## <u>Course Description</u> MEDD8895 STEM Across the Curriculum and the Society

### **Course description**

Cross-disciplinary integration is a central concept to STEM education. This course is aimed at looking at various models and approaches (e.g. discipline-focused, interdisciplinary, transdisciplinary, STEAM, STREAM) for developing integrated STEM curricula, among and beyond STEM-related disciplines (e.g. arts, languages, and humanities etc) to strengthen the coherence and collaboration among teachers of different disciplines. Critical reviews of the various integrated STEM curricula in Hong Kong and abroad are included to facilitate students to appreciate the good practices, realise the challenges involved, and examine outcomes when learning in these ways. Students have opportunities to design and develop integrated STEM curricula for the learning and teaching contexts they are familiar with. Besides discussing STEM across the curriculum, the role of STEM education in modern society is also discussed to facilitate students to understand its implications for society.

#### **Course objectives**

This course invites students to experience and expand various models and approaches for developing integrated STEM curricula, among and beyond STEM-related disciplines (e.g., arts, drama, history, etc.). Each week, students will be immersed in a STEM curriculum on a specific topic, observe from the insider's perspective, and take the challenge to improve the curriculum even further. In addition to the disciplinary boundaries, we will also break STEM jargon and stereotypes.

By the end of this course, students should:

- 1. Be sensitive in noticing everyday STEM teaching/learning opportunities.
- 2. Demystify STEM jargon and make STEM ideas relatable, tangible, sociable, and story-like.
- 3. Develop open-ended tasks, focusing on STEM as a method, not as a fact. Trust the process, not fixating on the results.
- 4. Embed STEM ideas and practices in traditionally non-STEM activities and conversations.
- 5. Be able to adopt appropriate theories, models, and approaches for planning, organizing, and evaluating STEM curriculums while clearly explaining the curriculum philosophies to fellow teachers using lay language.
- 6. Be aware of the misrepresentation, distortion, and oversimplification of STEM when it is integrated with art and media. Manage to keep a balance.
- 7. Massively reduce the amount of lecturing in curriculum design; instead, foster an authentic, meaningful, and/or hands-on environment for STEM learning.
- 8. Develop a personal portfolio, including a series of class activities or curricula that integrate STEM ideas and skillsets with real-life themes and topics, and document the details in curriculum design so that other teachers can replicate them.
- 9. The portfolio, or part of it, should be presentable in order to promote your own careers (e.g., present to principals, teachers, publishers, and/or academics).

Course learning outcomes		Aligned programme learning
		outcomes (PLOs)
1.	Understand the importance and role of STEM education in the	PLOs 1, 2, 3, 4
	contemporary world	
2.	Discuss practices and policies of STEM education in different countries	PLOs 1, 2, 3, 4
	including Hong Kong	
3.	Apply theories, models and learning approaches in	PLOs 1, 2, 3
	planning, organizing and evaluating STEM Education	
4.	Discuss international trends, theories and issues relating to STEM, STEAM	PLOs 1, 2, 3
	(Science, Technology, Engineering, Arts and Mathematics) and STREAM	
	(Science, Technology, Reading/Writing, Engineering, and Mathematics)	
	education	

### Course assessment methods

- Individual assignments
- Group assignment
- Class participation
- Final portfolio

# **Course content and topics**

Introduction to STEM integration STEM + Nature of Science (NOS) STEM + Algorithms to Live By Everything Everywhere All at Once: STEM + Geometry Everything I Learn I learned in Kindergarten: STEM, Storytelling, and Art STEM in the Movies STEM in the Arcade STEM in the News Co-design with Experts

### Required / recommended readings and online materials

- Dikilitas, K. (Ed.) (2016). *Innovative professional development methods and strategies for STEM education*. Hershey PA : Information Science Reference.
- Duschl, R. A. & Bismack, A. S. (Eds.) (2016). *Reconceptualizing STEM education: The central role of practices*. New York, NY : Routledge.
- Honey, M., Pearson, G., & Schweingruber, H. (Eds.). (2014). *STEM integration in K-12 education: Status, prospects, and an agenda for research.* Washington, D.C.: National
- Academies Press. Retrieved September 4, 2020, from http://stemoregon.org/wpcontent/uploads/2014/04/STEM-Integration-in-K12-Education-Book-Ginger-recommendation-from-OACTE.pdf (Can be downloaded online)
- Johnson, C. C., Peters-Burton E.E. & Moore, T. J. (Eds.) (2016). *STEM road map : A framework for integrated STEM education*. New York : Routledge.

Other additional course information

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