Information about the subject

Degree: Master's Degree in Secondary Teacher Training, Baccalaureate, Vocational Training and Language Teaching

Faculty: Faculty of Teaching and Educational Sciences

Code: 1020033   **Name:** Didactic resources for Teaching in Mathematics

Credits: 6 ECTS   **Year:**   1º   **Semester:** 2º

Module: Specific of Mathematics Education

Subject Matter: Complements for disciplinary training   **Type:** Basic formation

Department: Mathematics, Natural Sciences and Social Sciencies applied to Education

Type of learning: Classroom-based learning

Language in which it is taught: Spanish

Lecturers:

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Module organization

BASIC THEORETICAL TRAINING

Subject Matter	ECTS	Subject	ECTS	Year/semester
Complements for disciplinary training	6	The Mathematics curriculum	6	1/1
Learning and teaching of the corresponding subjects	12	Mathematics Didactics	6	1/1
		Didactic Resources for Teaching in Mathematics	6	1/2
Innovation in teaching and introduction to educational research	6	Innovation and Research in Didactics of Mathematics	6	1/2

Recommended Knowledge

Not required

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

Code	Learning outcomes
R1	The student analyzes, classifies and selects appropriate teaching resources for the teaching-learning of Mathematics in Secondary and Baccalaureate Education.
R2	The student designs teaching resources for teaching Mathematics in Secondary and Baccalaureate Education.
R3	The student manages the basic functionalities of Geogebra and use it to create new resources and from existing ones.
R4	The student prepares and implements a workshop on the use of teaching resources aimed at teachers.
R5	The student elects and uses different heuristic strategies to solve mathematical problems applying cooperative learning techniques.

Competences

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

Code	General	Weighting			
		1	2	3	4
CG1	Know how to apply the knowledge acquired and your problem-solving ability in new or little-known environments within broader (or multidisciplinary) contexts related to your area of study.			X	
CG3	Ability to communicate their findings (and the knowledge and rationale underpinning these,) to specialists and non-specialists in a clear and unambiguous.				X
CG5	To Know the curriculum related to the specialization and the didactics of teaching and learning. A knowledge of the different professions will be included for vocational training.				X
CG7	To look for, 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	
CG8	Fleshing out the curriculum that will be implemented in a school participating in collective planning of the same, develop are implement teaching methodologies both groups and individually adapted to the diversity of students			X	
CG10	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	

Code	Specific	Weighting			
		1	2	3	4
CE14	Know the history and recent developments of the subjects and their perspectives in order to transmit a dynamic vision of them				X
CE15	To know contexts and situations in which the various course content is used or applied.				X
CE16	To know the theoretical and practical processes in teaching and learning different classroom subjects				X
CE17	To transform the educational plan in work activities.				X
CE18	Acquire selection criteria and development of educational materials.				X
CE19	Promote a climate that facilitates learning and values student contributions.		X		

CE20	Integrate training in audiovisual and multimedia communication in the teaching and learning process.		X		
CE21	To learn strategies and evaluation techniques and to understand the evaluation as a tool to regulate and encourage the effort..				X
CE23	To analyze critically the process of teaching, the practicum and the direction using quality indicators		X		
CE24	To identify the problems of teaching and learning and to propose alternatives and solutions.				X
CE26	To gain experience in planning, teaching and evaluating Mathematics.			X	

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4	40%	Presentation of group work (Geogebra and workshop on manipulative materials).
R1, R2, R3, R4	20%	Oral presentation of individual and group Works: (Geogebra and workshop on manipulative materials).
R1, R2, R5	10%	Individual monitoring of active participation at face-to-face sessions
R1, R2, R5	30%	Questionnaires and classroom practices.

Mention of Distinction: In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with 9 Distinction) may be awarded.
Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong.

Observations: To pass the subject it is essential to attend classes in person. To obtain 100% of the qualification for Individual monitoring of active participation in face-to-face sessions and classroom practices, it is necessary to attend all sessions punctually.

Single evaluation: Exceptionally, those students who, for unforeseen, justified and accredited reasons, cannot undergo the continuous evaluation system and request it from the Coordination of the specialty, within the first month of teaching, may opt for this evaluation system. In this case, the percentage corresponding to the individual monitoring of active participation in face-to-face sessions and classroom practices will be evaluated through alternative practices that will be delivered within the deadlines set by the subject teachers.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1	Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.
M2	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.
M3	Application of interdisciplinary knowledge
M4	Personalized and small group attention. Period of instruction and/or orientation carried out by a tutor for the purpose of reviewing and discussing the materials and topics presented in lectures, semiseminars, readings, writing papers, etc.
M5	Group of oral and/or written tests used during initial, formative or additive assessment.
M6	Groupal preparation of readings, problem solving, seminars, papers, reports, ect. to be presented or submitted in theoretical lectures, practical and/or small-group tutoring. Work done on the university e-learning platform (www.plataforma.ucv.es)
M7	Student study: 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)

IN-CLASS LEARNING ACTIVITIES		
Activity	**Learning Outcomes**	**ECTS**
TEORICAL CLASS	R1, R2, R3, R5	0,52
PRACTICAL CLASS	R1, R2, R3, R4, R5	0,52
SEMINAR	R3, R4	0,04
TUTORING	R1, R2, R3, R4, R5	0,04
INDEPENDENT WORK	R1, R2, R5	0,6
GROUP WORK	R1, R2, R3, R4, R5	0,6
GROUP WORK EXHIBITION	R3, R4	0,04
ASSESSMENT	R1, R2, R3, R4, R5	0,04
	Total	2,4

LEARNING ACTIVITIES OF AUTONOMOUS WORK		
Activity	**Learning Outcomes**	**ECTS**
GROUP WORK	R1, R2, R3, R4, R5	1,44
INDEPENDENT WORK	R1, R2, R5	2,16
	Total	3,6

