PORTOFOLIO

PHILOSOPHY OF MATHEMATICS EDUCATION

ACADEMIC YEAR 2018/2019 ODD SEMESTER

Course Coordinator:
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Teaching Team:
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Dr. Yusuf Fuad, M.App.Sc.

DOCTORAL PROGRAM OF MATHEMATICS EDUCATION
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI SURABAYA

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A. LEARNING ACTIVITIES PLAN

A.1. COURSE IDENTITY

Module Name:	Philosophy of Mathematics Education
Module Level:	Doktor (S-3) / Doctor
Abbreviation, if applicable:	8400202038
Sub-heading, if applicable:	-
Course included in the module, if applicable:	-
Semester/term:	1 / First year
Module Coordinator(s):	Prof. Dr. Mega Teguh Budiarto, M.Pd.
Lecturer(s):	Prof. Dr. Mega Teguh Budiarto, M.Pd. Dr. Yusuf Fuad, M.Sc
Language:	Indonesia
Classification within the curriculum:	Compulsory course
Teaching format/class hours per week during the semester	Teaching format: lectures, tutorial assignment, and individual study. 2 x 270 minutes = 540 minutes = 9 hours lectures
Workload:	15 weeks per semester consisting of: ● 1 hour lecture (1 x 50 minutes) per week, ● 2 hours assignments (2 x 50 minutes) per week, ● 2 hours individual study (2 x 60 minutes) per week, Total workload: 14x2x270 minutes = 7,560 minutes = 5.04 ECTS*
Credit Point:	2
Requirements:	N/A

<table>
<tr><td>Learning Goals:</td><td>Knowledge (KNO-1)
CLO-1
Describe the ontology, epistemology, axiology, and aesthetics of mathematics and mathematics education according to a scientific and critical attitude
CLO-2
Applying ontology, epistemology, and axiology of Mathematics and Mathematics Education to examine mathematics education problems by developing communicative and effective arguments
CLO-3
Applying aspects of the philosophy of mathematics education to solve mathematics education problems through integrative studies.</td></tr>
<tr><td>Content:</td><td>The study of various aspects related to ontology, epistemology, axiology, and aesthetics of Mathematics and Mathematics Education which includes the concept of philosophy of science, the position of philosophy of mathematics, education, and mathematics education, philosophical thinking of mathematics according to the view of realism (platonism, Arstitelesion), logicism, formalism, intuitionism, constructivism, finitism, structuralism, embodied theories, and fictionalism, educational philosophical thought according to realism, scholasticism, pragmatism, analysis, existentialism, critical theory, perennialism, essentialism, social reconstructionism, democratism, and progressivism, philosophy of mathematics education in terms of the status of mathematics education and the field other sciences, teaching mathematics, learning mathematics, various educational goals according to authoritarian views, industrial pragmatists, humanism, progressive educators, and general educators, learning theory according to behaviorism, cognitivism, constructivism , and enactivism, and the aesthetics of mathematics.</td></tr>
<tr><td>Study/exam achievements</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 score is calculated as follows:
20% midterm exam + 30% assignments + 20% participation + 30% final exam
Final index is defined as follow:

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

Forms of Media	Slides and LCD projectors, whiteboard
Literature	1. Brown, James *(2008). Philosophy of Mathematics. New York: RoutledgE* 2. Ernest, P. (Ed.) *Philosophy of mathematics education journal*. ISSN 1465-2978 (Online). 3. Ernest, P. (1991).*The philosophy of mathematics education*. London: Falmer Press. 4. Fitzsimmons, J. A. (2014). *Philosophy of teaching and learning mathematics*.http://plato.wilmington.edu/faculty/jfitzs/tchg_phi.htm 5. **Gutek**, **Gerald** Lee. (2009). *New perspectives on philosophy and education*. Columbus, Ohio : **Pearson** 6. http://math.unipa.it/~grim/21_project/21_malasya_Ernest_05.pdf 7. Check also: Ellis, M.W & Berry, R.Q: The Mathematics Educator 2005, Vol. 15, No. 1, 7–17 8. https://gregashman.wordpress.com/2016/04/12/school-maths-versus-real-world-maths/ 9. (Marta Civil) *Chapter 4: Everyday Mathematics, Mathematicians' Mathematics, and School Mathematics: Can We Bring Them Together?* 10. https://files.eric.ed.gov/fulltext/EJ1210988.pdf Citation: Ismail, S. 11. Muhammad, S., Kanesan, A. G., & Ali, R. M. (2019). The Influence of Teachers' Perception and Readiness towards the Implementation of Critical Thinking Skills (CTS) Practice in Mathematics. *International Journal of Instruction*, 12(2), 337-352. https://doi.org/10.29333/iji.2019.12222a
Note	*Total hours per 1 credit in 1 semester={(1 credit x 270 minutes x 14 weeks)/60 minutes}= 63 hours. each ECTS equals with 25 hours therefore 1 credit in 1 semester equals 2.52 ECTS.

