The International Journal of
ENGINEERING
EDUCATION

CALL FOR PAPERS
SPECIAL ISSUE ON

Computational Thinking in Engineering Education for Addressing Complexity

Guest Editors

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Description

Engineering education, a field in which your expertise is crucial, is grappling with increasingly complex challenges in a world undergoing digital transformation and growing global interconnectedness. The ability to address these complex problems through computational thinking, a competency that you are uniquely positioned to develop and promote, has become essential for future engineers. It enables them to analyze, decompose, and solve situations systematically and logically.

Addressing complexity from engineering education through the development of computational thinking to address contemporary challenges aligned to the Sustainable Development Goals is a perspective that has been successfully adopted in different contexts. The literature in this branch reports that the integration of computational thinking competency is effectively achieved through model-based, project-based, and inquiry-based initiatives, fostering active participation of students in taking responsibility for their learning [1]. The sub-competences of computational thinking, i.e., algorithmic thinking, pattern recognition, abstraction, and decomposition [2-4], enable students in any discipline to create solutions to complex problems based on practice and linked to the surrounding reality. However, especially in engineering education, it is relevant to address emerging problems specific to the discipline that are particular to a specific field of technology and science [5]. That is undoubtedly under continuous exploration.

The motivations for applying new educational formulas with learning experiences emphasizing the development of computational thinking sub-competencies obey many reasons [6]. Engineering educators have explored effective and relevant strategies to enhance their students' learning, from applying emergent, competency-based pedagogical models to didactic learning techniques based on challenges, problems, projects, or research. This special issue explores how computational thinking can be effectively integrated into engineering education to address highly complex challenges by providing students with tools

that promote innovation, informed decision-making, and multidisciplinary problem-solving. This is an exciting frontier in engineering education, offering the potential for groundbreaking innovation and the opportunity to tackle complex, real-world problems.

We seek original research papers, case studies, and comprehensive reviews that address the following areas:

- Pedagogical models for integrating computational thinking into engineering education.
- Development and assessment of computational thinking sub-competencies (algorithmic, patterning, abstraction, and decomposition).
- Tools and technologies to foster computational thinking in educational settings.
- Curriculum design aligned to the Sustainable Development Goals (SDGs) through computational thinking.
- Case studies and applications of computational thinking in complex problem-solving.
- Teacher training and development for teaching computational thinking in engineering.
- Challenges, opportunities, and best practices in implementing computational thinking in engineering.

Submissions

Manuscripts should be submitted in MS Word format (docx) via email to moliva@profesor.usac.edu.gt

Important Deadlines

Submission of a complete manuscript:	May 31, 2025
Notification of reviewers' feedback:	July 30, 2025
Submission of revised manuscript:	September 12, 2025
Final decision:	October 15, 2025

Note

Manuscripts must be written in English and limited to 12 one-sided, one-column, single-spaced pages. Manuscripts should include keywords, complete affiliation addresses of the authors, including their emails, and short biographies. Citations and reference listing should comply with the IJEE Guide for Authors. Figures and illustrations should be suitable for non-color printing. No copyrighted material should be included.
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References

1. A. Ogegbo and U. Ramnarain, A systematic review of computational thinking in science classrooms, *Studies in Science Education*, **58**(2), pp. 203–230, 2022.

2. S. Rose, J. Habgood, and T. Jay, An exploration of the role of visual programming tools in the development of young children's computational thinking, *Electronic Journal of E-Learning*, **15**(4), pp. 297–309, 2017.

3. N. O. Ezeamuzie and J. S. C. Leung, Computational Thinking Through an Empirical Lens: A Systematic Review of Literature, *Journal of Educational Computing Research*, **60**(2), pp. 481–511, 2022.

4. C. E. George-Reyes, Imbricación del pensamiento computacional y la alfabetización digital en la educación. Modelación a partir de una revisión sistemática de la literatura, *Revista Española De Documentación Científica*, **46**(1), p. e345, 2023.

5. P. J. Denning and M. Tedre, Computational thinking: A disciplinary perspective, *Informatics in Education*, **20**(3), pp. 361, 2021.

6. M. Lodi and S. Martini, Computational thinking, between Papert and Wing, *Science & Education*, **30**(4), pp. 883–908, 2021.