COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Humanities		
ACADEMIC UNIT	Department of Prechool Education Sciences and Educational Design. Postgraduate Studies Programme in Children's Book and Educational Material.		
LEVEL OF STUDIES	Postgraduate Studies (Level 7)		
COURSE CODE	ΠΥ3	SEMESTER	B'
COURSE TITLE	Educational material in mathematics		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	WEEKLY TEACHING HOURS	CREDITS
Lectures	3	6 in total for the whole course
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialised general knowledge, and skills development
PREREQUISITE COURSES:	Core courses
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://pms-pvpy.aegean.gr/en/educational-material-orientation/

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The students are expected to:

The students are expected to:

- know materials and means for teaching and learning mathematics
- develop the ability to select educational materials for teaching and learning mathematics
- develop the ability to evaluate educational materials for teaching and learning mathematics
- develop the ability to integrate educational materials in teaching mathematics
- develop capacity to access and utilize educational research
- design and develop educational materials for teaching and learning mathematics

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

The general competences sought to be acquired are:

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Adapting to new situations
- Decision-making
- Working independently
- Team work
- Working in an interdisciplinary environment
- Production of new research ideas
- Project planning and management
- Respect for difference and multiculturalism
- Respect for the natural environment
- Showing social, professional and ethical responsibility and sensitivity to gender issues
- Production of free, creative and inductive thinking

(3) SYLLABUS

The purpose of this course is to investigate the role of educational material in the teaching and learning of mathematics, as well as to highlight the need for designing its integration in the educational process. The study of the different types of materials is sought to determine the characteristics of the educational materials as well as the principles of their design/selection, and evaluation. Also, the special characteristics attributed to the role of educational materials are studied and analyzed from the perspective of different learning theories. Through examples of the use of educational materials, the various dimensions related to their inclusion in the teaching and learning process are highlighted and analyzed. From the study of the current teaching and learning approaches, the principles of design, development and integration of educational materials emerge, which form the basis for the design and production of educational materials.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>face-to-face or/and distance learning</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of ICT in teaching and communication with students</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>26 h</td></tr>
<tr><td>Literature study and analysis</td><td>60 h</td></tr>
<tr><td>Elaboration and presentation of a theoretical manuscript</td><td>28 h</td></tr>
<tr><td>Elaboration and presentation of a research manuscript</td><td>36 h</td></tr>
<tr><td>Course total</td><td>150 h</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>The language of evaluation is Greek.

The assessment for the course accounts the following:

• Individual reflection assignments (edit of reflection texts for basic concepts) (20%),
• Collaborative learning project (50%)
• Presentation of the collaborative project (20%)
• Thorough and active participation (10%)

The assessment procedure may adapt year by year.

The use of GenAI tools within the context of the course is governed by Senate Decision No. 45/20.02.2026 of the University of the Aegean, as well as by the specific guidelines provided by the teaching staff member. The teaching staff member determines the applicable level of GenAI use (1–5) for the course, along with the conditions for its permissible use and disclosure and informs students accordingly at the beginning of the semester.
The GenAI usage policy may vary from one academic year to another and/or between courses, depending on the learning objectives and requirements of each course.</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Bragg, L. (2012). Testing the effectiveness of mathematical games as a pedagogical tool for children's learning. International Journal of Science and Mathematics Education, 10, National Science Council.

Elia, I. (2020). Word problem solving and pictorial representations: insights from an exploratory study in kindergarten. ZDM 52(17-31).

Fujita, T., Doney, J., & Wegerif, R. (2019). Students' collaborative decision-making processes in defining and classifying quadrilaterals: a semiotic/dialogic approach. Educational Studies in Mathematics, 101, 341–356. https://doi.org/10.1007/s10649-019-09892-9

Gómezescobar, (2020). How long is it? Difficulties with the standard ruler use in Spanish children aged 5 to 8. Early Childhood Education Journal 48, 693-701.

Heshmati, S., Kersting, N. & Sutton, T. (2018). Opportunities and challenges of implementing instructional games in mathematics classrooms: Examining the quality of teacher-student interactions during the cover-up and un-cover games. International Journal of Science and Mathematics Education 16, 777-796.

MacDonald, A., & Murphy, S. (2020). Young children's understandings of clocks at the start of school. International Journal for Mathematics Teaching and Learning, 21(1), 19-30.

Montenegro, P. Costa, C. & Lopes, B. (2018). Transformations in the visual representation of a figural pattern. Mathematical Thinking and Learning, 20, 2, 91-107, DOI: 10.1080/10986065.2018.1441599

Osana, H., Adrien, E. & Duponsel, N. (2017). Effects of instructional guidance and sequencing of manipulatives and written symbols on second graders' numeration knowledge. Education Sciences, 7(2), 52. doi:10.3390/educsci7020052

Overmann, K. (2018). Constructing a concept of number. Journal of Numerical Cognition, 4(2), 464-493, doi:10.5964/jnc.v4i2.161

Rezat, S. & Straßer, R. (2012). From the didactical triangle to the socio-didactical tetrahedron: artifacts as fundamental constituents of the didactical situation. ZDM Mathematics Education, 44, 641–651. DOI 10.1007/s11858-012-0448-4

Ross, W., Vallée-Tourangeau, F. & Van Herwegen, J. (2020) Mental arithmetic and interactivity: the effect of manipulating external number representations on older children's mental arithmetic success. International Journal of Science and Mathematics Education, 18, 985-1000.

Stebler, R., Vogt, F., Wolf, I., Hauser, B. & Rechsteiner, K. (2013). Play-Based Mathematics in Kindergarten. A Video Analysis of Children's Mathematical Behaviour While Playing a Board Game in Small Groups. J Math Didakt, 34, 149-175. Doi 10.1007/s13138-013-0051-4

Ubuz, B. & Erdogan, B. (2019). Effects of physical manipulative instructions with or without explicit metacognitive questions on geometrical knowledge acquisition. International Journal of Science and Mathematics Education 17, 129-151.

Ulusoy, F. (2019). Early-Years prospective teachers' definitions, examples and non-examples of cylinder and prism. International Journal for Mathematics Teaching and Learning, 20(2), 149-169.

Van Lieshout E. & Xenidou-Dervou, I. (2020). Simple pictorial mathematics problems for children: locating sources of cognitive load and how to reduce it. ZDM 52(73-85).

- Related academic journals:

Educational Studies in Mathematics
Eurasia Journal of Mathematics, Science & Technology Education
International Journal for Mathematics in Education
International Journal of Science and mathematics Education
Research in Science Education
ZDM