A.2. COURSE DESCRIPTION

This course discusses various aspects related to the ontology, epistemology, axiology, and aesthetics of mathematics and mathematics education which includes the concept of philosophy of science, the position of the philosophy of mathematics, education, and mathematics education, philosophical thinking of mathematics according to the views of realism (platonism, Aristoteleion), logicalism, formalism, intuitionism, constructivism, finitism, structuralism, embodied theories, and fictionalism, philosophical thinking of education according to the views of realism, scholasticism, pragmatism, analysisism, existentialism, critical theory, perennialism, essentialism, social reconstructionism, democratism, and progressivism, philosophical thinking of mathematics education in terms of the status of mathematics education and other fields of science, teaching mathematics, learning mathematics, various educational goals according to the views of authoritarian, industrial pragmatists, humanism, progressive educators, and general educators, learning

theory according to the views of behaviorism, cognitivism, constructivism, and enactivism, and mathematical aesthetics.

A.3. LESSON PLAN

UNESA Universitas Negeri Surabaya	UNIVERSITAS NEGERI SURABAYA **FACULTY OF MATHEMATICS AND NATURAL SCIENCES** DOCTORAL PROGRAMME OF MATHEMATICS EDUCATION	**Document Code**

LESSON PLAN

Name of Module	Code	Module Cluster	Credits		Semester	Date of Preparation
Philosophy of Mathematics Education		Basic Science of Mathematics Education	T = 2	P = 0	1	August 5th 2020

Authorization

Lesson Plan Creator	Module Coordinator	Head of MPME
Prof. Dr. Mega Teguh Budiarto, M.Pd.		Prof. Dr. Tatag Yuli Eko Siswono, M.Pd.

COURSE LEARNING OUTCOMES (CLO) AND PROGRAMME LEARNING OUTCOMES (PLO) CORRELATION

Code	Course Learning Outcomes (CLO)	Charged Programme Learning Outcomes (PLO)
CLO-1	Describing the ontology, epistimology, axiology, and aesthetics of mathematics and mathematics education according to a scientific and critical attitude	KNO-1, SOC-1

CLO-2	Applying the ontology, epistimology, and axiology of Mathematics and Mathematics Education to study mathematics education problems by composing communicative and effective arguments.	KNO-1
CLO-3	Applying the aspects of the philosophy of mathematics education to solve mathematics education problems through integrative studies.	SKI-1

MODULE DESCRIPTION	The study of various aspects related to the ontology, epistemology, axiology, and aesthetics of mathematics and mathematics education which includes the concept of philosophy of science, the position of the philosophy of mathematics, education, and mathematics education, philosophical thinking of mathematics according to the views of realism (platonism, Aristoteleion), logicalism, formalism, intuitionism, constructivism, finitism, structuralism, embodied theories, and fictionalism, philosophical thinking of education according to the views of realism, scholasticism, pragmatism, analysisism, existentialism, critical theory, perennialism, essentialism, social reconstructionism, democratism, and progressivism, philosophical thinking of mathematics education in terms of the status of mathematics education and other fields of science, teaching mathematics, learning mathematics, various educational goals according to the views of authoritarian, industrial pragmatists, humanism, progressive educators, and general educators, learning theory according to the views of behaviorism, cognitivism, constructivism, and enactivism, and mathematical aesthetics. Lectures begin with the explanation of concepts and principles, assignments and discussions with students, and presentations with the use of ICT with an assessment including assignments (30%), participation (20%), midterm assessment (20%) and final assessment (30%).

REFERENCES	**Primary References:** 1. Brown, James *(2008). Philosophy of Mathematics. New York: Routledge*. 2. Ernest, P. (Ed.) *Philosophy of mathematics education journal*. ISSN 1465-2978 (Online). 3. Ernest, P. (1991). *The philosophy of mathematics education*. London: Falmer Press.

