UNESA	**Universitas Negeri Surabaya** **Faculty of Education,** **Doctoral Study Program in Basic Education**	**Document Code**

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Mathematical Praxis Study*	8602203008	Study Program Elective Courses	**T=3**	**P=0**	**ECTS=7.56**	3	April 29, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Dr. Wiryanto, M.Si.	-	Prof. Dr. Suryanti, M.Pd.

Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-3	Develop logical, critical, systematic and creative thinking in carrying out specific work in their field of expertise and in accordance with work competency standards in the field concerned
	PLO-5	Mastering the philosophy and learning methodology of basic education to produce learning innovations.
	PLO-7	Able to develop or discover new scientific theories/conceptions/ideas to contribute to the development and practice of science and technology that are innovative and responsive to basic education needs.
	PLO-11	Able to develop basic education learning models along with supporting devices that are innovative and responsive to students' learning needs, as well as accommodating developments in technology and information.
	Program Objectives (PO)	
	PO - 1	Develop knowledge to answer three scientific questions (ontology, epistemology, and axiology) on Mathematics so as to obtain a comprehensive understanding. 2. Changing the existing paradigm of thinking in looking at Mathematics so that through an inter- or multi-disciplinary approach with other fields of study we can see changes in paradigm shifts regarding the historical philosophy of Mathematics and the development of human civilization. 3. Analyze various paradigms in approaches to Mathematics education that emerge from philosophical studies regarding the nature of mathematics and the nature of Mathematics education. 4. Manage and develop research based on correct and comprehensive reasoning, and utilize philosophical logic regarding Mathematics in studying its impact on mathematics education, especially in elementary schools
	PLO-PO Matrix	

P.O	PLO-3	PLO-5	PLO-7	PLO-11
PO-1				

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																

Short Course Description	This course deepens understanding of the general approach to the philosophy of Mathematics, the philosophy of Mathematics education, and the impact of different paradigms of views of the philosophy of Mathematics on views on Mathematics education. In detail, this course is designed to provide an in-depth understanding of the ontology, epistemology and axiology of Mathematics, the characteristics and nature of Mathematics education in elementary schools as a vehicle for broadening the vision of doctoral candidates so that it can trigger the ability to think reflectively and think critically in developing and implementing Mathematics education and its relationship to the development of civilization in society. Apart from that, this course is also designed to study and analyze various paradigms in Mathematics education approaches which give rise to various theories ranging from behavioristics, social constructivism, to critical and postmodern paradigms.	
References	**Main :**	
	Supporters:	

	1. 2. Ellis, M. W., & Berry III, R. Q. (2005). The paradigm shift in mathematics education: Explanations and implications of reformingconceptions of teaching and learning. The mathematics educator , 15 (1). 3. Ernest, P., Skovsmose, O., Paul van Bendegem, J., Bicudo, M., Miarka, R., Kvasz, L., & Moeller, R. (2016). The philosophy ofmathematics education . Springer Nature. 4. Ernest, P. (Ed.). (2003). Mathematics education and philosophy: An international perspective . Routledge. 5. Ernest, P. (1998). Social constructivism as a philosophy of mathematics . Suny Press. 6. Ernest, P. (1994). The philosophy of mathematics and the didactics of mathematics. Didactics of mathematics as a scientificdiscipline , 335-350. 7. Gutstein, E. (2006). Reading and writing the world with mathematics: Toward a pedagogy for social justice . Taylor & Francis.
Supporting lecturer	Dr. Wiryanto, M.Si.

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. Demonstrate a responsible attitude towards work in their field of expertise independently. 2. Able to develop knowledge, technology and/or art that has novelty value in the scientific field of basic education and professional practice through research to produce creative, original and tested work. 3. Able to discover or develop new scientific theories/conceptions/ideas, contributing to the development and practice of science and/or technology that pays attention to and applies the human values of elementary school education, by producing scientific research based on scientific methodology, logical, critical, systematic and creative thinking. 4. Able to discover or develop theories/concepts/scientific ideas in the field of basic education that have novelty value through inter-, multi- and trans-disciplinary approaches as well as applying humane values.	1. Able to present the problems raised based on sub-CPMK at meeting 1 and able to provide direction and solution actions.	**Form of Assessment** : Participatory Activities, Portfolio Assessment	PBL- and direction by the Mathematics Fraction Study subject instructor 3x50 minutes	- -	**Material:** Identification of problems according to the issues raised regarding each participant's dissertation proposal plan based on a study of mathematical fractions in basic education. **References:** **Material:** 1. Biehler, R., Scholz, R.W., Strässer, R., & Winkelmann, B. (Eds.). (2006). Didactics of mathematics as a scientific discipline (Vol. 13). Springer Science & Business Media. 2. Ellis, M. W., & Berry III, R. Q. (2005). The paradigm shift in mathematics education: Explanations and implications of reforming conceptions of teaching and learning. The mathematics educator, 15(1). 3. Ernest, P., Skovsmose, O., Paul van Bendegem, J., Bicudo, M., Miarka, R., Kvasz, L., & Moeller, R. (2016). The philosophy of mathematics education. Springer Nature. **References:**	5%

