Universitat de Lleida

DEGREE CURRICULUM

DEVELOPMENT AND TECHNOLOGICAL INNOVATION AT SCHOOL

Coordination: BARBERO SOLA, IVAN RAUL

Academic year 2023-24

DEVELOPMENT AND TECHNOLOGICAL INNOVATION A... 2023-24

Subject's general information

Subject name	DEVELOPMENT AND TECHNOLOGICAL INNOVATION AT SCHOOL
Code	100991
Semester	1st Q(SEMESTER) CONTINUED EVALUATION
Typology	

Degree	Course	Character	Modality
Bachelor's Degree in Primary Training	4	OPTIONAL	Attendance-based
Double bachelor's degree: Degree in Pre-school Education and Degree in Primary Training	5	OPTIONAL	Attendance-based
Double bachelor's degree: Degree in Primary Training and Degree in Physical Activity and Sports Sciences	5	OPTIONAL	Attendance-based

Course number of credits (ECTS)	6
Type of activity, credits, and groups	

Activity type	PRAULA	TEORIA
Number of credits	1.8	4.2
Number of groups	1	1

Coordination	BARBERO SOLA, IVAN RAUL
Department	EDUCATION SCIENCES
Important information on data processing	Consult this link for more information.
Language	Catalan

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
BARBERO SOLA, IVAN RAUL	ivan.barbero@udl.cat	2	
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Subject's extra information

This course participates in the academic year 2023/2024 in the project "UnimSTEM: proposta integradora universitat-escoles per al desenvolupament de competències STEAM i CDD" (code EDU128/23/000161) subsidised by the Department of Education of the Generalitat de Catalunya in line 2 of the call for proposals Digital impulse to education. Framework of the Recovery, Transformation and Resilience Plan (Next Generation Fund, EU). This involves the co-participation of in-service teachers during the course at certain times and in relation to part of the assessment activities (especially block 3).

Learning objectives

1. Identify the possibilities of technology for educational innovation through STEM assumptions.

2. Analyse STEM educational experiences enriched by technology in elementary education classrooms.

3. Experimenting with digital pedagogies and appropriate technologies to develop STEM skills.

4. Experimenting with inquiry making use of digital technologies and data to solve social problems present to STEM challenges.

5. Create STEM educational scenarios for primary education that make an innovative / transformative use of technology in teaching-learning methodologies.

6. Develop a proactive, critical and responsible attitude to the use of technologies to STEM educational innovations.

Competences

BASIC SKILLS

CB02: Apply their knowledge to their work or vocation in a professional way and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.

CB03: Gather and interpret relevant data (usually within their study area) to make judgments that include a reflection on relevant issues of a social, scientific or ethical nature.

CB04: Transmitting information, ideas, problems and solutions to both specialized and non-specialized audiences.

GENERAL COMPETENCES

CG01. To promote democratic values, with special emphasis on tolerance, solidarity, justice and non-violence, and to know and value human rights.

CG02. Know the intercultural reality and develop attitudes of respect, tolerance and solidarity towards different social and cultural groups.

CG03. Know the right to equal treatment and opportunities between women and men, in particular by eliminating discrimination against women, whatever their circumstance or condition, in any of the areas of life.

CG04. Know the measures that guarantee and make effective the right to equal opportunities for people with disabilities.

CG05. Develop the ability to critically analyze and reflect on the need to eliminate all forms of discrimination, direct or indirect, in particular racial discrimination, discrimination against women, that derived from sexual orientation or that caused by a disability.

CG06. Assume the commitment of personal and professional development with oneself and the community. Adapt the learning proposals to the most significant cultural evolutions.

SPECIFIC COMPETENCES

CE01: Know the curricular areas of Primary Education, the interdisciplinary relationship between them, the evaluation criteria and the body of didactic knowledge around the respective teaching and learning procedures.

CE02: Design, plan and evaluate teaching and learning processes, both individually and in collaboration with other teachers and professionals at the center.

CE04: Encourage reading and critical comment on texts from the various scientific and cultural domains contained in the school curriculum.

CE09: Assume that the exercise of the teaching function has to be perfected and adapted to scientific, pedagogical and social changes throughout life.

CE14: Reflect on classroom practices to innovate and improve teaching work.

CE15: Acquire habits and skills for autonomous and cooperative learning and promote it among students.

CE16: Selectively discern audiovisual information that contributes to learning, civic training and cultural wealth.

CE.17. Understand the role, possibilities and limits of education in today's society and the fundamental competencies that affect primary schools and their professionals.

TRANSVERSAL COMPETENCES

CT03: Acquire training in the use of new technologies and information and communication technologies.

CT04: Acquire basic knowledge of entrepreneurship and professional environments.

CT05: Acquire essential notions of scientific thought.

Subject contents

Topic 1: Technology and engineering in education

1.1. Resolution of STEM challenges through engineering. Mechanisms and operators of specific engineering.

1.2. Artificial intelligence in education (AIEd) and the internet of things.

1.3. 3d printing.

