	Universitas Negeri Surabaya Faculty of Education, Bachelor of Primary School Teacher Education Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
STEAM education in elementary school	8620603260	Study Program Elective Courses	T=3	P=0	ECTS=4.77	5	July 23, 2021

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Neni Mariana, S.Pd., M.Sc., Ph.D; Nadia Lutfi Choirunnisa, S.Pd., M.Pd.; Dr. Heru Subrata, M.Si.; Julianto, S.Pd., M.Pd.; Prof. Dr. Wahyu Sukartiningsih, M.Pd.; Delia Indrawati, S.Pd., M.Pd; Putri Rachmadyanti, S.Pd., M.Pd.; Farida Istianah, S.Pd., M.Pd.; Maryam Isnaini Damayanti, S.Pd., M.Pd. Prof. Dr. Suryanti, M.Pd.; Ika Rahmawati, S.Si., M.Pd.	Neni Mariana, S.Pd., M.Sc., Ph.D.	Putri Rachmadyanti, S.Pd., M.Pd.

Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-6	Able to develop, maintain a network and establish effective communication with the academic community to support lifelong learning.
	PLO-7	Distinguish the characteristics of research types and apply them in designing, implementing and reporting research results through the publication of articles as the development of science in elementary schools.
	PLO-9	Solving integrated basic knowledge and skills problems in study areas (mathematics, language, science, social studies, civics, arts, sports).
	Program Objectives (PO)	
	PO - 1	Identifying the characteristics of project-based projects through literacy analysis of STEAM.
	PO - 2	Develop STEAM projects oriented to theory and field experience including analyzing problems in the environment and their solutions.
	PO - 3	Developing STEAM-based elementary school learning through theoretical analysis and field analysis which is realized in the form of scientific articles.
	PO - 4	Develop communication skills to obtain information relevant to the STEAM project being developed
	PO - 5	Apply critical thinking in developing STEAM content in projects and be creative in developing STEAM projects
	PLO-PO Matrix	

P.O	PLO-6	PLO-7	PLO-9
PO-1	✔		
PO-2			✔
PO-3	✔		✔
PO-4	✔		
PO-5	✔		✔

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PO-1	✔															
PO-2		✔	✔													
PO-3									✔			✔	✔	✔		
PO-4				✔											✔	
PO-5					✔	✔	✔			✔	✔					

Short Course Description	The STEAM (Science, Technology, Engineering, Arts, and Mathematics) education course in elementary school is a course that aims to provide students with an understanding of one of the trends in multidisciplinary education in elementary schools. This course uses two approaches, project-based and problem-based. In the middle of the first semester, students are asked to critically identify problems in society, look for and offer solutions to these problems by integrating STEAM knowledge components. In the middle of the last semester, they will use the integration patterns they have experienced to design simple STEAM activity designs for elementary school students.
References	**Main :**

1. Bush, S. B., & Cook, K. L. (2019). Step into STEAM, grades K-5: Your standards-based action plan for deepening mathematics and science learning . Corwin Press.
2. Haifaturrahmah, H., Hidayatullah, R., Maryani, S., Nurmiwati, N., & Azizah, A. (2020). Pengembangan Lembar Kerja Siswa Berbasis STEAM untuk Siswa Sekolah Dasar. Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembelajaran , 6 (2), 310-318.
3. Khine, M. S. (2019). Steam education . Springer Berlin Heidelberg,.
4. Kim, Y., & Park, N. (2012). The effect of STEAM education on elementary school student's creativity improvement. In Computer applications for security, control and system engineering (pp. 115-121).
5. Springer, Berlin, Heidelberg. Lu, Y. C., Liu, W. S., Wu, T. T., Sandnes, F. E., & Huang, Y. P. (2019, December). A Study of Problem Solving Using Blocks Vehicle in a STEAM Course for Lower Elementary Levels. In International Conference on Innovative Technologies and Learning (pp. 49-57).
6. Springer, Cham. Martinez, J. E. (2017). The search for method in STEAM education . Springer International Publishing.
7. Mun, J., & Shin, Y. (2018). The Effect of Science-centered STEAM Program on Science Positive Experience: Focused on the. Journal of Science Education , 42 (2), 214-229
8. Nurwulan, N. R. (2020). Pengenalan Metode Pembelajaran STEAM Kepada Para Siswa Tingkat Sekolah Dasar Kelas 1 Sampai 3. Madaniya , 1 (3), 140-146.
9. Quigley, C. F., & Herro, D. (2019). An educators guide to steam: Engaging students using real-world problems . Teachers College Press.
10. Ward, A. S. (2021). An Investigation of the Successful Implementation of Innovative Instructional Techniques in a Steam Elementary School: An Instrumental Case Study . Drexel University.