	4. Fitzsimmons, J. A. (2014). *Philosophy of teaching and learning mathematics*.http://plato.wilmington.edu/faculty/jfitzs/tchg_phi.htm 5. Gutek, Gerald Lee. (2009). *New perspectives on philosophy and education*. Columbus, Ohio : Pearson
	Supporting References: 0. http://math.unipa.it/~grim/21_project/21_malasya_Ernest_05.pdf 0. Check also: Ellis, M.W & Berry, R.Q: The Mathematics Educator 2005, Vol. 15, No. 1, 7–17 0. https://gregashman.wordpress.com/2016/04/12/school-maths-versus-real-world-maths/ 0. (Marta Civil) *Chapter 4: Everyday Mathematics, Mathematicians' Mathematics, and School Mathematics: Can We Bring Them Together?* 0. https://files.eric.ed.gov/fulltext/EJ1210988.pdf Citation: Ismail, S. 0. Muhammad, S., Kanesan, A. G., & Ali, R. M. (2019). The Influence of Teachers' Perception and Readiness towards the Implementation of Critical Thinking Skills (CTS) Practice in Mathematics. *International Journal of Instruction*, 12(2), 337-352. https://doi.org/10.29333/iji.2019.12222a

Lecturers	Prof. Dr. Mega Teguh Budidarto, M.Pd. Dr. Yusuf Fuad, M.Sc

Pre - Requicite	-

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Explaining the etymological meaning of “philosophy”	Describing the meaning of philosophy in general and the philosophy of mathematics education	Independent or group assignment	Collaborative reciprocal; class discussion	• Browsing and internet-based searching, dynamic independence in lectures
					• Interactive discussion (brain storming) about:
					  ◦ http://math.unipa.it/~grim/21_project/21_malasya_Ernest_05.pdf
					  ◦ Check also: Ellis, M.W & Berry, R.Q: The Mathematics Educator 2005, Vol. 15, No. 1, 7–17
					• Distribution and agreement of presentation schedule.
					• Project-based: Lecture’s topic, presentation and discussion using Learning Management System (LMS) Vinesa
					• Asynchronus or Synchronus
					[100 minutes]
						Introductions, consensus and lecture targets, paradigm shifts in mathematics education (Paul Ernest).	

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

2	Explaining the main aspects of philosophical review (ontology, epistemology, axiology).	Explaining overviews of the ontology, epistemology, and axiology of mathematics education	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from week 1.
					• Interactive discussion (brain storming) about:
					  • https://gregashman.wordpress.com/2016/04/12/school-maths-versus-real-world-maths/
					  • (Marta Civil) *Chapter 4: Everyday Mathematics, Mathematicians' Mathematics, and School Mathematics: Can We Bring Them Together?*
					• Project-based: Lecture's topic, presentation and discussion using LMS Vinesa
					• Asynchronus or Synchronus
					[100 minutes]
						Analytical review: Mathematics, School Mathematics, Mathematics Education, Philosophy, Philosophy of Mathematics, Philosophy of Mathematics Education	

3	Explaining the main aspects of philosophical review	Explaining overviews of the ontology, epistemology,	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from week 2. • Interactive discussion (brain storming) about:	Critical-Creative Thinking, Reasoning, Analytical	

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(ontology, epistemology, axiology).	and axiology of mathematics education			• https://files.eric.ed.gov/fulltext/EJ1210988.pdf Citation: Ismail, S. • Muhammad, S., Kanesan, A. G., & Ali, R. M. (2019). The Influence of Teachers' Perception and Readiness towards the Implementation of Critical Thinking Skills (CTS) Practice in Mathematics. *International Journal of Instruction*, 12(2), 337-352. https://doi.org/10.29333/iji.2019.12222a • Project-based: Lecture topic of week 4. • Project-based: Lecture's topic, presentation and discussion using LMS Vinesa	Thinking, and Lateral-Divergent Thinking in Mathematics Education.	

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					• Asynchronous or synchronous [100 minutes]		
4	Describing epistemological schools related to mathematics education.	Analyzing the differences in epistemological schools of Mathematics Education.	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from the week 3. • Presentation-01 & interactive discussion. • Revising presentation-01 materials. • Project-based: Lecture's topic of week 5.	Philosophical Epistemology in Mathematics Education	
5	Describing ontological schools related to mathematics education.	Analyzing the differences in the ontological schools of Mathematics Education.	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from the week 4. • Presentation-02 & interactive discussion. • Revision of presentation-01 materials. • Revising presentation-02 materials. • Project-based: Lecture's topic of week 6.	Ontology-Philosophy in Mathematics Education	
6	Describing ontological schools related	Analyzing the differences in the ontological	Independent or group assignment	Collaborative reciprocal;	• Project-based assignment from the week 5.	Axiology-Philosophy in	

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	to mathematics education.	schools of Mathematics Education.		class discussion	• Presentation-03 & interactive discussion. • Revision of presentation-02 materials. • Revising presentation-03 materials. • Project-based: Lecture's topic of week 7. • Presentation and discussion using LMS Vinesa • Asynchronous or synchronous [100 minutes]	Mathematics Education	
7	Synthesizing the influence of classical philosophy on mathematics education	Synthesizing the influence of classical philosophy on mathematics education.	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from the week 6. • Presentation-04 & interactive discussion. • Revision of presentation-03 materials. • Revising presentation-04 materials. • Project-based: Lecture's topic of week 9.	The influence of Classical Philosophy on Mathematics Education	