2	1. Demonstrate a responsible attitude towards work in their field of expertise independently. 2. Able to develop knowledge, technology and/or art that has novelty value in the scientific field of basic education and professional practice through research to produce creative, original and tested work. 3. Able to discover or develop new scientific theories/conceptions/ideas, contributing to the development and practice of science and/or technology that pays attention to and applies the human values of elementary school education, by producing scientific research based on scientific methodology, logical, critical, systematic and creative thinking. 4. Able to discover or develop theories/concepts/scientific ideas in the field of basic education that have novelty value through inter-, multi- and trans-disciplinary approaches as well as applying humane values.	1. Able to present the problems raised based on sub-CPMK at meeting 1 and able to provide direction and solution actions.	**Form of Assessment** : Participatory Activities, Portfolio Assessment	PBL- and direction by the Mathematics Fraction Study subject instructor 3x50 minutes	- -	**Material:** Identification of problems according to the issues raised regarding each participant's dissertation proposal plan based on a study of mathematical fractions in basic education. **References:** **Material:** 1. Biehler, R., Scholz, R.W., Strässer, R., & Winkelmann, B. (Eds.). (2006). Didactics of mathematics as a scientific discipline (Vol. 13). Springer Science & Business Media. 2. Ellis, M. W., & Berry III, R. Q. (2005). The paradigm shift in mathematics education: Explanations and implications of reforming conceptions of teaching and learning. The mathematics educator, 15(1). 3. Ernest, P., Skovsmose, O., Paul van Bendegem, J., Bicudo, M., Miarka, R., Kvasz, L., & Moeller, R. (2016). The philosophy of mathematics education. Springer Nature. **References:**	0%

3	1. Demonstrate a responsible attitude towards work in their field of expertise independently. 2. Able to develop knowledge, technology and/or art that has novelty value in the scientific field of basic education and professional practice through research to produce creative, original and tested work. 3. Able to discover or develop new scientific theories/conceptions/ideas, contributing to the development and practice of science and/or technology that pays attention to and applies the human values of elementary school education, by producing scientific research based on scientific methodology, logical, critical, systematic and creative thinking. 4. Able to discover or develop theories/concepts/scientific ideas in the field of basic education that have novelty value through inter-, multi- and trans-disciplinary approaches as well as applying humane values.	1. Able to present the problems raised based on sub-CPMK at meeting 1 and able to provide direction and solution actions.	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment	PBL- and direction by the Mathematics Fraction Study subject instructor 3x50 minutes	- -	**Material:** Identification of problems according to the issues raised regarding each participant's dissertation proposal plan based on a study of mathematical fractions in basic education. **References:** **Material:** 1. Biehler, R., Scholz, R.W., Strässer, R., & Winkelmann, B. (Eds.). (2006). Didactics of mathematics as a scientific discipline (Vol. 13). Springer Science & Business Media. 2. Ellis, M. W., & Berry III, R. Q. (2005). The paradigm shift in mathematics education: Explanations and implications of reforming conceptions of teaching and learning. The mathematics educator, 15(1). 3. Ernest, P., Skovsmose, O., Paul van Bendegem, J., Bicudo, M., Miarka, R., Kvasz, L., & Moeller, R. (2016). The philosophy of mathematics education. Springer Nature. **References:**	5%