Supporters:

1. Zubaidah, S. (2019, September). STEAM (science, technology, engineering, arts, and mathematics): Pembelajaran untuk memberdayakan keterampilan abad ke-21. In Seminar Nasional Matematika Dan Sains, September (pp. 1-18).

Supporting lecturer	Dr. Heru Subrata, M.Si. Drs. Suprayitno, M.Si. Prof. Dr. Suryanti, M.Pd. Ganes Gunansyah, S.Pd., M.Pd. Dr. Julianto, S.Pd., M.Pd. Ulhaq Zuhdi, S.Pd., M.Pd. Neni Mariana, S.Pd., M.Sc., Ph.D. Farida Istianah, S.Pd., M.Pd. Ricky Setiawan, S.Pd.SD., M.Ed. Putri Rachmadyanti, S.Pd., M.Pd. Nadia Lutfi Choirunnisa, S.Pd., M.Pd. Ali Fakhrudin, M.Pd. Vivi Astuti Nurlaily, M.Pd. Eva Amalia, M.Pd. Maryam Isnaini Damayanti, S.Pd., M.Pd.

Week-	**Final abilities of each learning stage (Sub-PO)**	**Evaluation**		**Help Learning, Learning methods, Student Assignments, [Estimated time]**		**Learning materials [References]**	**Assessment Weight (%)**
		Indicator	**Criteria & Form**	**Offline (*offline*)**	**Online (*online*)**		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
1	1. Describe the characteristics and components of STEAM-based projects 2. Find problems in society	1. Define the concept of STEAM components broadly based on theory and research results 2. Explains examples of projects in STEAM 3. Identify problems found in the community 4. Formulate the background and focus of the project 5. Finding STEAM project ideas based on the results of identifying problems in society	**Criteria:** 1. according to the answer key 2. **Form of Assessment** : Test	Discussion about the definition of STEAM from various figures/experts, detailing the characteristics of the components of Science, Technology, Engineering, Arts, Mathematics, and the characteristics of STEAM-based projects. 3 X 50	Virtual class (zoom meeting) to discuss the definition of STEAM from various figures/experts, detailing the characteristics of the components of Science, Technology, Engineering, Arts, Mathematics, and the characteristics of STEAM-based projects. Asynchronous: learning via LMS sidia/vinesa 3 X 50	**Material:** Definition of STEAM and STEAM education **References:** *Khine, MS (2019). Steam education . Springer Berlin Heidelberg,.* **Material:** STEAM learning steps **Reference:** *Bush, SB, & Cook, KL (2019). Step into STEAM, grades K-5: Your standards-based action plan for deepening mathematics and science learning . Corwin Press.*	5%

