

<b>STEAM EDUCATION FOR SUSTAINABILITY: METHODOLOGICAL APPROACHES AND INSPIRING EXPERIENCES (MASTED-02-15)</b>				
<b>DEGREE PROGRAM:</b>		Master in integrated STEAM Education (MASTED)		
<b>SEMESTER:</b> Second	<b>TYPE:</b> Basic	<b>CREDITS:</b> 6 ECTS	<b>WORKLOAD:</b> 150 hours	<b>MENTORING:</b> 4 hours/week
<b>LANGUAGE:</b> Spanish/English friendly				

<b>OBJECTIVES</b>	
<b>General</b>	Acquiring specific knowledge, values and skills for the implementation of STEAM educational approaches for promoting sustainability.
<b>Specific</b>	<ul style="list-style-type: none"> <li>• Knowing about the origin and foundation of STEAM education.</li> <li>• Identifying sociological, epistemological and didactic arguments for STEAM education.</li> <li>• Learning about international initiatives for STEAM and sustainability education.</li> <li>• Recognising the main features and affordances of inquiry-based learning and its potential for STEM education.</li> <li>• Applying context-based learning to provide meaningful and relevant STEM education.</li> <li>• Recognising the main features and affordances of Project-Based Learning and its potential for STEM education.</li> <li>• Designing STEM interventions based on the use of socio-scientific inquiry-based learning.</li> <li>• Learning about approaches related to citizen science and its potential for STEM and sustainability education.</li> </ul>
<b>SUBJECT MATTER</b>	
During the modules, students will be introduced to the foundation of STEAM educational approaches and analyse and apply good practices to promote sustainability through interdisciplinary context-based learning.	
<b>COMPETENCES</b>	
<ul style="list-style-type: none"> <li>• C2: Developing advanced cognitive and procedural skills associated with knowledge development and creation.</li> <li>• C3: Developing of plans and organising and innovating the teaching/learning process, as well as apply the plan and assess its application for STEAM and sustainability education.</li> <li>• C7: Developing the ability to establish effective relationships with families, to cooperate with colleagues and with other institutions from the community.</li> <li>• C17: Embracing complexity in sustainability.</li> <li>• C18: Acting for sustainability.</li> </ul>	
<b>LEARNING OUTCOMES</b>	
<b>Knowledge</b>	<ul style="list-style-type: none"> <li>• Knowledge of the origin and foundation of STEAM education, identifying sociological, epistemological and didactic arguments for STEAM education.</li> <li>• Knowledge about different pedagogical approaches, good practices and international initiatives in STEM education with a focus on contextualized meaningful and competence-based learning.</li> </ul>
<b>Skills</b>	<ul style="list-style-type: none"> <li>• Ability to design, plan, implement and evaluate STEAM educational approaches for sustainability.</li> </ul>
<b>Attitudes/values</b>	<ul style="list-style-type: none"> <li>• Commitment to STEAM high-quality education.</li> <li>• Ability to value STEAM education as an interesting tool for education to sustainable development.</li> </ul>
<b>TEACHING METHODS</b>	
Students will be introduced to the foundations of STEAM education and will develop design and evaluation skills to promote sustainability through STEAM education approaches. Lessons will be developed around questions for discussion and reflection, offering opportunities to analyse own and	

others' ideas, to explore relevant literature work, to experience interesting pedagogical approaches for promoting sustainability through STEAM education.

**EVALUATION**

Students will be evaluated on the basis of the content and quality of their productions, their participation and engagement in the activities carried out and the knowledge, skills and attitudes shown in their responses and reactions to the questions and challenges posed by the teacher. Evaluation criteria will be aligned with the learning objectives and will allow us to evaluate to what extent the objectives have been attained.

**PRECONDITIONS**

None

**DEPARTMENT**

Didactics of Sciences; Animal Biology, Plant Biology and Ecology.

**LECTURERS**

Romero Ariza, Marta  
 Quesada Armenteros, Antonio  
 Abril Gallego, Ana María  
 Martín Peciña, María  
 Muela García, Francisco Javier  
 Parra Anguita, Gema.

**LITERATURE**

- Hadjichambis, A. C., Reis, P., Paraskeva-Hadjichambi, D., Činčera, J., Boevde Pauw, J., Gericke, N., & Knippels, M. C. (2020). Conceptualizing environmental citizenship for 21st century education. Springer Nature.
- Khine, M., & Areepattamannil, S. (2019). Steam education. Springer International Publishing, ISBN 9783030040024.
- National Academies of Sciences, Engineering, and Medicine 2020. Teaching K-12 Science and Engineering During a Crisis. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25909>.
- National Academy of Sciences (2014). STEM integration in K-12 education: Status, prospects, and an agenda for research. Washington, DC: National Academies Press.
- Sengupta, P., Shanahan, M. C., & Kim, B. (Eds.). (2019). Critical, transdisciplinary and embodied approaches in STEM education. Springer.
- Thibaut, L., Ceuppens, S., De Loof, H., De Meester, J., Goovaerts, L., Struyf, A., ... Depaepe, F. (2018). Integrated STEM education: A systematic review of instructional practices in secondary education. European Journal of STEM Education, 3(1), 02. <https://doi.org/10.20897/ejsteme/85525>