroom, and addressing problems of discipline and conflict resolution.		X		
G15. Inform and advise families about the process of teaching and learning and on the personal, academic and professional of their children.		X		

Systemic	1	2	3	4
G8 Fleshing out the curriculum that will be implemented in a school participating in collective planning of the same, develop and implement teaching methodologies both groups and individually adapted to the diversity of students.		X		
G9.Design and develop learning with a focus on equity, emotional and values education, equal rights and opportunities for men and women, civic education and respect for human rights that make life easier in		X		



PI-02-F-16 ED. 00

society, decision making and building a sustainable future.				
G12. Design and conduct formal and informal activities that help make the school a place of participation and culture in the environment where it is located, perform the functions of mentoring and guiding students in a collaborative and coordinated participation in evaluation, research and innovation in teaching and learning processes.			X	
G13. Knowing the rules and institutional organization of the education system and models of quality improvement with application to the schools.	X			
G14. Understand and analyze the historical characteristics of the teaching profession, current situation, perspectives and interaction with the social reality of the time.	X			

SPECIFIC COMPETENCES				
Disciplinary	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 of the same.		X		
E3. Knowing contexts and situations in which use or apply the various curricula.		X	X	
E4. Knowing the theoretical and practical aspects of teaching and learning relevant material.	X			
Professional	1	2	3	4
E5. Transform the educational program to activities programs and work activities.		X	X	
E6. Acquire selection criteria and preparing educational materials.				X
E7. Foster a climate that facilitates learning and put in value the contributions of students.		X		
E8. Integrating training of media studies in the teaching-learning process.				X
E9. Learn strategies and techniques for assessing and understanding the assessment as a tool to regulate and stimulate the effort.		X		
Attitudinal	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	X			



PI-02-F-16 ED. 00

evaluation.				
-------------	--	--	--	--

LEARNING OUTCOMES	COMPETENCES
RA: Knowing, in its broadest sense, the concept of educational resource to critically analyze resources and materials.	G1; G2; G3; G5; G6; G7; E1; E6; E7; E8; E9; E11; E12
RB: Using network analysis as a tool for critical analysis of teaching materials and resources.	G1; G3; G4; G5; G7; G10; E1; E6; E7; E8; E9; E11; E12
RC: Creation and / or adaptation of resources and materials for regular classroom for a workshop classroom and a virtual classroom in the area of Mathematics	G1; G3; G5; G6; G7; G9; G10; E1; E2; E3; E4; E5; E6; E7; E8; E9; E10; E12; E13
RD: To acknowledge the importance of the method of projects to the area of technology and distinguish the various models of project in that area.	G2; G3; G4; G6; G8; G10; G12; G14; E1; E2; E3; E4; E5; E6; E8; E10
RE: Know cope in a classroom workshop Mathematics.	G2; G4; G5; G6; G7; G9; G10; G11; G13; E1; E3; E5; E6; E7; E8
RF: Acquire criteria classroom materials for teachers, ICT materials and textbooks.	G1; G2; G3; G4; G5; G6; G7; G8; G10; G12; G15; E1; E2; E6; E7; E8; E9; E11; E12; E13
RG: Know how to use a virtual classroom on the <i>moodle</i> platform, providing it with resources and activities for students.	G1; G2; G3; G4; G5; G6; G7; G8; G10; G11; G12; G14; E3; E5; E6; E8; E10; E13



ON-CAMPUS EDUCATIONAL ACTIVITIES			
ACTIVITY	Teaching-Learning Methodology	Relationship With Learning Outcomes for the subject	ECTS
ON-CAMPUS CLASS	Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.	RA; RB; RC; RD; RE; RF; RG	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.	RB; RC; RE; RF; RG	1
LABORATORY	Activities carried out in spaces with specialized equipment.	RE; RG	0,1
SEMINAR	Supervised monographic sessions with shared participation	RA; RB; RC; RD; RE; RF	0,1
GROUP PRESENTATION OF PAPERS	Application of multidisciplinary knowledge	RB; RC; RE; RG	0,1
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, seminars, readings, papers, etc.	RC; RE; RF; RG	0,05
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, seminars, readings,	RA; RB; RC; RD; RE; RF; RG	0,05



PI-02-F-16 ED. 00

	papers, etc.		
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. Work done on the university e-learning platform (www.plataforma.ucv.es)	RA; RB; RC; RD; RE; RF; RG	2,3
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. Work done on the university e-learning platform (www.plataforma.ucv.es)	RA; RB; RC; RD; RE; RF; RG	2,3
Total			3,6
SYSTEM FOR ASSESSING THE ACQUISITION OF THE COMPETENCES AND ASSESSMENT SYSTEM			
Assessment Tool	LEARNING OUTCOMES ASSESSED		Allocated Percentage
Attendance and class participation	RC; RD; RE; RG		10%



Written tests	RA; RB; RC; RD; RE; RF; RG	30%
Written and practical work presentations	RA; RB; RC; RD; RE; RF; RG	40%
Oral presentationss	RA; RB; RC; RD; RE; RF; RG	20%

MENTION OF DISTINCTION:

From getting a 9 and if the outcome is the result of excellent academic achievement coupled with an effort and interest in the subject.