2	1. Describe the characteristics and components of STEAM-based projects 2. Find problems in society	1. Define the concept of STEAM components broadly based on theory and research results 2. Explains examples of projects in STEAM 3. Identify problems found in the community 4. Formulate the background and focus of the project 5. Finding STEAM project ideas based on the results of identifying problems in society	**Criteria:** 1. according to the answer key 2. **Form of Assessment** : Test	Discussion about the definition of STEAM from various figures/experts, detailing the characteristics of the components of Science, Technology, Engineering, Arts, Mathematics, and the characteristics of STEAM-based projects. 3 X 50	Virtual class (zoom meeting) to discuss the definition of STEAM from various figures/experts, detailing the characteristics of the components of Science, Technology, Engineering, Arts, Mathematics, and the characteristics of STEAM-based projects. Asynchronous: learning via LMS sidia/vinesa 3 X 50	**Material:** Definition of STEAM and STEAM education **References:** *Khine, MS (2019). Steam education . Springer Berlin Heidelberg,.* **Material:** STEAM learning steps **Reference:** *Bush, SB, & Cook, KL (2019). Step into STEAM, grades K-5: Your standards-based action plan for deepening mathematics and science learning . Corwin Press.*	5%
3	1. Determine the design for creating a STEAM project 2. Prepare a schedule for creating a STEAM project 3. Use critical and creative thinking during the design and implementation of STEAM projects	1. Presenting STEAM project ideas in the community 2. Prepare a timeline and communicate it with the lecturer 3. Submit relevant experts 4. Interact with experts on STEAM design solutions	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Discussing problems that occur in the surrounding environment Exploring ideas for solving problems to later be turned into STEAM-based projects 3 X 50	Synchronous: Zoom meeting to discuss the same things as the offline method. Asynchronous: reading references, observing problems that occur in the environment, and exploring ideas for solving problems as well as creating a design and schedule for creating a STEAM project. 3 X 50	**Material:** Formulating the problem **References:** *Quigley, CF, & Herro, D. (2019). An educators guide to steam: Engaging students using real-world problems . Teachers College Press.*	5%
4	1. Determine the design for creating a STEAM project 2. Prepare a schedule for creating a STEAM project 3. Use critical and creative thinking during the design and implementation of STEAM projects	1. Presenting STEAM project ideas in the community 2. Prepare a timeline and communicate it with the lecturer 3. Submit relevant experts 4. Interact with experts on STEAM design solutions	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Discussing problems that occur in the surrounding environment Exploring ideas for solving problems to later be turned into STEAM-based projects 3 X 50	Synchronous: Zoom meeting to discuss the same things as the offline method. Asynchronous: reading references, observing problems that occur in the environment, and exploring ideas for solving problems as well as creating a design and schedule for creating a STEAM project. 3 X 50	**Material:** Formulating the problem **References:** *Quigley, CF, & Herro, D. (2019). An educators guide to steam: Engaging students using real-world problems . Teachers College Press.*	5%

5	1. Conduct trials of STEAM projects in the community 2. Apply oral communication skills to present the results of the implementation of the STEAM project being developed	1. Sharpen the STEAM project design based on the results of discussions with experts 2. Construct solutions involving STEAM components 3. Designing a STEAM Project Trial in the community 4. Evaluate STEAM projects in the community 5. Reporting the results of the implementation of the STEAM project along with the results of the evaluation	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discussing the STEAM design to get feedback from lecturers and experts 2. Communicating the design to the community and related parties 3. Presenting the results of the design and responses from the community and related parties to the design 4. Filling out a survey on the success of implementing STEAM design in the community 3 X 50	Synchronous: Zoom Meeting with an agenda like the offline method. Asynchronous: conducting a trial implementation of a STEAM project in the community. 3 X 50	**Material:** STEAM Method **References:** *Springer, Cham. Martinez, J. E. (2017). The search for methods in STEAM education . Springer International Publishing.*	5%
6	1. Conduct trials of STEAM projects in the community 2. Apply oral communication skills to present the results of the implementation of the STEAM project being developed	1. Sharpen the STEAM project design based on the results of discussions with experts 2. Construct solutions involving STEAM components 3. Designing a STEAM Project Trial in the community 4. Evaluate STEAM projects in the community 5. Reporting the results of the implementation of the STEAM project along with the results of the evaluation	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discussing the STEAM design to get feedback from lecturers and experts 2. Communicating the design to the community and related parties 3. Presenting the results of the design and responses from the community and related parties to the design 4. Filling out a survey on the success of implementing STEAM design in the community 3 X 50	Synchronous: Zoom Meeting with an agenda like the offline method. Asynchronous: conducting a trial implementation of a STEAM project in the community. 3 X 50	**Material:** STEAM Method **References:** *Springer, Cham. Martinez, J. E. (2017). The search for methods in STEAM education . Springer International Publishing.*	10%
7	1. Conduct trials of STEAM projects in the community 2. Apply oral communication skills to present the results of the implementation of the STEAM project being developed	1. Sharpen the STEAM project design based on the results of discussions with experts 2. Construct solutions involving STEAM components 3. Designing a STEAM Project Trial in the community 4. Evaluate STEAM projects in the community 5. Reporting the results of the implementation of the STEAM project along with the results of the evaluation	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discussing the STEAM design to get feedback from lecturers and experts 2. Communicating the design to the community and related parties 3. Presenting the results of the design and responses from the community and related parties to the design 4. Filling out a survey on the success of implementing STEAM design in the community 3 X 50	Synchronous: Zoom Meeting with an agenda like the offline method. Asynchronous: conducting a trial implementation of a STEAM project in the community. 3 X 50	**Material:** STEAM Method **References:** *Springer, Cham. Martinez, J. E. (2017). The search for methods in STEAM education . Springer International Publishing.*	10%