4	1. Internalize the spirit of independence, struggle and entrepreneurship. 2. Able to solve science, technology and/or arts problems in the scientific field of basic education through an interdisciplinary, multidisciplinary or transdisciplinary approach. 3. Able to prepare interdisciplinary, multidisciplinary or transdisciplinary research, including theoretical studies and/or experiments in the fields of science, technology, arts and innovation which are outlined in the form of dissertations, and papers that have been published in reputable international journals. 4th Meeting 4. Able to communicate research results through publications published in reputable international journals.		**Criteria:** The assessment criteria are based on the final ability achievements at meeting 4. **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Problem Base Learning (PBL) 3x50 minutes	- -	**Material:** 3. Ernest, P., Skovsmose, O., Paul van Bendegem, J., Bicudo, M., Miarka, R., Kvasz, L., & Moeller, R. (2016). The philosophy of mathematics education. Springer Nature. 4. Ernest, P. (Ed.). (2003). Mathematics education and philosophy: An international perspective. Routledge. 5. Ernest, P. (1998). Social constructivism as a philosophy of mathematics. Sunny Press. 6. Ernest, P. (1994). The philosophy of mathematics and the didactics of mathematics. Didactics of mathematics as a scientific discipline, 335-350. **References:**	5%
5	1. Internalize the spirit of independence, struggle and entrepreneurship. 2. Able to solve science, technology and/or arts problems in the scientific field of basic education through an interdisciplinary, multidisciplinary or transdisciplinary approach. 3. Able to prepare interdisciplinary, multidisciplinary or transdisciplinary research, including theoretical studies and/or experiments in the fields of science, technology, arts and innovation which are outlined in the form of dissertations, and papers that have been published in reputable international journals. 4th Meeting 4. Able to communicate research results through publications published in reputable international journals.		**Criteria:** The assessment criteria are based on the final ability achievements at meeting 4. **Form of Assessment** : Assessment of Project Results / Product Assessment, Practices / Performance	Problem Base Learning (PBL) 3x50 minutes	- -	**Material:** 3. Ernest, P., Skovsmose, O., Paul van Bendegem, J., Bicudo, M., Miarka, R., Kvasz, L., & Moeller, R. (2016). The philosophy of mathematics education. Springer Nature. 4. Ernest, P. (Ed.). (2003). Mathematics education and philosophy: An international perspective. Routledge. 5. Ernest, P. (1998). Social constructivism as a philosophy of mathematics. Sunny Press. 6. Ernest, P. (1994). The philosophy of mathematics and the didactics of mathematics. Didactics of mathematics as a scientific discipline, 335-350. **References:**	10%

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7	1. Internalize the spirit of independence, struggle and entrepreneurship. 2. Able to solve science, technology and/or arts problems in the scientific field of basic education through an interdisciplinary, multidisciplinary or transdisciplinary approach. 3. Able to prepare interdisciplinary, multidisciplinary or transdisciplinary research, including theoretical studies and/or experiments in the fields of science, technology, arts and innovation which are outlined in the form of dissertations, and papers that have been published in reputable international journals. 4th Meeting 4. Able to communicate research results through publications published in reputable international journals.		**Criteria:** The assessment criteria are based on the final ability achievements at meeting 4. **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Problem Base Learning (PBL) 3x50 minutes	- -	**Material:** 3. Ernest, P., Skovsmose, O., Paul van Bendegem, J., Bicudo, M., Miarka, R., Kvasz, L., & Moeller, R. (2016). The philosophy of mathematics education. Springer Nature. 4. Ernest, P. (Ed.). (2003). Mathematics education and philosophy: An international perspective. Routledge. 5. Ernest, P. (1998). Social constructivism as a philosophy of mathematics. Sunny Press. 6. Ernest, P. (1994). The philosophy of mathematics and the didactics of mathematics. Didactics of mathematics as a scientific discipline, 335-350. **References:**	10%

8			**Form of Assessment** : Test	UTS 3X50‘	UTS 3X50‘	**Material:** References: [1], [2], [3], [4], [5], and [6] References **:**	10%
9	1. Able to manage, lead and develop research and development that is beneficial for the benefit of humanity, and able to gain national and international recognition. 2. Able to choose research that is appropriate, current, most advanced, and provides benefit to humanity through an interdisciplinary, multidisciplinary, or transdisciplinary approach, in order to develop and/or produce solutions to problems in the fields of science, technology, art, or society, based on the results of studies on resource availability internal and external. 3. Able to solve problems in the field of basic education through inter, multi and transdisciplinary research approaches for the benefit of humanity.		**Criteria:** Very Poor [0-50], Poor [51-60], Fair [61-75], Good [76-84], Very Good [86-100] **Form of Assessment** : Project Results Assessment / Product Assessment	- -	Problem Base Learning (PBL) 3x50‘		5%
10	1. Able to manage, lead and develop research and development that is beneficial for the benefit of humanity, and able to gain national and international recognition. 2. Able to choose research that is appropriate, current, most advanced, and provides benefit to humanity through an interdisciplinary, multidisciplinary, or transdisciplinary approach, in order to develop and/or produce solutions to problems in the fields of science, technology, art, or society, based on the results of studies on resource availability internal and external. 3. Able to solve problems in the field of basic education through inter, multi and transdisciplinary research approaches for the benefit of humanity.		**Criteria:** Very Poor [0-50], Poor [51-60], Fair [61-75], Good [76-84], Very Good [86-100] **Form of Assessment** : Project Results Assessment / Product Assessment	- -	Problem Base Learning (PBL) 3x50‘	**Material:** References: [1], [2], [3], [4], [5], and [6] References **:**	10%
11	1. Able to manage, lead and develop research and development that is beneficial for the benefit of humanity, and able to gain national and international recognition. 2. Able to choose research that is appropriate, current, most advanced, and provides benefit to humanity through an interdisciplinary, multidisciplinary, or transdisciplinary approach, in order to develop and/or produce solutions to problems in the fields of science, technology, art, or society, based on the results of studies on resource availability internal and external. 3. Able to solve problems in the field of basic education through inter, multi and transdisciplinary research approaches for the benefit of humanity.		**Criteria:** Very Poor [0-50], Poor [51-60], Fair [61-75], Good [76-84], Very Good [86-100] **Form of Assessment** : Project Results Assessment / Product Assessment	- -	Problem Base Learning (PBL) 3x50‘	**Material:** References: [1], [2], [3], [4], [5], and [6] References **:**	5%