In case there are more candidates than possible tuition grant will be a development test consisting of a single open question about the content of the course.

DESCRIPTION OF CONTENTS	COMPETENCES
Definition, functions and selection criteria for teaching resources.	E1; E6; E7; E8; E9; E11; E12
Didactic materials for teaching mathematics.	E1;E2; E6; E8; E9; E12
ICT resources for teaching mathematics.	E1;E2; E6; E8; E9; E12
REFERENCES	
<p>Ausubel, D., 1978. In defense of advance organizers: A reply to the critics. Review of Educational Research, 48, 251-257</p> <p>Batanero, C., 2001. Didáctica de la Estadística, Grupo de Investigación en Educación Estadística. Granada. ISBN: 84-699- 4295-6</p> <p>Batanero, C. y Díaz, C., 2011. Estadística con Proyectos, Departamento de Didáctica de las Matemáticas. Universidad de Granada. ISBN: 978-84-694- 9152-2, disponible en http://www.ugr.es/~batanero/ARTICULOS/libros/Libroproyectos.pdf</p> <p>Batanero, C. y Godino, J. D., 2003. Estocástica y su didáctica para maestros. Departamento de Didáctica de las Matemáticas. Universidad de Granada. ISBN: 84-932510-0-3, disponible en http://www.ugr.es/~jgodino/edumat-maestros/</p>	



- Baroody, A. J., 1988. El pensamiento matemático de los niños. Madrid: Visor/MEC
- Bouvier, A. y George, M., 1984, Diccionario de matemáticas, Akal Editores
- Boyer C., 1968. Historia de la matemática. Alianza Editorial, Madrid
- Briand, J. y Chevalier, M.C., 1995. Les enjeux didactiques dans l'enseignement des mathématiques. Paris: Hatier
- Brousseau, G., 1988. Utilidad e interés de la didáctica para un profesor. Suma, 4: 5-12 y Suma 5: 5-12 (segunda parte).
- Cabriá, S., 1994. Filosofía de la estadística, Servicio de Publicaciones de la Universidad de Valencia
- Calvo, M.C., Deolofeu, J., Jareño, J., Morera, L. 2016. Aprender a enseñar matemáticas en la ESO. Síntesis: Madrid
- Cascallana, M. T., 1998. Iniciación a la matemática. Materiales y recursos didácticos, Aula XXI. Santillana. ISBN: 84-294-6634-7
- Castro, E., 2001. Didáctica de la Matemática en la Educación Primaria. Madrid: Síntesis
- Centeno, J., 1988. Números decimales. ¿Por qué? ¿Para qué? Madrid: Síntesis
- Chamorro, C. y Belmonte, J. M., 1988. El problema de la medida. Didáctica de las magnitudes lineales (núm. 17). Madrid: Editorial Síntesis S. A.
- Chevallard, Y., 1985. La transposition didactique. Grenoble: La Pensée Sauvage
- Cid, E., 2002. Los modelos concretos en la enseñanza de los números negativos. Actas de las X Jornadas para el Aprendizaje y Enseñanza de las Matemáticas (JAEM), ICE de la Universidad de Zaragoza.
- Cid, E., Godino, J. D., y Batanero, C., 2003. Sistemas numéricos y su didáctica para maestros, Departamento de Didáctica de las Matemáticas. Universidad de Granada. ISBN: 84-932510-4-6, disponible en <http://www.ugr.es/~jgodino/edumat-maestros/>
- Colectivo Periódica Pura, 1982. Didáctica de los números enteros. Madrid: Nuestra Cultural
- Corbalán, F., 1994. Juegos matemáticos para secundaria y bachillerato. Madrid: Síntesis.
- Dantzig, T., 1971. El número lenguaje de la ciencia. Ed. Hobbs Sudamericana, Buenos Aires
- De Guzmán, M., 1996. El rincón de la pizarra. Ensayos y visualización en el análisis matemático. Madrid: Pirámide.
- Dienes, Z.P., Golding, E.W., 1966. Exploración del espacio y práctica de la medida. Teide
- Dickson, L., Brown, M. y Gibson, O., 1991. El aprendizaje de las matemáticas. Madrid: MEC y Ed. Labor