8	Midterm exam		**Form of Assessment** : Project Results Assessment / Product Assessment, Portfolio Assessment	Midterm Exam 3 X 50	3 X 50		0%
9	1. Developing STEAM-based learning designs in elementary schools 2. Use critical and creative thinking during the design and implementation of STEAM projects	1. Designing Project STEAM-based learning in elementary schools 2. Analyze learning outcomes in elementary school for each STEAM component 3. Testing STEAM Ideas in Elementary Schools	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discuss the STEAM component of the selected design 2. Analyze learning outcomes in elementary school that are in accordance with STEAM 3. Present the design of STEAM activities in elementary school 3	Synchronous: Same as the offline method agenda. Asynchronous: Reading references about examples of STEAM learning designs and constructing STEAM learning ideas, looking for STEAM activity designs for elementary schools, looking for students for learning trials, and implementing STEAM activity designs for elementary school students 3 X 50	**Material:** STEAM for grade 5 elementary school **Reader:** *Bush, SB, & Cook, KL (2019). Step into STEAM, grades K-5: Your standards-based action plan for deepening mathematics and science learning . Corwin Press.* **Material:** STEAM Student Worksheet **Reference:** *Haifaturrahmah, H., Hidayatullah, R., Maryani, S., Nurmiwati, N., & Azizah, A. (2020). Development of STEAM-Based Student Worksheets for Elementary School Students. Journal of Education: Journal of Research Results and Literature Review in the Field of Education, Teaching and Learning, 6 (2), 310-318.* **Material:** STEAM for Elementary School **Reference:** *Kim, Y., & Park, N. (2012). The effect of STEAM education on elementary school student's creativity improvement. In Computer applications for security, control and systems engineering (pp. 115-121).* **Material:** STEAM Project Examples **Library:** *Springer, Berlin, Heidelberg. Lu, YC, Liu, WS, Wu, TT, Sandnes, FE, & Huang, YP (2019, December). A Study of*	5%

							Problem Solving Using Blocks Vehicles in a STEAM Course for Lower Elementary Levels. In International Conference on Innovative Technologies and Learning (pp. 49-57). **Material:** STEAM Learning Effects **References:** *Mun, J., & Shin, Y. (2018). The Effect of Science-centered STEAM Program on Science Positive Experience: Focused on the. Journal of Science Education, 42(2), 214-229* **Material:** STEAM Learning for Early Grade Elementary School **Reference:** *Nurwulan, NR (2020). Introduction to the STEAM Learning Method for Elementary School Students Grades 1 to 3. Madaniya, 1 (3), 140-146.* **Material:** STEAM in Elementary School **Reader:** *Ward, AS (2021). An Investigation of the Successful Implementation of Innovative Instructional Techniques in a Steam Elementary School: An Instrumental Case Study. Drexel University.* **Material:** STEAM learning in the 21st century **References:** *Zubaidah, S. (2019, September). STEAM (science, technology, engineering, arts, and mathematics): Learning to empower 21st century skills. In National Mathematics*		

