Module designation	**STEM Education** **Indonesian title:** *Pendidikan STEM* **Course code:** 8420202004
Semester(s) in which the module is taught	Semester 4 (Second year)
Person responsible for the module	**Coordinator:** Dr. Yurizka Melia Sari, M.Pd. **Teaching staff:** Prof. Rooselyna Ekawati, Ph.D.; Dr. Endah Budi Rahaju, M.Pd.; Dr. Yurizka Melia Sari, M.Pd.; Dr. Ali Shodikin, S.Pd., M.Pd; Dr. Lestariningsih, S.Pd., M.Pd.; Nurus Saadah, S.Pd., M.Pd.; Shofan Fiangga, S.Pd., M.Sc.
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lectures, tutorial assignments, and individual study **Media and tools:** Slides and LCD projectors, whiteboard
Workload (incl. contact hours, self-study hours)	**(Estimated) total workload:** 2 CU × 170 minutes × 16 weeks = 5,440 minutes = 90.67 hours (≈ 3.18 ECTS) **Contact hours:** lectures, 2 × 50 minutes per week × 16 weeks = 26.67 hours (class hours per week: 340 minutes = 5.67 hours, including structured activities) **Private study including examination preparation:** structured assignments, 2 × 60 minutes per week × 16 weeks = 32.00 hours; independent study, 2 × 60 minutes per week × 16 weeks = 32.00 hours (total 64.00 hours)
Credit points	2 CU (3.18 ECTS) *1 CU = 170 minutes per week × 16 weeks = 45.3 hours; 1 ECTS = 28.48 hours (144 CU = 229 ECTS), so 1 CU = 1.59 ECTS (UNESA Rector's Decree No. 736/HK/KM/2023).*
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Programme learning outcomes (PLO) addressed:** • PLO-5: Apply the basic principles of mathematics to solve simple mathematical problems. • PLO-7: Demonstrate pedagogical knowledge in designing, implementing and evaluating mathematics learning. • PLO-8: Design, implement and evaluate mathematics learning using IT. • PLO-10: Make decisions based on data/information in completing tasks that are the student's responsibility and evaluating the work that has been done. • PLO-11: Communicate ideas and research results effectively, orally, and in writing.
Content	This course discusses the definition, fundamental concepts, and principles of STEM education as a multidisciplinary learning model. The course starts with a discussion on the history and urgency of the emergence of STEM as a relevant alternative for 21st-century learning, along with its practical classroom applications. Furthermore, the students will have the opportunity to complete STEM projects related

<table>
<tr><td></td><td>to support the problems in the SDGs (Sustainable Development Goals) by gaining practical experience in designing and evaluating STEM-based instruction. This course will provide prospective teachers with knowledge regarding a significant, currently developing multidisciplinary learning alternative, while simultaneously fostering their scientific, technological, engineering, and mathematical literacy.</td></tr>
<tr><td>Examination forms</td><td>Final score is calculated from the weekly assessment scheme below (CLO/PLO addressed and weight of each assessment):
<table>
<tr><th>Week</th><th>CLO</th><th>PLO</th><th>Weight (%)</th></tr>
<tr><td>1</td><td>CLO-1</td><td>PLO-5</td><td>5</td></tr>
<tr><td>2</td><td>CLO-1</td><td>PLO-5</td><td>5</td></tr>
<tr><td>3</td><td>CLO-1</td><td>PLO-5</td><td>5</td></tr>
<tr><td>4</td><td>CLO-6</td><td>PLO-8</td><td>5</td></tr>
<tr><td>5</td><td>CLO-4</td><td>PLO-7</td><td>5</td></tr>
<tr><td>6</td><td>CLO-4</td><td>PLO-7</td><td>5</td></tr>
<tr><td>7</td><td>CLO-4</td><td>PLO-7</td><td>5</td></tr>
<tr><td>8</td><td>CLO-1</td><td>PLO-5</td><td>15</td></tr>
<tr><td>9</td><td>CLO-2</td><td>PLO-11</td><td>5</td></tr>
<tr><td>10</td><td>CLO-2</td><td>PLO-11</td><td>5</td></tr>
<tr><td>11</td><td>CLO-2</td><td>PLO-11</td><td>5</td></tr>
<tr><td>12</td><td>CLO-3</td><td>PLO-10</td><td>5</td></tr>
<tr><td>13</td><td>CLO-4</td><td>PLO-7</td><td>5</td></tr>
<tr><td>14</td><td>CLO-5</td><td>PLO-7</td><td>5</td></tr>
<tr><td>15</td><td>CLO-4</td><td>PLO-7</td><td>5</td></tr>
<tr><td>16</td><td>CLO-4</td><td>PLO-7</td><td>15</td></tr>
</table></td></tr>
<tr><td>Study and examination requirements</td><td>Students are considered competent and pass if the final score calculated from the score of midterm exam, assignments, participation, and final exam is at least 55 or C.
Final index (grade conversion):
<table>
<tr><th>Index</th><th>Converted score</th><th>Score range (A = final score)</th></tr>
<tr><td>A</td><td>4.00</td><td>85 ≤ A ≤ 100</td></tr>
<tr><td>A-</td><td>3.75</td><td>80 ≤ A < 85</td></tr>
<tr><td>B+</td><td>3.50</td><td>75 ≤ A < 80</td></tr>
<tr><td>B</td><td>3.00</td><td>70 ≤ A < 75</td></tr>
<tr><td>B-</td><td>2.75</td><td>65 ≤ A < 70</td></tr>
<tr><td>C+</td><td>2.50</td><td>60 ≤ A < 65</td></tr>
<tr><td>C</td><td>2.00</td><td>55 ≤ A < 60</td></tr>
<tr><td>D</td><td>1.00</td><td>40 ≤ A < 55</td></tr>
<tr><td>E</td><td>0.00</td><td>0 ≤ A < 40</td></tr>
</table></td></tr>
<tr><td>Reading list</td><td>1. Rodger W. Bybee. 2013. The Case for STEM Education: Challenges and Opportunities. USA: NSTA Press
2. English, L. D. (2016). STEM education K-12: Perspectives on integration. International Journal of STEM education, 3, 1-8
3. Kelley, T. R., & Knowles, J. G. (2016). A conceptual framework for</td></tr>
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	integrated STEM education. International Journal of STEM education, 3, 1-11 4. Beatty, A. S. (2011). Successful STEM education. National Academies Press