- Donaldson, M., 1978. Children's Minds. London: Fontana/Croom Helm, ISBN 0-85664-759-4
- Fernández, F., Llopis, A. M. y Pablo, C., 1985. Niños con dificultades para las matemáticas. Madrid: CEPE
- Fischbein, E., 1993. The theory of figural concepts. Educational Studies in Mathematics, 24: 139-162
- Flores, P., 2001. Aprendizaje y evaluación. En E. Castro (Ed.), Didáctica de la matemática en la Educación Primaria (pp. 41-59). Madrid: Síntesis
- Font, V., 1994. Motivación y dificultades de aprendizaje en matemáticas. Suma, 17: 10- 16
- Fouz, F., 2004. Modelo de Van Hiele para la didáctica de la Geometría, Un paseo por la geometría, Ciclo de conferencias.
- Gadner, M., 1984. El carnaval matemático. Alianza Editorial, Madrid (4.a ed.)
- Godino, J. D., Batanero, C. y Roa, R., 2003. [Medida y su didáctica para maestros](#). Departamento de Didáctica de las Matemáticas. Universidad de Granada. ISBN:84-932510-2-X, disponible en <http://www.ugr.es/~jgodino/edumat-maestros/>
- Godino, J. D. y Ruiz, F., 2003. [Geometría y su didáctica para maestros](#). Departamento de Didáctica de las Matemáticas. Universidad de Granada. ISBN: 84-932510-1-1, disponible en <http://www.ugr.es/~jgodino/edumat-maestros/>
- Godino, J. (Director), 2004. Departamento de Didáctica de las Matemáticas. Universidad de Granada. ISBN: 84-933517-1-7. Este libro contiene la Monografía "Fundamentos de la enseñanza y el aprendizaje de las matemáticas" y las partes C, Conocimientos didácticos, de las restantes monografías publicadas por el proyecto Edumat-maestros, disponible en <http://www.ugr.es/~jgodino/edumat-maestros/>
- Gómez, B., 1988. Numeración y Cálculo, Colección: Matemáticas Cultura y Aprendizaje. Ed. Síntesis. ISBN: 84-7738-014-7, disponible en <http://www.uv.es/gomezb/Mispublicacionesdedominiopublico.html>
- Gutiérrez, A., 2009. Apuntes de Matemáticas y su Didáctica. Universitat de València
- Lovell, K., 1977. Desarrollo de los conceptos básicos matemáticos y científicos en los niños. Morata, Madrid
- Marín, A. y Lupiáñez, J. L., 2005. Los nuevos Principios y Estándares del NTSC en castellano, SUMA 48, pp. 105-112
- Moreno, M., 1983. La pedagogía operatoria, Laia. Barcelona
- Moore, D. S., 1991. Teaching Statistics as a respectable subject, En F. Gordon y S. Gordon (eds.), Statistics for the Twenty-First Century, (pp. 14-25). Mathematical Association of America
- NCTM, 1991. Professional Standards for Teaching Mathematics. Reston, VA: NCTM
- Nomdedeu, R., 2012. Didáctica de las Matemáticas, Universitat Internacional Valenciana / VIU (en prensa)



PI-02-F-16 ED. 00

Nortes Checa, A., 1993. Matemáticas y su didáctica. Tema-DM

Piaget, J., e Inhelder, B., 1951. La genése de l'idée de hasard chez l'enfant. Paris: Presses Universitaires de France

Rico Romero, L. y Moreno Verdejo, A. 2016. Elementos de didáctica de la matemática para el profesor de Secundaria. Pirámide: Madrid

Russell, B., 1969. Definición de número. Sigma. El mundo de las matemáticas. Vol. 4, Ed. Newman, J., Grijalbo, México

Siegel, L.S.; Brainerd, C.J., 1983: Alternativas a Piaget. Pirámide: Madrid

Skemp, R., 1980. Psicología del aprendizaje de las matemáticas. Morata, Madrid

Van de Walle, J. A., 2001. Elementary and middle school mathematics. Teaching developmentally (4^a ed.). New York: Longman

Vidal Raméntol, S. 2021. La matemática nos facilita la vida. Laertes: Barcelona

Whilhelmi, M. R., 2004. Combinatoria y Probabilidad, Departamento de Didáctica de las Matemáticas. Universidad de Granada. ISBN: 84-933517-0-9



Addendum to the Course Guide of the Subject Didactic Resources for teaching in Mathematics

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,



PI-02-F-16 ED. 00

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:

- | | |
|---|---|
| <input checked="" type="checkbox"/> Microsoft Teams | <input type="checkbox"/> Blackboard Collaborate Ultra |
| <input type="checkbox"/> 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:

- | | |
|---|---|
| <input checked="" type="checkbox"/> Microsoft Teams | <input type="checkbox"/> Blackboard Collaborate Ultra |
| <input checked="" type="checkbox"/> Kaltura | <input checked="" type="checkbox"/> UCVNet |

Explanation about the practical sessions:



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

ONSITE 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.



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.
- ☐ 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.