						and Science Seminar, September (pp. 1-18).	
10	1. Developing STEAM-based learning designs in elementary schools 2. Use critical and creative thinking during the design and implementation of STEAM projects	1. Designing Project STEAM-based learning in elementary schools 2. Analyze learning outcomes in elementary school for each STEAM component 3. Testing STEAM Ideas in Elementary Schools	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discuss the STEAM component of the selected design 2. Analyze learning outcomes in elementary school that are in accordance with STEAM 3. Present the design of STEAM activities in elementary school 3	Synchronous: Same as the offline method agenda. Asynchronous: Reading references about examples of STEAM learning designs and constructing STEAM learning ideas, looking for STEAM activity designs for elementary schools, looking for students for learning trials, and implementing STEAM activity designs for elementary school students 3 X 50	**Material:** STEAM for grade 5 elementary school **Reader:** *Bush, SB, & Cook, KL (2019). Step into STEAM, grades K-5: Your standards-based action plan for deepening mathematics and science learning . Corwin Press.* **Material:** STEAM Student Worksheet **Reference:** *Haifaturrahmah, H., Hidayatullah, R., Maryani, S., Nurmiwati, N., & Azizah, A. (2020). Development of STEAM-Based Student Worksheets for Elementary School Students. Journal of Education: Journal of Research Results and Literature Review in the Field of Education, Teaching and Learning, 6 (2), 310-318.* **Material:** STEAM for Elementary School **Reference:** *Kim, Y., & Park, N. (2012). The effect of STEAM education on elementary school student's creativity improvement. In Computer applications for security, control and systems engineering (pp. 115-121).* **Material:** STEAM Project Examples **Library:** *Springer, Berlin, Heidelberg. Lu, YC, Liu, WS, Wu, TT, Sandnes, FE, & Huang, YP (2019, December). A Study of Problem Solving Using Blocks Vehicles in a STEAM Course for*	5%

						Lower Elementary Levels. In International Conference on Innovative Technologies and Learning (pp. 49-57). **Material:** STEAM Learning Effects **References:** *Mun, J., & Shin, Y. (2018). The Effect of Science-centered STEAM Program on Science Positive Experience: Focused on the. Journal of Science Education, 42(2), 214-229* **Material:** STEAM Learning for Early Grade Elementary School **Reference:** *Nurwulan, NR (2020). Introduction to the STEAM Learning Method for Elementary School Students Grades 1 to 3. Madaniya, 1 (3), 140-146.* **Material:** STEAM in Elementary School **Reader:** *Ward, AS (2021). An Investigation of the Successful Implementation of Innovative Instructional Techniques in a Steam Elementary School: An Instrumental Case Study. Drexel University.* **Material:** STEAM learning in the 21st century **References:** *Zubaidah, S. (2019, September). STEAM (science, technology, engineering, arts, and mathematics): Learning to empower 21st century skills. In National Mathematics and Science Seminar, September (pp. 1-18).*	
11			**Criteria:**	1. Discuss the	Synchronous: Same as	**Material:**	5%

