Module designation	**Artificial Intelligence for Mathematics Education** **Course code:** 8420202234
Semester(s) in which the module is taught	Semester 8 (Fourth year)
Person responsible for the module	**Coordinator:** Nurus Saadah **Teaching staff:** Nurus Saadah, Nina Rinda Prihartiwi
Language	Indonesian
Relation to curriculum	Elective
Teaching methods	Lectures, project-based tutorial assignments, and individual study **Media and tools:** Slides and LCD projectors, whiteboard, computers/laptops, AI tools, learning management system
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-3: Develop logical, critical, systematic and creative thinking in carrying out specific work in the field of expertise and in accordance with the work competency standards in the relevant field. • PLO-5: Apply the basic principles of mathematics to solve simple mathematical problems. • PLO-6: Demonstrate mathematical knowledge and insight. • 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. **Course learning outcomes (CLO): after completing this module, students are able to:** • CLO-1: Explain basic concepts of artificial intelligence (AI), machine learning, and generative AI, including their mathematical foundations at a conceptual level, and their potential and limitations in solving mathematical problems and in their applications in education • CLO-2: Use AI tools appropriately (including prompt engineering) to support mathematical thinking: problem solving, exploration, reasoning, and the design of mathematical problems and tasks • CLO-3: Evaluate AI output logically, critically, and systematically

<table>
<tr><td></td><td>(mathematical correctness, pedagogical suitability), and apply ethics, data privacy, and academic integrity in using AI
• CLO-4: Make data-based decisions in designing AI-assisted assessment and feedback, and develop, present, and evaluate an AI-assisted mathematics learning product</td></tr>
<tr><td>Content</td><td>This course introduces artificial intelligence (AI), machine learning, and generative AI and their use in mathematics education. Students study the mathematical ideas behind machine learning at a conceptual level, prompt engineering, AI-based learning platforms, the use of AI to explore mathematical problems and to design problems, tasks, and instructional materials, AI-assisted formative assessment and feedback with data-based decision making, critical evaluation of AI output, and ethics, data privacy, and academic integrity. The course concludes with a project to develop an AI-assisted mathematics learning product through project-based learning.</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>4</td></tr>
<tr><td>2</td><td>CLO-1</td><td>PLO-5</td><td>4</td></tr>
<tr><td>3</td><td>CLO-1</td><td>PLO-5</td><td>4</td></tr>
<tr><td>4</td><td>CLO-2</td><td>PLO-6</td><td>5</td></tr>
<tr><td>5</td><td>CLO-2</td><td>PLO-6</td><td>4</td></tr>
<tr><td>6</td><td>CLO-2</td><td>PLO-6</td><td>4</td></tr>
<tr><td>7</td><td>CLO-2</td><td>PLO-6</td><td>5</td></tr>
<tr><td>8</td><td>CLO-2</td><td>PLO-6</td><td>15</td></tr>
<tr><td>9</td><td>CLO-4</td><td>PLO-10</td><td>5</td></tr>
<tr><td>10</td><td>CLO-3</td><td>PLO-3</td><td>5</td></tr>
<tr><td>11</td><td>CLO-3</td><td>PLO-3</td><td>5</td></tr>
<tr><td>12</td><td>CLO-4</td><td>PLO-10</td><td>5</td></tr>
<tr><td>13</td><td>CLO-4</td><td>PLO-10</td><td>5</td></tr>
<tr><td>14</td><td>CLO-4</td><td>PLO-10</td><td>5</td></tr>
<tr><td>15</td><td>CLO-4</td><td>PLO-10</td><td>10</td></tr>
<tr><td>16</td><td>CLO-4</td><td>PLO-10</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 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>
</table>

Reading list	1. Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Center for Curriculum Redesign. 2. Russell, S., & Norvig, P. (2021). Artificial Intelligence: A Modern Approach (4th ed.). Pearson. 3. UNESCO. (2023). Guidance for Generative AI in Education and Research. UNESCO. 4. Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence Unleashed: An Argument for AI in Education. Pearson. 5. Kasneci, E., et al. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences, 103, 102274. 6. UNESCO. (2024). AI Competency Framework for Teachers. UNESCO. 7. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? International Journal of Educational Technology in Higher Education, 16, 39.