Description of the contents

Description of the necessary contents to acquire the learning outcomes:

CONTENT BLOCK	Contents
Block I: Classification, analysis and selection of teaching resources	1. Teaching resources. 2. Classification of teaching resources. 3. Functions of teaching resources 4. Analysis of teaching resources. 5. Criteria for selecting teaching resources.
Block II: Technological resources for teaching mathematics	1. The use of Geogebra in teaching mathematics. 2. Platforms for learning mathematics. 3. Artificial intelligence in mathematics learning.
Block III: Manipulative resources for teaching mathematics	1. Importance of the use of manipulative materials in teaching mathematics. 2. Manipulative materials for the different blocks of the Mathematics curriculum. 3. Mathematics workshop
Block IV: Problem solving	1. Importance of problem solving in teaching mathematics. 2. Difficulties in solving mathematics problems. 3. Math problem solving strategies.

Temporary organization of learning

BLOCK OF CONTENT/DICACTIC UNIT	Number of sessions	Hours
Block I: Classification, analysis and selection of teaching resources	2	5
Block II: Technological resources for teaching mathematics	5	12,5
Block III: Manipulative resources for teaching mathematics	6	15
Block IV: Problem solving	1	2,5

References

1. Ausubel, D., 1978. In defense of advance organizers: A reply to the critics. Review of Educational Research, 48, 251-257

2. Batanero, C., 2001. Didáctica de la Estadística, Grupo de Investigación en Educación Estadística. Granada. ISBN: 84-699- 4295-6

3. 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

4. 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/

5. Baroody, A. J., 1988. El pensamiento matemático de los niños. Madrid: Visor/MEC

6. Bouvier, A. y George, M., 1984, Diccionario de matemáticas, Akal Editores

7. Boyer C., 1968. Historia de la matemática. Alianza Editorial, Madrid

8. Briand, J. y Chevalier, M.C., 1995. Les enjeux didactiques dans l'ensignement des mathématiques. Paris: Hatier

9. Brousseau, G., 1988. Utilidad e interés de la didáctica para un profesor. Suma, 4: 5-12 y Suma 5: 5-12 (segunda parte.

10. Cabriá, S., 1994. Filosofía de la estadística, Servicio de Publicaciones de la Universidad de Valencia

11. Calvo, M.C., Deolofeu, J., Jareño, J., Morera, L. 2016. Aprender a enseñar matemáticas en la ESO. Síntesis: Madrid

12. Cascallana, M. T., 1998. Iniciación a la matemática. Materiales y recursos didácticos, Aula XXI. Santillana. ISBN: 84-294-6634-7

13. Castro, E., 2001. Didáctica de la Matemática en la Educación Primaria. Madrid: Síntesis

14. Centeno, J., 1988. Números decimales. ¿Por qué? ¿Para qué? Madrid: Síntesis

15. Chamorro, C. y Belmonte, J. M., 1988. El problema de la medida. Didáctica de las magnitudes lineales (núm. 17). Madrid: Editorial Síntesis S. A.

16. Chevallard, Y., 1985. La transposition didactique. Grenoble: La Pensée Sauvage

17. 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.

18. 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/

19. Colectivo Periódica Pura, 1982. Didáctica de los números enteros. Madrid: Nuestra Cultural

20. Corbalán, F., 1994. Juegos matemáticos para secundaria y bachillerato. Madrid: Síntesis.

21. Dantzig, T., 1971. El número lenguaje de la ciencia. Ed. Hobbs Sudamericana, Buenos Aires

22. De Guzmán, M., 1996. El rincón de la pizarra. Ensayos y visualización en el análisis matemático. Madrid: Pirámide.

23. Dienes, Z.P., Golding, E.W., 1966. Exploración del espacio y práctica de la medida. Teide

24. Dickson, L., Brown, M. y Gibson, O., 1991. El aprendizaje de las matemáticas. Madrid: MEC y Ed. Labor

25. Donaldson, M., 1978. Children's Minds. London: Fontana/Croom Helm, ISBN 0-85664-759-4

26. Fernández, F., Llopis, A. M. y Pablo, C., 1985. Niños con dificultades para las matemáticas. Madrid: CEPE

27. Fischbein, E., 1993. The theory of figural concepts. Educational Studies in Mathematics, 24: 139-162

28. Flores, P., 2001. Aprendizaje y evaluación. En E. Castro (Ed.), Didáctica de la matemática en la Educación Primaria (pp. 41-59). Madrid: Síntesis

29. Font, V., 1994. Motivación y dificultades de aprendizaje en matemáticas. Suma, 17: 10- 16

30. Fouz, F., 2004. Modelo de Van Hiele para la didáctica de la Geometría, Un paseo por la geometría, Ciclo de conferencias.

31. Gadner, M., 1984. El carnaval matemático. Alianza Editorial, Madrid (4.a ed.)

32. 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/

33. 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/

34. 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/

35. 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

36. Gutiérrez, A., 2009. Apuntes de Matemáticas y su Didáctica. Universitat de València

37. Lovell, K., 1977.Desarrollo de los conceptos básicos matemáticos y científicos en los niños. Morata, Madrid

38. Marín, A. y Lupiáñez, J. L., 2005. Los nuevos Principios y Estándares del NTSC en castellano, SUMA 48, pp. 105-112

39. Moreno, M., 1983. La pedagogía operatoria, Laia. Barcelona

40. 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

41. NCTM, 1991. Professional Standards for Teaching Mathematics. Reston, VA: NCTM

42. Nomdedeu, R., 2012. Didáctica de las Matemáticas, Universitat Internacional Valenciana / VIU (en prensa)

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

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

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

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

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

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

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

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

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