	1. Developing STEAM-based learning designs in elementary schools 2. Use critical and creative thinking during the design and implementation of STEAM projects	1. Designing Project STEAM-based learning in elementary schools 2. Analyze learning outcomes in elementary school for each STEAM component 3. Testing STEAM Ideas in Elementary Schools	according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	STEAM component of the selected design 2. Analyze learning outcomes in elementary school that are in accordance with STEAM 3. Present the design of STEAM activities in elementary school 3	the offline method agenda. Asynchronous: Reading references about examples of STEAM learning designs and constructing STEAM learning ideas, looking for STEAM activity designs for elementary schools, looking for students for learning trials, and implementing STEAM activity designs for elementary school students 3 X 50	STEAM for grade 5 elementary school **Reader:** *Bush, SB, & Cook, KL (2019). Step into STEAM, grades K-5: Your standards-based action plan for deepening mathematics and science learning . Corwin Press.* **Material:** STEAM Student Worksheet **Reference:** *Haifaturrahmah, H., Hidayatullah, R., Maryani, S., Nurmiwati, N., & Azizah, A. (2020). Development of STEAM-Based Student Worksheets for Elementary School Students. Journal of Education: Journal of Research Results and Literature Review in the Field of Education, Teaching and Learning, 6 (2), 310-318.* **Material:** STEAM for Elementary School **Reference:** *Kim, Y., & Park, N. (2012). The effect of STEAM education on elementary school student's creativity improvement. In Computer applications for security, control and systems engineering (pp. 115-121).* **Material:** STEAM Project Examples **Library:** *Springer, Berlin, Heidelberg. Lu, YC, Liu, WS, Wu, TT, Sandnes, FE, & Huang, YP (2019, December). A Study of Problem Solving Using Blocks Vehicles in a STEAM Course for Lower Elementary Levels. In International Conference on Innovative*		

						Technologies and Learning (pp. 49-57). **Material:** STEAM Learning Effects **References:** *Mun, J., & Shin, Y. (2018). The Effect of Science-centered STEAM Program on Science Positive Experience: Focused on the. Journal of Science Education, 42(2), 214-229* **Material:** STEAM Learning for Early Grade Elementary School **Reference:** *Nurwulan, NR (2020). Introduction to the STEAM Learning Method for Elementary School Students Grades 1 to 3. Madaniya, 1 (3), 140-146.* **Material:** STEAM in Elementary School **Reader:** *Ward, AS (2021). An Investigation of the Successful Implementation of Innovative Instructional Techniques in a Steam Elementary School: An Instrumental Case Study. Drexel University.* **Material:** STEAM learning in the 21st century **References:** *Zubaidah, S. (2019, September). STEAM (science, technology, engineering, arts, and mathematics): Learning to empower 21st century skills. In National Mathematics and Science Seminar, September (pp. 1-18).*	
12	1.Developing STEAM-based learning designs in	1.Designing Project STEAM-based learning in	**Criteria:** according to the assessment rubric **Forms of Assessment** :	1. Discuss the STEAM component of the selected design 2. Analyze	Synchronous: Same as the offline method agenda. Asynchronous: Reading references about examples of	**Material:** STEAM for grade 5 elementary school **Reader:** *Bush,*	10%

	elementary schools 2. Use critical and creative thinking during the design and implementation of STEAM projects	elementary schools 2. Analyze learning outcomes in elementary school for each STEAM component 3. Testing STEAM Ideas in Elementary Schools	Participatory Activities, Project Results Assessment / Product Assessment	learning outcomes in elementary school that are in accordance with STEAM 3. Present the design of STEAM activities in elementary school 3	STEAM learning designs and constructing STEAM learning ideas, looking for STEAM activity designs for elementary schools, looking for students for learning trials, and implementing STEAM activity designs for elementary school students 3 X 50	*SB, & Cook, KL (2019). Step into STEAM, grades K-5: Your standards-based action plan for deepening mathematics and science learning . Corwin Press.* **Material:** STEAM Student Worksheet **Reference:** *Haifaturrahmah, H., Hidayatullah, R., Maryani, S., Nurmiwati, N., & Azizah, A. (2020). Development of STEAM-Based Student Worksheets for Elementary School Students. Journal of Education: Journal of Research Results and Literature Review in the Field of Education, Teaching and Learning, 6 (2), 310-318.* **Material:** STEAM for Elementary School **Reference:** *Kim, Y., & Park, N. (2012). The effect of STEAM education on elementary school student's creativity improvement. In Computer applications for security, control and systems engineering (pp. 115-121).* **Material:** STEAM Project Examples **Library:** *Springer, Berlin, Heidelberg. Lu, YC, Liu, WS, Wu, TT, Sandnes, FE, & Huang, YP (2019, December). A Study of Problem Solving Using Blocks Vehicles in a STEAM Course for Lower Elementary Levels. In International Conference on Innovative Technologies and Learning (pp. 49-57).* **Material:**		

