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COURSE GUIDE

# Basic Mathematics for Primary Education (2561113)

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| Grado (Bachelor's Degree) | Grado en Educación Primaria (Bilingüe) | Branch | Social and Legal Sciences |
| Module | Enseñanza y Aprendizaje de las Matemáticas | Subject | Bases Matemáticas en la Educación Primaria |

| Year of study | Semester | ECTS Credits | Course type |
|---|---|---|---|
| 1º | 1º | 9 | Compulsory course |

## PREREQUISITES AND RECOMMENDATIONS

- Mastering knowledge of elementary mathematics and, in partiular, primary education mathematics.

## BRIEF DESCRIPTION OF COURSE CONTENT (According to the programme's verification report)

- Study, analysis and reflection on mathematical concepts and procedures, their ways of representation and modelling, phenomenology and historical aspects, using materials and resources on numbers and operations, measurement, estimation and calculation, geometry (shapes and figures and their properties), data analysis and probability.
- The transversal contents of mathematics in primary education: number Sense, problem solving, use of new technologies in mathematics, historical, social and cultural dimension of mathematics.

## SKILLS

### GENERAL SKILLS

- CG01 - Analizar y sintetizar la información
- CG05 - Comunicar oralmente y por escrito con orden y claridad, en la propia lengua y en una segunda lengua
- CG06 - Buscar, seleccionar, utilizar y presentar la información usando medios tecnológicos avanzados
- CG08 - Trabajar en equipo y comunicarse en grupos multidisciplinares
- CG13 - Investigar y seguir aprendiendo con autonomía

### SUBJECT-SPECIFIC SKILLS

- CE01 - Conocer las áreas curriculares de la Educación Primaria, la relación interdisciplinar entre ellas, los criterios de evaluación y el cuerpo de conocimientos didácticos en torno a los procedimientos de enseñanza y aprendizaje respectivos
- CE09 - Valorar la responsabilidad individual y colectiva en la consecución de un futuro sostenible
- CE11 - Conocer y aplicar en las aulas las tecnologías de la información y de la comunicación. Discernir selectivamente la información audiovisual que contribuya a los aprendizajes, a la formación cívica y a la riqueza cultural
- CE50 - Adquirir competencias matemáticas básicas (numéricas, cálculo, geométricas, representaciones especiales, estimación y medida, organización e interpretación de la información, etc.)
- CE52 - Analizar, razonar y comunicar propuestas matemáticas
- CE53 - Plantear y resolver problemas vinculados con la vida cotidiana
- CE55 - Desarrollar y evaluar contenidos del currículo mediante recursos didácticos apropiados y promover las competencias correspondientes en los estudiantes

## LEARNING OUTCOMES

- Know and relate the main concepts, structures and procedures that make up the topics of Primary School Mathematics.
- Understand and properly employ the facts and properties of mathematical concepts and structures.
- Use mathematical procedures correctly in a written and symbolic way.
- Analyze, reason and effectively communicate mathematical arguments.
- Manage and relate the different ways of representing the mathematical concepts and procedures of Primary Education.
- Model phenomena from different disciplines with notions and basic mathematical tools.
- State, formulate and solve mathematical problems through different strategies in a variety of situations and contexts.
- Use manipulative, graphic, symbolic and technological models to express relationships, properties and mathematical operations.
- Use symbolic language in mathematics and relate it to everyday language.
- Know and manage the basic structure of the Primary Education math curriculum in terms of its contents, and describe it clearly and accurately.
- Perceive mathematical knowledge as part of our culture, with an interdisciplinary and socially useful character.
- Appreciate the educational work in mathematics as a professional, ethical and social commitment

## PLANNED LEARNING ACTIVITIES

### THEORY SYLLABUS

- **Unit 1.** Numbers and algebra
    1. Numbers. Classification, properties, representations and uses
    2. Interpretation of operations. Approach and resolution of arithmetic word problems
    3. Calculation strategies and algorithms. Properties of numbers and operations
    4. Patterns and relationships. Interpretation and representations
- **Unit 2.** Geometry

1. Geometric elements in the plane and in space. Representations and visualization
2. Properties of plane figures and 3D-shapes: Geometric modeling
3. Transformations in the plane and regularities
4. Reasoning and Proof in Geometry

- **Unit 3.** Measurement
  1. Perception of magnitudes: length, surface, volume, amplitude, mass, capacity, time and money
  2. Units of measurement: types, choice of units and conversion
  3. Direct measurement. Personal strategies
  4. Indirect measurement. Interpretation of school formulas
  5. Measurement estimation
- **Unit 4.** Statistics and probability
  1. Statistical studies. Collection of information, types of data and variables
  2. Data representation: tables, graphs and statistical measures. Interpretations
  3. Deducing conclusions and statistical inference
  4. Perception of random phenomena and quantification of uncertainty

