

## Course Description

### MEDD8859 Learning, Teaching and Assessment in STEM Education

Course description		
<p>As an introductory course of the STEM education specialism, this course is aimed at looking at integrated STEM education from its trends, models and theoretical perspectives, conceptualising STEM and contextualising it within the education and broader society, and how these theories inform its learning, teaching and assessment. Particular focus will be given to the relevant learning approaches grounding learning designs for integrated STEM education (e.g., self-regulated learning, scientific investigation, inquiry-based learning, etc.) and the challenges encountered, especially when designing assessment plans for students, through case studies of related learning designs.</p>		
<p><b>Coursework / Examination ratio:</b> <u>100</u> % Coursework, <u>0</u> % Examination</p>		
Course objectives		
<ul style="list-style-type: none"> <li>• Apply appropriate theories, models and learning approaches to design, develop and evaluate learning designs for integrated STEM education among teachers of different disciplines; and</li> <li>• Demonstrate an understanding of the strengths and limitations of these theories and any constraints and challenges that may apply in reviewing and preparing for the learning designs for integrated STEM education.</li> </ul>		
Course learning outcomes (CLOs)	Aligned programme learning outcomes (PLOs)	
1. Understand the importance and role of integrated STEM education in the contemporary world	PLOs 1, 2, 3	
2. Critically review the learning designs for integrated STEM education in Hong Kong and abroad	PLOs 1, 2, 3	
3. Apply appropriate theories, models and learning approaches to design, develop and evaluate learning designs for integrated STEM education among teachers of different disciplines	PLOs 1, 2, 3	
Course assessment methods		
Assessment method	Weighting (%)	Aligned course learning outcome(s)
Group presentation and paper	40	CLOs 1,2
Individual Task: Learning design and assessment plan for a short curriculum for integrated STEM education	50	CLOs 1,3
Group / Individual Task: In-class and out-of-class participation	10	CLOs 1, 2, 3
Course content and topics		
<p>Introduction to the course and integrated STEM education            Trends, models and theories conceptualising integrated STEM education            Self-regulated learning approach            Scientific inquiry / investigation approach            Other learning approaches            Assessment in integrated STEM education (I)            Assessment in integrated STEM education (II)</p>		
Required / recommended readings and online materials		
<ul style="list-style-type: none"> <li>• *Dikilitas, K. (Ed.) (2016). <i>Innovative professional development methods and strategies for STEM education</i>. Hershey, PA: Information Science Reference.</li> <li>• *Duschl, R. A. &amp; Bismack, A. S. (Eds.) (2016). <i>Reconceptualizing STEM education: The central role of practices</i>. New York: Routledge</li> <li>• Honey, M., Pearson, G., &amp; Schweingruber, H. (Eds.). (2014). <i>STEM integration in K-12 education: Status, prospects, and an agenda for research</i>. Washington, D.C.: National Academies Press. Retrieved August 31, 2022, from <a href="http://stemoregon.org/wp-content/uploads/2014/04/STEM-Integration-in-K12-Education-Book-Ginger-r-ecommendation-from-OACTE.pdf">http://stemoregon.org/wp-content/uploads/2014/04/STEM-Integration-in-K12-Education-Book-Ginger-r-ecommendation-from-OACTE.pdf</a> (Can be downloaded online)</li> </ul>		

- \*Johnson, C. C., Peters-Burton E.E. & Moore, T. J. (Eds.) (2016). *STEM road map: A framework for integrated STEM education*. New York: Routledge.
- \*National Research Council. (2011). *Successful K-12 STEM education: Identifying effective approaches in Science, Technology, Engineering, and Mathematics*. Washington, DC: The National Academies Press. Retrieved January 13, 2022, from <https://www.nap.edu/catalog/13158/successful-k-12-stem-education-identifying-effective-approaches-in-science>

(Can be downloaded online)

- \*Smith, K. A., Douglas, T. C., & Cox, M. F. (2009). Supportive teaching and learning strategies in STEM education. *New Directions for Teaching and Learning*, 117, 19-32. Retrieve January 17, 2022, from [https://www.researchgate.net/publication/247989944\\_Supportive\\_teaching\\_and\\_learning\\_strategies\\_in\\_STEM\\_education](https://www.researchgate.net/publication/247989944_Supportive_teaching_and_learning_strategies_in_STEM_education)

(Can be downloaded online)

\* eBooks in HKU Library

**Other additional course information**

Nil