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13	1. Create scientific articles related to the implementation of STEAM-based learning design in elementary schools 2. Apply written	1. Evaluating the Implementation of STEAM Design in Elementary Schools 2. Reporting the results of implementing STEAM	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Presenting the results of testing STEAM activity designs at SD 3	Synchronous: Same as the offline method agenda. Asynchronous: Writing test results data in the form of scientific articles, consulting the results of article writing with the team of lecturers, revising the draft article and	**Material:** STEAM for grade 5 elementary school **Reader:** *Bush, SB, & Cook, KL (2019). Step into STEAM, grades K-5: Your standards-*	10%

		communication skills to create scientific articles about STEAM learning design in elementary school	learning in elementary schools 3. Prepare draft articles in groups from group projects carried out individually 4. Article Presentation			adapting it to the target journal template, reading references about examples of STEAM learning designs and constructing STEAM learning ideas. 3 X 50	*based action plan for deepening mathematics and science learning . Corwin Press.* **Material:** STEAM Student Worksheet **Reference:** *Haifaturrahmah, H., Hidayatullah, R., Maryani, S., Nurmiwati, N., & Azizah, A. (2020). Development of STEAM-Based Student Worksheets for Elementary School Students. Journal of Education: Journal of Research Results and Literature Review in the Field of Education, Teaching and Learning, 6 (2), 310-318.* **Material:** STEAM for Elementary School **Reference:** *Kim, Y., & Park, N. (2012). The effect of STEAM education on elementary school student's creativity improvement. In Computer applications for security, control and systems engineering (pp. 115-121).* **Material:** STEAM Project Examples **Library:** *Springer, Berlin, Heidelberg. Lu, YC, Liu, WS, Wu, TT, Sandnes, FE, & Huang, YP (2019, December). A Study of Problem Solving Using Blocks Vehicles in a STEAM Course for Lower Elementary Levels. In International Conference on Innovative Technologies and Learning (pp. 49-57).* **Material:** STEAM Learning Effects **References:** *Mun, J., & Shin,*	

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14	1.Create scientific articles related to the implementation of STEAM-based learning design in elementary schools 2.Apply written communication skills to create scientific articles about STEAM learning design	1.Evaluating the Implementation of STEAM Design in Elementary Schools 2.Reporting the results of implementing STEAM learning in elementary schools 3.Prepare draft articles in groups from	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Presenting the results of testing STEAM activity designs at SD 3	Synchronous: Same as the offline method agenda. Asynchronous: Writing test results data in the form of scientific articles, consulting the results of article writing with the team of lecturers, revising the draft article and adapting it to the target journal template, reading references about examples of STEAM learning designs and	**Material:** STEAM for grade 5 elementary school **Reader:** *Bush, SB, & Cook, KL (2019). Step into STEAM, grades K-5: Your standards-based action plan for deepening mathematics and science learning .*	10%

	in elementary school	group projects carried out individually 4. Article Presentation			constructing STEAM learning ideas. 3 X 50	*Corwin Press.* **Material:** STEAM Student Worksheet **Reference:** *Haifaturrahmah, H., Hidayatullah, R., Maryani, S., Nurmiwati, N., & Azizah, A. (2020). Development of STEAM-Based Student Worksheets for Elementary School Students. Journal of Education: Journal of Research Results and Literature Review in the Field of Education, Teaching and Learning, 6 (2), 310-318.* **Material:** STEAM for Elementary School **Reference:** *Kim, Y., & Park, N. (2012). The effect of STEAM education on elementary school student's creativity improvement. In Computer applications for security, control and systems engineering (pp. 115-121).* **Material:** STEAM Project Examples **Library:** *Springer, Berlin, Heidelberg. Lu, YC, Liu, WS, Wu, TT, Sandnes, FE, & Huang, YP (2019, December). A Study of Problem Solving Using Blocks Vehicles in a STEAM Course for Lower Elementary Levels. In International Conference on Innovative Technologies and Learning (pp. 49-57).* **Material:** STEAM Learning Effects **References:** *Mun, J., & Shin, Y. (2018). The Effect of Science-centered STEAM Program on*		