## PRACTICAL SYLLABUS

The practices in small groups are associated with the four basic blocks of content (Arithmetic, Geometry, Magnitudes and their measurement and Statistics and probability) and will be carried out through the use of manipulative materials and/or computing resources. This design of practices pursues a twofold goal.
Firstly, it is intended that students, in groups and autonomously, explore and experience mathematical activities to face the work with new mathematical notions or to deepen the study of notions already introduced in previous sessions. Secondly, these activities contribute to know and use a large number of manipulatives and resources that can be used in the teaching and learning of mathematics in primary education.
Some of the thematic core of the four practice sections are the following:

- Arithmetic: numbering systems; calculation: algorithms and methods; arithmetic problems; fractions and decimals.
- Geometry: polygons: classification and properties; patterns and shapes; polyhedra: classification and basic elements; geometric transformations
- Magnitudes and measurement: direct and indirect measures; measuring instruments; metric system.
- Statistics and probability: organisation of data; interpretation of information in the media; phenomena related to chance.

# RECOMMENDED READING

## ESSENTIAL READING


- CARRILLO, J., CONTRERAS, L. C., CLIMENT, N., MONTES, M. A., ESCUDERO, D. I. Y FLORES, E. (2016). Didáctica de las Matemáticas para maestros de Educación Primaria. Paraninfo.
- CHAPIN, S. H., & JOHNSON, A. (2006). Math Matters: Understanding the Math You Teach Grades K-8 (2nd Ed.). Math solutions publications.
- CASTRO, E. (Edt.)(2001). Didáctica de la matemática en la Educación primaria. Síntesis.
- GODINO, J. D. (Dir.) (2004). Matemáticas para maestros. Departamento de Didáctica de la Matemática. http://www.ugr.es/local/jgodino
- KRAUSE, E. F. (1991). Mathematics for elementary teachers. A balanced approach. D. C.

Heath and Company.
- SEGOVIA. I. Y RICO, L. (Coord.) (2011). Matemáticas para maestros de educación primaria. Pirámide.

## COMPLEMENTARY READING

**Books on primary education mathematics and its didactics**

- ALSINA, Á. (2019). Itinerarios didácticos para la enseñanza de las matemáticas (6-12 años). Graó.
- BLANCO, L., CLIMENTE, N., GONZÁLEZ, M. T., MORENO, A., SÁNCHEZ-MATAMOROS, G., DE CASTRO, C. Y JIMÉNEZ, C. (Eds.) (2023), Aportaciones al desarrollo del currículo desde la investigación en educación matemática. Editorial Universidad de Granada.
- CALVO, C., CARRILLO, A., DE LA FUENTE, A., DE LEÓN, M., GONZÁLEZ, M. J., GORDALIZA, A., GUEVARA, I., LÁZARO, C., MONZÓ, O., MORENO, A. J., RODRÍGUEZ, L. J., RODRÍGUEZ, J. Y SERRADÓ, A. (2021). Bases para la elaboración de un currículo de Matemáticas en Educación no Universitaria. Comité Español de Matemáticas.
- CASTRO, E. (Edt) (2001). Didáctica de la matemática en la Educación primaria. Síntesis.
- CHAMORRO, C. (Coord.) (2003). Didáctica de las matemáticas para primaria. Pearson-Prentice Hall.
- GODINO, J. D. (Dir.) (2004). Matemáticas para maestros. Departamento de Didáctica de la Matemática de la Universidad de Granada. http://www.ugr.es/local/jgodino
- LLINARES, S. Y SANCHEZ, V. (1988). Fracciones. Síntesis.
- MAZA, C. (1991). Enseñanza de la suma y de la resta. Síntesis.
- RESNICK, L. Y FORD, W. (1990). La enseñanza de las matemáticas y sus fundamentos psicológicos. Paidós-MEC.
- VAN DE WALLE, J. A. (2009) Elementary and Middle School Mathematics. Teaching Developmentally. Longman, New York.

**Focused on numbers and algebra**

- BURGOS, M. (2023). Razonamiento algebraico elemental. Implicaciones en la formaciónde profesores. Servicio de publicaciones de la Universidad de Almería.
- CAÑADAS, M. C. (2016). Álgebra escolar: un enfoque funcional. Uno: Revista de didácticade las matemáticas, 73, 7-13.
- CASTRO E., RICO L., CASTRO E. (1988) Números y operaciones. Fundamento para unaaritmética escolar. Síntesis.
- CENTENO, J. (1988). Números decimales. ¿Por qué? ¿Para qué? Síntesis.
- GARCÍA-PEREZ, M. T. Y ADAMUZ-POVEDANO, N. (2019). Del número al sentidonumérico y de las cuentas al cálculo táctico. Fundamentos, recursos y actividades para iniciar el aprendizaje. Octaedro.
- GOMEZ B. (1988). Numeración y Cálculo. Síntesis.

