MINISTRY OF HIGHER EDUCATION, SCIENCE, AND TECHNOLOGY
UNIVERSITAS NEGERI SURABAYA
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNDERGRADUATE PROGRAM OF MATHEMATICS EDUCATION
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Module Name:	Digital Learning Environment Lingkungan Belajar Digital
Module Level:	Sarjana (S-1) / Undergraduate
Abbreviation, if applicable:	8420202236
Sub-heading, if applicable:	-
Course included in the module, if applicable:	-
Semester/term:	7 / Fourth year
Module Coordinator(s):	Dr. Yurizka Melia Sari, M.Pd.
Lecturer(s):	Dr. Yurizka Melia Sari, M.Pd.
Language:	Indonesian
Classification within the curriculum:	~~Compulsory course~~/elective studies
Teaching format/class hours per week during the semester	Teaching format: interactive lectures, case-based learning, project-based learning with design workshops, simulation-based learning, and group discussions Class hours per week: 2 x 170 minutes = 340 minutes (5.67 hours), of which 2 x 50 minutes are lectures
Workload:	16 weeks per semester consisting of: • 2 hours lectures (2 x 50 minutes) per week, • 2 hours structured assignments (2 x 60 minutes) per week, • 2 hours independent study (2 x 60 minutes) per week, Total workload: 16 x 2 x 170 minutes = 5,440 minutes = 90.67 hours = 3.18 ECTS*
Credit Point:	2 CU (3.18 ECTS)
Requirements:	N/A
Learning Goals :	**Programme Learning Outcomes (PLO) addressed:** PLO 1: Able to demonstrate the values of religion, nationality and national culture, as well as academic ethics in carrying out their duties

	PLO 6: Design, implement and evaluate mathematics learning using IT PLO 8: Make decisions based on data/information in completing tasks that are the student's responsibility and evaluating the work that has been done PLO 10: Demonstrate pedagogical knowledge in designing, implementing and evaluating mathematics learning **Course Learning Outcomes (CLO): after completing this module, students are able to:** CLO-1: Articulate the characteristics, main components, functions, and interaction dynamics of Digital Learning Environments (DLE) that support meaningful mathematics learning at the junior and senior secondary levels (PLO 10) CLO-2: Analyse and select features of digital tools (GeoGebra, Desmos, Polypad) that are relevant to the secondary mathematics curriculum, based on digital affordance (PLO 10) CLO-3: Predict the development of students' cognitive schemes (instrumentation) and their adaptation of tools (instrumentalisation), including diagnosing technical and conceptual obstacles (instrumental distance) in the process of instrumental genesis (PLO 8) CLO-4: Apply embodied design activities that use perception-action loops and attentional anchors in digital learning environments (PLO 10) CLO-5: Design lessons that optimise learning trajectories in digital environments using instrumental orchestration theory (PLO 6) CLO-6: Manage lessons in digital learning environments, make appropriate interventions, and facilitate students' learning (PLO 6)
Content:	This course is designed for final-year pre-service mathematics teachers to bridge advanced digital technology with mathematics

	pedagogy at the junior and senior secondary levels. Grounded in Digital Affordance, Instrumental Genesis, Instrumental Orchestration, and Digital Embodied Cognition, it prepares students to design, manage, and evaluate Digital Learning Environments (DLE). Students analyse and select features of tools such as GeoGebra, Desmos, and Polypad, diagnose the obstacles students meet when using digital tools, design embodied and interactive tasks, and plan didactical configurations, exploitation modes, and teacher interventions. They then practise managing lessons in a 1-to-1 device setting through simulations, including real-time monitoring, scaffolding, and facilitating plenary discussions based on students' digital work. The course contributes to SDGs 4 and 9.
Study/exam achievements	• Students are considered competent and pass if the final score, calculated from weekly assignments and project outputs (weeks 1 to 12: 60%), simulation-based practice (weeks 13 to 15: 30%), and the final assessment (week 16: 10%), is at least 55 or C. • Final score is calculated as follows:

Week	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)	Evaluation
1	CLO-1	PLO-10	5%
2	CLO-2	PLO-10	5%
3	CLO-2	PLO-10	5%
4	CLO-3	PLO-8	5%
5	CLO-3	PLO-8	5%
6	CLO-4	PLO-10	5%
7	CLO-5	PLO-6	5%
8	CLO-5	PLO-6	5%
9	CLO-5	PLO-6	5%
10	CLO-5	PLO-6	5%
11	CLO-5	PLO-6	5%
12	CLO-5	PLO-6	5%

13	CLO-6	PLO-6	10%
14	CLO-6	PLO-6	10%
15	CLO-6	PLO-6	10%
16	CLO-6	PLO-6	10%

- Final index is defined as follow:

Index	Converted Score	Score Range
A	4.00	$85 \leq A \leq 100$
A-	3.75	$80 \leq A- < 85$
B+	3.50	$75 \leq B+ < 80$
B	3.00	$70 \leq B < 75$
B-	2.75	$65 \leq B- < 70$
C+	2.50	$60 \leq C+ < 65$
C	2.00	$55 \leq C < 60$
D	1.00	$40 \leq D < 55$
E	0.00	$0 \leq E < 40$

Forms of Media

Slides, LCD projector, UNESA Learning Management System (LMS), GeoGebra, Desmos, Polypad, students' devices (1-to-1), classroom monitoring and dashboard platform for simulations

Literature

1. Oyovwe, S. O., & Oyovwi, M. O. (2026). Unveiling the latent curriculum incidental mathematics through digital task integration in secondary education. Discover Education, 5, 286. https://doi.org/10.1007/s44217-026-01123-7
2. Drijvers, P., Doorman, M., Boon, P., Reed, H., & Gravemeijer, K. (2010). The teacher and the tool: Instrumental orchestration in the technology-rich mathematics classroom. Educational Studies in Mathematics, 75(2), 213-234.
3. Wei, H., Bos, R., & Drijvers, P. (2025). A digital-embodied design for functional thinking in the classroom. Mathematical Thinking and Learning. https://doi.org/10.1080/10986065.2025.2493375
4. Haspekian, M. (2014). An instrumental approach to study the integration of digital resources into mathematics teachers' practices. ZDM Mathematics Education, 46(1), 23-37.
5. Clark-Wilson, A., Robutti, O., & Sinclair, N. (Eds.). (2014).

	The mathematics teacher in the digital era: An international perspective on technology integration in mathematics classrooms. Springer.
Note	*Based on the Regulation of the Minister of Education, Culture, Research, and Technology of the Republic of Indonesia Number 53 of 2023 on Quality Assurance in Higher Education, 1 credit unit (CU) corresponds to 45 hours of learning per semester. UNESA implements this as 170 minutes per week over 16 weeks, including the midterm and final examinations: 1 CU = 170 x 16 = 2,720 minutes or 45.3 hours. The total workload of 144 CU is therefore 144 x 45.3 = 6,523.2 hours. UNESA sets this workload as equivalent to 229 ECTS, so that 1 ECTS = 6,523.2 / 229 = 28.48 hours and 1 CU = 1.59 ECTS.