						Science Positive Experience: Focused on the. Journal of Science Education, 42(2), 214-229 **Material:** STEAM Learning for Early Grade Elementary School **Reference:** *Nurwulan, NR (2020). Introduction to the STEAM Learning Method for Elementary School Students Grades 1 to 3. Madaniya, 1 (3), 140-146.* **Material:** STEAM in Elementary School **Reader:** *Ward, AS (2021). An Investigation of the Successful Implementation of Innovative Instructional Techniques in a Steam Elementary School: An Instrumental Case Study. Drexel University.* **Material:** STEAM learning in the 21st century **References:** *Zubaidah, S. (2019, September). STEAM (science, technology, engineering, arts, and mathematics): Learning to empower 21st century skills. In National Mathematics and Science Seminar, September (pp. 1-18).*	
15	1. Create scientific articles related to the implementation of STEAM-based learning design in elementary schools 2. Apply written communication skills to create scientific articles about STEAM learning design in elementary school	1. Evaluating the Implementation of STEAM Design in Elementary Schools 2. Reporting the results of implementing STEAM learning in elementary schools 3. Prepare draft articles in groups from group projects carried out individually	**Criteria:** according to the assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Presenting the results of testing STEAM activity designs at SD 3	Synchronous: Same as the offline method agenda. Asynchronous: Writing test results data in the form of scientific articles, consulting the results of article writing with the team of lecturers, revising the draft article and adapting it to the target journal template, reading references about examples of STEAM learning designs and constructing STEAM learning ideas. 3 X 50	**Material:** STEAM for grade 5 elementary school **Reader:** *Bush, SB, & Cook, KL (2019). Step into STEAM, grades K-5: Your standards-based action plan for deepening mathematics and science learning . Corwin Press.* **Material:** STEAM Student Worksheet	10%

			4.Article Presentation				**Reference:** *Haifaturrahmah, H., Hidayatullah, R., Maryani, S., Nurmiwati, N., & Azizah, A. (2020). Development of STEAM-Based Student Worksheets for Elementary School Students. Journal of Education: Journal of Research Results and Literature Review in the Field of Education, Teaching and Learning, 6 (2), 310-318.* **Material:** STEAM for Elementary School **Reference:** *Kim, Y., & Park, N. (2012). The effect of STEAM education on elementary school student's creativity improvement. In Computer applications for security, control and systems engineering (pp. 115-121).* **Material:** STEAM Project Examples **Library:** *Springer, Berlin, Heidelberg. Lu, YC, Liu, WS, Wu, TT, Sandnes, FE, & Huang, YP (2019, December). A Study of Problem Solving Using Blocks Vehicles in a STEAM Course for Lower Elementary Levels. In International Conference on Innovative Technologies and Learning (pp. 49-57).* **Material:** STEAM Learning Effects **References:** *Mun, J., & Shin, Y. (2018). The Effect of Science-centered STEAM Program on Science Positive Experience: Focused on the. Journal of*		

						Science Education, 42(2), 214-229 **Material:** STEAM Learning for Early Grade Elementary School **Reference:** *Nurwulan, NR (2020). Introduction to the STEAM Learning Method for Elementary School Students Grades 1 to 3. Madaniya, 1 (3), 140-146.* **Material:** STEAM in Elementary School **Reader:** *Ward, AS (2021). An Investigation of the Successful Implementation of Innovative Instructional Techniques in a Steam Elementary School: An Instrumental Case Study. Drexel University.* **Material:** STEAM learning in the 21st century **References:** *Zubaidah, S. (2019, September). STEAM (science, technology, engineering, arts, and mathematics): Learning to empower 21st century skills. In National Mathematics and Science Seminar, September (pp. 1-18).*	
16				Final exams			0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	45%
2.	Project Results Assessment / Product Assessment	45%
3.	Test	10%
		100%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.

4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.