



UNIVERSITI TEKNOLOGI MARA

SME543: " Integrated STEM Education "

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| Course Name (English) | " Integrated STEM Education " APPROVED |
| Course Code | SME543 |
| MQF Credit | 3 |
| Course Description | This course will provide knowledge and skills through an interdisciplinary approach to integrating STEM into practice specifically into science and mathematics lessons. For that purpose, the course will provide insights into the fundamental concepts and basis of integrated STEM education. It will assist students to critically examine STEM lessons and diverse students' needs in the classroom, to plan integrated STEM classroom instructions as well as to develop instructional materials. Students will be exposed to problem-based and project-based learning activities, mathematics and science inquiry learning tasks along with strategies for differentiated instructions in STEM lesson. Additionally, students will be given opportunity to go through various seminars and workshops that can provide them with knowledge and skills to design and develop their own STEM learning activity. |
| Transferable Skills | Gathering information, Analyzing, Solving Problems |
| Teaching Methodologies | Lectures, Seminar/Colloquium, Simulation Activity, Discussion, Project-based Learning |
| CLO | CLO1 Examine the pedagogical approaches in STEM classroom CLO2 Identify effective practices, issues, and challenges in STEM education research CLO3 Design engaging STEM activities for learners |
| Pre-Requisite Courses | No course recommendations |
| Topics | |
| 1. Introduction to Integrated STEM Education 1.1) Defining Integrated STEM 1.2) Purpose of integrating Science, Technology, Engineering and Mathematics (STEM) disciplines in teaching and learning. 1.3) Career related to STEM. 1.4) Framework of STEM education 1.5) Theories in STEM teaching | |
| 2. STEM teaching 2.1) Approaches 2.2) Implementation method 2.3) Activities 2.4) Assessment for learning | |
| 3. Research in STEM Education 3.1) Effective Practices 3.2) Issues and Challenges 3.3) Gap and Improvement 3.4) Reflection 3.5) Reflection | |
| 4. Designing Integrated STEM instruction and instructional materials 4.1) Discussion on models of instructional materials development 4.2) Discussion on the examples of STEM instructional material(s) developed based on a specific model. 4.3) Hands-on activity | |
| 5. Weekly workshops on STEM learning activities and instructional materials. 5.1) N/A | |

| Assessment Breakdown | | % | |
|-----------------------|--|---------|--|
| Continuous Assessment | | 100.00% | |

| Details of Continuous Assessment | Assessment Type | Assessment Description | % of Total Mark | CLO |
|----------------------------------|-----------------|------------------------|-----------------|------|
| | Assignment | Individual assignment | 30% | CLO2 |
| | Group Project | n/a | 50% | CLO3 |
| | Test | n/a | 20% | CLO1 |

| Reading List | Reference Book Resources |
|--------------------|--|
| | <ul style="list-style-type: none"> • Richard M. Felder, Rebecca Brent & Jossey-Bass 2016, <i>Teaching and Learning STEM: A Practical Guide</i>, 1st Edition Ed., Jossey-Bass [ISBN: 978-111892581] • Carla C. Johnson, Erin E. Peters-Burton & Tamara J. Moore 2016, <i>STEM Road Map: A Framework for Integrated STEM Education</i>, 1st Edition Ed., Routledge New York [ISBN: 978-113880423] • Penprase, Bryan Edward 2020, <i>STEM Education for the 21st Century</i>, 1st Edition Ed., Springer International Publishing Switzerland [ISBN: 978-3-030-416] • MacDonald, Amy, Danaia, Lena, Murphy, Steve (Eds) 2020, <i>STEM Education Across the Learning Continuum</i>, 1st Edition Ed., Springer Singapore Singapore [ISBN: 978-981-15-28] • Sengupta, Pratim, Shanahan, Marie-Claire, Kim, Beaumie (Eds.) 2019, <i>Critical, Transdisciplinary and Embodied Approaches in STEM Education</i>, 1st Edition Ed., Springer International Publishing Switzerland [ISBN: 978-3-030-294] |
| Article/Paper List | This Course does not have any article/paper resources |
| Other References | This Course does not have any other resources |