12	1. Able to develop knowledge, technology and/or art that has novelty value in the scientific field of basic education and professional practice through research to produce creative, original and tested work. 2. Able to develop a research roadmap with an interdisciplinary, multidisciplinary or transdisciplinary approach, based on a study of the main research targets and their constellation of broader targets. 3. Able to formulate scientific, technological or artistic arguments and solutions based on a critical view of facts, concepts, principles or theories that can be justified scientifically and academically, and communicate them through mass media or directly to the public. 4. Able to find or develop innovations, policies and management of basic education through inter, multi and transdisciplinary approaches.		**Form of Assessment** : Project Results Assessment / Product Assessment	PBL 3x50‘	- -	**Material:** References: [1], [2], [3], [4], [5], and [6] References **:**	5%
13	1. Able to develop knowledge, technology and/or art that has novelty value in the scientific field of basic education and professional practice through research to produce creative, original and tested work. 2. Able to develop a research roadmap with an interdisciplinary, multidisciplinary or transdisciplinary approach, based on a study of the main research targets and their constellation of broader targets. 3. Able to formulate scientific, technological or artistic arguments and solutions based on a critical view of facts, concepts, principles or theories that can be justified scientifically and academically, and communicate them through mass media or directly to the public. 4. Able to find or develop innovations, policies and management of basic education through inter, multi and transdisciplinary approaches.		**Criteria:** 5 **Form of Assessment** : Project Results Assessment / Product Assessment	PBL 3x50‘	- -	**Material:** References: [1], [2], [3], [4], [5], and [6] References **:**	10%

14	1. Able to develop knowledge, technology and/or art that has novelty value in the scientific field of basic education and professional practice through research to produce creative, original and tested work. 2. Able to develop a research roadmap with an interdisciplinary, multidisciplinary or transdisciplinary approach, based on a study of the main research targets and their constellation of broader targets. 3. Able to formulate scientific, technological or artistic arguments and solutions based on a critical view of facts, concepts, principles or theories that can be justified scientifically and academically, and communicate them through mass media or directly to the public. 4. Able to find or develop innovations, policies and management of basic education through inter, multi and transdisciplinary approaches.		**Form of Assessment** : Participatory Activities	PBL 3x50‘	- -	**Material:** References: [1], [2], [3], [4], [5], and [6] References **:**	5%
15	1. Students are able to show proof of having submitted the output of lectures on the study of mathematics fractions at elementary schools in the form of articles that are relevant to the direction or embryo of the dissertation proposal they have prepared. 2. Students have completed the course output stage process in the form of registration with IPR as proof of their work in accordance with the objectives of the mathematics fraction study course in basic education.		**Criteria:** Very Good [86-100], Good [76-85], Fair [51-75], Poor [0-50] **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment	-	Question and answer, assignment 3x50‘	**Material:** References: [1], [2], [3], [4], [5], and [6] References **:**	5%
16	1. Students are able to show proof of having submitted the output of lectures on the study of mathematics fractions at elementary schools in the form of articles that are relevant to the direction or embryo of the dissertation proposal they have prepared. 2. Students have completed the course output stage process in the form of registration with IPR as proof of their work in accordance with the objectives of the mathematics fraction study course in basic education.		**Criteria:** Very Good [86-100], Good [76-85], Fair [51-75], Poor [0-50] **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment	-	Question and answer, assignment 3x50‘	**Material:** References: [1], [2], [3], [4], [5], and [6] References **:** **Material:** 1. Biehler, R., Scholz, R.W., Strässer, R., & Winkelmann, B. (Eds.). (2006). Didactics of mathematics as a scientific discipline (Vol. 13). Springer Science & Business Media. 2. Ellis, M. W., & Berry III, R. Q. (2005). The paradigm shift in mathematics education: Explanations and implications of reforming concepts of teaching and learning. The mathematics educator,	5%

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Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	20.01%
2.	Project Results Assessment / Product Assessment	57.51%
3.	Portfolio Assessment	7.51%
4.	Practice / Performance	5%
5.	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.