**Focused on geometry**

- ALSINA, C., BURGUES, C., FORTUNY, J. M. (1987). Invitación a la didáctica de la geometría. Síntesis.
- ALSINA, C., BURGUES, C., FORTUNY, J. M. (1988). Materiales para construir la geometría. Síntesis.
- GUILLEN G. (1991). Poliedros. Síntesis.

**Focused on measurement**

- CHAMORRO, C., BELMONTE, J. M. (1988) El problema de la medida. Didáctica de las magnitudes lineales. Síntesis.
- OLMO, A., MORENO, F. y GIL, F. (1988) Superficie y volumen. ¿Algo más que el trabajo con fórmulas? Síntesis.
- SEGOVIA, I., CASTRO E., CASTRO E. y RICO L. (1989). Estimación en cálculo y medida. Síntesis.

**Focused on statistics and probability**

- BOLOGNA, E. (2013). Estadística para psicología y educación. Editorial Brujas.
- GODINO, J. D., BATANERO, C. y CAÑIZARES, M. J. (1987) Azar y probabilidad. Síntesis.


**Other resources**

- Primary Education Mathematics textbooks.

## RECOMMENDED LEARNING RESOURCES/TOOLS

- http://clic.xtec.cat/db/listact_es.jsp (Spanish)
- https://es.mathigon.org/ (Spanish)
- https://www.geogebra.org/? (English, Spanish, etc.)
- http://illuminations.nctm.org/mobile/ (English)
- https://intef.es/recursos-educativos/recursos-para-el-aprendizaje-en-linea/matesgg/ (Spanish)
- http://nlvm.usu.edu/es/ (Spanish)
- https://nrich.maths.org/ (English)
- https://pensamientoalgebraico.es/es/actividades/primaria-6-11-anos (English/Spanish)
- http://recursostic.educacion.es/descartes/web/ (Spanish)
- https://tuvalabs.com/ (Spanish)

## TEACHING METHODS

- MD01 - Aprendizaje cooperativo. Desarrollar aprendizajes activos y significativos de forma cooperativa.
- MD02 - Aprendizaje por proyectos. Realización de proyectos para la resolución de un problema, aplicando habilidades y conocimientos adquiridos.
- MD03 - Estudio de casos. Adquisición de aprendizajes mediante el análisis de casos reales o simulados.
- MD04 - Aprendizaje basado en problemas. Desarrollar aprendizajes activos a través de la resolución de problemas.

## ASSESSMENT METHODS (Instruments, criteria and percentages)

### ORDINARY EXAMINATION DIET

The evaluation of the level of acquisition of the competences, in ordinary call, will be continuous and formative, taking into account the aspects of the development of the subject, in which individual and group work is observed, as well as the significant learning of the theoretical contents and its practical application. To opt for continuous evaluation, it will be essential that the teacher has observations of each student in a percentage equal to or greater than 80% of the practical sessions taught. These observations will focus on their way of working, their commitment to the subject, dedication to it or the skills they show, among others.
In this case, the overall grade will correspond to the weighted score of the different aspects and activities that make up the evaluation system:

- Part 1. Evaluation of one or several written tests (that may include problem solving, essay questions, short answer questions, questions referring to cases or assumptions, questions to discuss the truth/falsehood of certain statements, etc.).
- Part 2. Evaluation of tasks and small projects, carried out individually or in group.The presentation, writing and clarity of ideas, structure and scientific level, creativity,

justification of what it argues, critical ability, adequacy o the bibliography used will be valued.
- Part 3. Evaluation of the degree of involvement and attitude of students expressed in their active and reflective participation in the sessions, consultations, exhibitions and debates; as well as in the preparation of work (individual or in groups), and in discussion sessions. Attendance at classes, seminars, tutorials, group sessions will also be taken into account.

To pass the subject it is necessary to independently pass the different parts of the evaluation mentioned above, whose weights in the final grade are as follows.
- Part 1: 50%;
- Part 2: 40%;
- Part 3: 10%.