Topic 2: STEM educational scenarios with digital technologies

2.1. Maker methodology.

2.2. Gamification. Virtual or hybrid escape rooms.

2.3. Augmented and virtual reality.

2.4. Personalization of learning. Machine learning and chatbots.

2.5. Open data. Data repositories. Data journalism.

2.6. Repositories and STEM software. STEM educational experiences.

Topic 3: Development of computational thinking

3.1. Programming languages.

3.2. Computational thinking. Computational thinking unplugged.

3.3. Educational robotics.

3.4. Creation of mobile apps.

Methodology

- Case-based learning
- ICT use
- Individual works
- Tutorships
- Practices
- Collaborative / Cooperative
- Project / problem-based learning
- Readings / bibliographic consultation
- Personal study
- Oral communication and / or work debates / didactic proposals
- Monitoring of individual / group work
- Written tests / performance of work

Development plan

TOPIC 1

Week	Activity
1	Initial activity of solving STEM challenges through engineering. Identify STEM elements.
1	Resolution of real problems from the design and use of programmable machines.
2	Analysis of different apps for 3D printing.

2 Initiation activity to 3D printing.

TOPIC 2

Week Activity

3 Maker Methodology. Analysis of experiences.

3 Analyse / Observe different creations of virtual escape rooms. Design a virtual escape room.

4 Initiation activity to augmented reality. Analysis of virtual reality experiences.

4 Initiation to inquiry based on open data.

5-7 Initiation to chatbots and machine learning. Possibilities and challenges of AI in Education.

11 Study and investigation of the different spaces, digital resources, apps and STEM programming. Identification and analysis of STEM educational scenarios with technologies.

TOPIC 3

Week Activity

7 Introduction to computational thinking. Materials and resources to develop computational thinking in the primary education classroom.

7 Introduction to programming: introduction to the different programming languages (Scratch, blocks, etc.).

7-9 Introduction to educational robotics. Design and implementation of robotics projects.

9-10 Mobile application design.

Evaluation

BLOCK 1: Classroom practices of STEM educational scenarios with digital technologies (in group): 30%

- *Assessment activity 1: Escape Room: 15%*
- *Assessment activity 2: Educational Chatbot: 15%*

Recoverable block. The minimum grade for each activity in the block must be 5 and the maximum mark for recovery of failed activities (if applicable) is 5.

BLOCK 2: Practical activities for developing computational thinking (in group): 30%

- *Assessment activity 1: Computational thinking and Robotics: 15%*
- *Assessment activity 2: Educational App: 15%*

Recoverable block. The minimum grade for each activity in the block must be 5 and the maximum mark for recovery of failed activities (if applicable) is 5.

BLOCK 3: Proposal for educational innovation with technology at school (individual): 40%

- *Assessment activity 1: Group tutorials to monitor the individual proposal: 15%.*
- *Assessment activity 2: Final delivery of the written work: 25%.*

It will be especially valued that the proposals incorporate technology in a way that goes beyond improvement based on substitution, towards educational transformation (of processes, learning, communication, etc.), and that they consider the integration of STEM and not only T.

Recoverable block. The minimum grade for the block must be 5 and the maximum mark for the block (if applicable) is 5.

BLOCK 4: Assessment activity STEM Portfolio (individual): 10%

The process of developing the STEM portfolio is important and includes the personal and individual selection of evaluable and non-evaluable practical classroom activities, and especially the reflection on their contribution to one's own learning, STEM didactic potential and one's own professional identity as a STEM teacher, among other aspects.

Non-recoverable block. If failed, it is averaged with the rest of the grades of the blocks.

ALTERNATIVE ASSESSMENT

Due to the dynamics of the subject, students who meet the alternative assessment requirements will have to carry out the same activities individually. The weighting criteria are those established for each activity. The delivery dates and assessment criteria are the same as those applied to students with continuous assessment.

In the case of practical classroom activities that require physical manipulation (such as educational robotics), an alternative educational design practice will be carried out with the corresponding technological elements.

It will be compulsory to attend the follow-up tutorial of the educational innovation proposal with technology at school (assessment act. 1 of Block 3).

ADDITIONAL NOTE

If applicable, the support measures for assessment derived from UdLxTothom will be complied with.

Bibliography

Arabit-García J. & Prendes-Espinosa, Mª. P. (2020). Metodologías y Tecnologías para enseñar STEM en Educación Primaria: análisis de necesidades. *Pixel-Bit. Revista de Medios y Educación, 57*, 107-128. https://doi.org/10.12795/pixelbit.2020.i57.04

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en educación. *Revista Interuniversitaria de Investigación en Tecnología Educativa*, (7). https://doi.org/10.6018/riite.407731

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Generalitat de Catalunya (2017). *Pla STEMcat d'impuls de les vocacions científiques, tecnològiques, en enginyeria i en matemàtiques*. https://projectes.xtec.cat/steamcat/wp-content/uploads/usu1760/2019/09/pla-stem.pdf

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