## Course Description
## MEDD8896 Computational Thinking and Education

| Course description |
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| Computational thinking has been considered one of the most important problem-solving competence in 21st century, and its cognitive process becomes fundamental to the development of human intelligence in solving advanced problems in STEM, for example, artificial intelligence and many other technologies are the outcomes of solving computational problems using computational thinking. Many educators and teachers may believe that computational thinking is equivalent to programming, which leads to the pure teaching of programming in schools. Computational thinking goes beyond programming skills, where the basic components that form its thinking process are not only for solving programming problems, but also empowering learners to be competent in dealing with interdisciplinary challenges in STEM. Computational thinking could also help learners develop other 21st century skills, such as creative thinking, communication, and collaboration. To equip learners with ability to solve computational-related problems existing in STEM, schools and teachers need to rethink what computational thinking is, and how computational thinking can be infused in school's STEM curriculum so that education can respond to the needs of future generation in dealing with computation-related issues. This course will offer students a stage to reimagine what computational thinking is and will be |

| Course objectives |
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| This course aims to prepare K–12 trainee teachers from diverse disciplinary backgrounds to cultivate computational thinking and AI-enriched education in schools. It seeks to help taught postgraduate students understand the importance of developing children's computational thinking as a foundational 21st-century literacy skillset for interdisciplinary problem-solving. Furthermore, the course encourages students to critically analyse contemporary issues related to computational thinking, AI, and STEM education, considering both local and global perspectives. By integrating these elements, the course aims to equip current and future educators with the knowledge and skills necessary to navigate the evolving educational landscape and effectively implement innovative teaching practices. |

| Course learning outcomes | Aligned programme learning outcomes (PLOs) |
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| 1. Describe the importance of computational thinking in STEM curriculum and global education policy. | PLOs 1, 3 |
| 2. Identify and criticize development and implementation challenges and opportunities of STEM teaching and learning with computational thinking. | PLOs 2, 3, 4 |
| 3. Apply the theory of constructionism and other pedagogical approaches to design a constructionist learning environment that supports computational thinking in schools. | PLOs 2, 3, 5 |

| Course assessment methods |
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| • Individual weekly reflection<br>• Learning design project and presentation<br>• Learning design project report |

| Course content and topics |
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| • Course Introduction<br>• Introduction to Computational Thinking, Its Core Practices, and Its History<br>• Unplugged Computational Thinking with Non-Digital Tools<br>• Plugged Computational Thinking with Micro-Bit and MakeCode<br>• Plugged Computational Thinking with AI Chatbots<br>• Putting Computational Thinking into Teaching-Learning Practice |

| **Required / recommended readings and online materials** |
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| Readings are listed in Moodle. |

| **Other additional course information** |
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| Nil |