The final grade in the subject obtained by each student under the continuous evaluation mode in the ordinary evaluation call is as follows.
If the student has taken the test or tests referred to in part 1:
- If the grade obtained in each of the three aforementioned evaluation parts is greater than or equal to 5 out of 10 points, the final grade is the weighted average of the grades obtained;
- If the grade obtained in at least one of the evaluation parts is less than 5 out of 10 points, the final grade is the minimum of the grades obtained in the evaluation parts.

If the student has not taken the test or tests referred to in part 1, the final grade is “No show”.
In the event of failing to pass any of the evaluation parts that make up the ordinary evaluation of the subject, the student may take the extraordinary evaluation.
Disambiguations of these grading criteria will be done, if necessary, by the corresponding teaching staff.

## EXTRAORDINARY EXAMINATION DIET

The extraordinary evaluation of the subject aims to assess the meaningful learning of the students regarding the theoretical contents of the subject and its practical application.
Evaluation in this call is carried out through one or more written tests about theoretical and practical contents. Passing the subject requires passing each test. The weight of the theoretical part in the final grade is 50% and the weight of the practical part in the final grade is 50%. If a student had passed any of the parts 1 or 2 that make up the ordinary evaluation of the subject, in the extraordinary evaluation test the student may choose to address only the part not passed in the ordinary evaluation call. In such case, the grade obtained by the student in the extraordinary evaluation call in the part passed in the ordinary evaluation call will be considered to be the one obtained in it.
The final grade in the subject obtained by each student in the extraordinary evaluation call is as follows.
- If the grade obtained in each of the parts is greater than or equal to 5 out of 10 points, the final grade is the weighted average of the grades obtained;
- If the grade obtained in at least one of the parts is less than 5 out of 10 points, the final grade is the minimum of the grades obtained.
- If the student has not taken the test(s), the final grade is "No show".

Disambiguations of these grading criteria will be done, if necessary, by the corresponding teaching staff.

## SINGLE FINAL ASSESSMENT (evaluación única final)

Those students who have been granted the single final evaluation according to the corresponding regulations (www.ugr.es/sites/default/files/2017-09/NCG1114.pdf) will be evaluated through a written test, with theoretical and practical parts, with weights in the final grade of 50% and 50%

respectively. This test will assess their significant learning of the contents of the subject and their development of the expected competencies.
The final grade in the subject obtained by each student under the single final evaluation mode is as follows.
If the student has taken the test:

- If the grade in each of the parts is greater than or equal to 5 out of 10 points, the final grade is the weighted average of the grades obtained;
- If the grade obtained in at least one of the parts is less than 5 out of 10 points, the final grade is the minimum of the grades obtained.

If the student has not taken the test, the final grade is "No show".
Disambiguations of these grading criteria will be done, if necessary, by the corresponding teaching staff.

## ADDITIONAL INFORMATION

- In those evaluation tests that require or plan to use audio and/or video during its development, this use will be done in accordance with the guidelines established in the instructions and recommendations for the application of data protection, personal or home privacy regulations established by the General Secretary or competent body of the University of Granada.
- This syllabus is subject to possible adaptations for students with recognised specific educational support needs (SESN) in accordance with the reports provided by their corresponding SESN tutors at the University of Granada and the regulations of the University of Granada: https:/ /www.ugr.es/sites/default/files/2017-09/NCG1114.pdf.
- Following the Regulations for Evaluation and Qualification of the students of the University of Granada (https://www.ugr.es/universidad/normativa/texto-consolidado-normativa-evaluacioncalificacion-estudiantes-universidad-granada), is highlighted the content of article 15 about the originality of the works and production in tests:

1. The University of Granada will promote respect for intellectual property and will transmit to students that plagiarism is a practice contrary to the principles that govern the University education. For this, it will proceed to recognise the authorship of the works and their protection in accordance with intellectual property as established by current legislation.
2. Plagiarism, understood as the presentation of a work or work done by another person as one's own or the copying of texts without citing their origin and giving them as one's own elaboration, will automatically lead to a numerical grade of zero in the subject in which it was detected, regardless of the rest of the grades that the student would have obtained. This consequence must be understood without prejudice to the disciplinary responsibilities that students who plagiarize may incur.

- Link to single final evaluation request: https://sede.ugr.es/procs/Gestion-Academica-Solicitud-de-evaluacion-unica-final.
- Link to request for evaluation due to incidents: https://sede.ugr.es/procs/Gestion-Academica-Solicitud-de-evaluacion-por-incidencias.

Información de interés para estudiantado con discapacidad y/o Necesidades Específicas de Apoyo Educativo (NEAE): Gestión de servicios y apoyos (https://ve.ugr.es/servicios/atencion-social/estudiantes-con-discapacidad).

## SOFTWARE LIBRE

LibreOffice, Maxima, GeoGebra, PSPP, etc.