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					• Presentation and discussion using LMS Vinesa • Asynchronous or synchronous [100 minutes]		
8							
9	Synthesizing the influence of modern philosophy on mathematics education.	Synthesizing the influence of modern philosophy on mathematics education.	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from the week 7. • Presentation-05 & interactive discussion. • Revision of presentation-04 materials. • Revising presentation-05 materials. • Project-based: Lecture's topic of week 10. • Presentation and discussion using LMS Vinesa • Asynchronous or synchronous [100 minutes]	The Influence of Modern Philosophy on Mathematics Education	

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
10	Synthesizing the influence of contemporary philosophy on mathematics education.	Synthesizing the influence of contemporary philosophy on mathematics education.	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from the week 9. • Presentation-06 & interactive discussion. • Revision of presentation-05 materials. • Revising presentation-06 materials. • Project-based: Lecture's topic of week 11. • Presentation and discussion using LMS Vinesa • Asynchronous or synchronous [100 minutes]	The Influence of Contemporary Philosophy on Mathematics Education	
11	Evaluating the development of the philosophy of mathematics education	Evaluating the Development of Mathematics Education from the Philosophy of Science.	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from the week 10. • Presentation-07 & interactive discussion. • Revision of presentation-06 materials. • Revising presentation-07 materials.	The Development of Mathematics Education from the Philosophy of Science	

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					• Project-based: Lecture's topic of week 12. • Presentation and discussion using LMS Vinesa • Asynchronous or synchronous [100 minutes]		
12	Evaluating the development of the philosophy of mathematics education	Evaluating the Development of Mathematics Education from the Philosophy of Science.	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from the week 11. • Presentation-08 & interactive discussion. • Revision of presentation-07 materials. • Revising presentation-08 materials. • Project-based: Lecture's topic of week 13. • Presentation and discussion using LMS Vinesa • Asynchronous or synchronous [100 minutes]	*A Science-of-Learning Approach to Mathematics Education*	

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
13	Evaluating the development of the philosophy of mathematics education.	Analyzing the Paradox-philosophy of the concept of independent learning (merdeka belajar) in Mathematics Education.	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from the week 12. • Presentation-09 & interactive discussion. • Revision of presentation-08 materials. • Revising presentation-09 materials. • Project-based: Lecture's topic of week 14. • Presentation and discussion using LMS Vinesa • Asynchronous or synchronous • [100 minutes]	Paradoxical-philosophical concept of independent learning (kurikulum merdeka) in Mathematics Education.	
14	Evaluating the development of the philosophy of mathematics education.	Analyzing the Paradox-philosophy of online learning concept in School Mathematics Learning.	Independent or group assignment	Collaborative reciprocal; class discussion	• Project-based assignment from the week 13. • Presentation-10 & interactive discussion. • Revision of presentation-09 materials. • Revising presentation-10 materials.	Paradoxical-philosophical concept of online learning in School Mathematics Learning	

Week	Final abilities of each stage of learning	Assessment		Teaching Methodology		Learning Materials	Weight (%)
		Indicators	Assessment Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					• Project-based: Lecture's topic of week 14. • Presentation and discussion using LMS Vinesa • Asynchronous or synchronous • [100 minutes]		
15	FINAL EXAMINATION (TAKE HOME)						
16-17	Revision of assignments						

A.4. MAPPING OF LEARNING OUTCOMES – COURSE OUTCOMES

A.4.1. The Expected Program Learning Outcomes (PLO) of Doctoral Program of Mathematics Education

ASPECTS	PLO	CODE
KNOWLEDGE	1. Able to master the paradigm of thinking in the philosophy of mathematics and education mathematics, the relationship between the two in science, and concepts cognitive psychology, as well as other concepts developed to solve problems mathematics education.	**KNO-1**
	0. Able to master advanced mathematical concepts	**KNO-2**
	0. Able to master the theory and research related to pedagogical principles in mathematics education that is original, creative, and innovative through research.	**KNO-3**
SKILL	1. Able to find new scientific ideas in mathematics education through interdisciplinary, multidisciplinary, or trans-disciplinary approaches	**SKI-1**
	0. Able to solve educational problem through integrative studies in life, culture, pedagogy, mathematics, and technology, and information.	**SKI-2**
	0. Able to carry out research and development of mathematics education beneficial to the public interest.	**SKI-3**
COMPETENCES	1. Able to make decision based on data and communicate research ideas, results and its argumentation written and oral	**COM-1**
ATTITUDE AND SOCIAL	1. Able to demonstrate national culture values as well as ethics academics in carrying out their professional duties	**SOC-1**
	0. Able to demonstrate scientific, critical, creative, and innovative attitude in developing mathematics education.	**SOC-2**

A4.2. The Education Program Objectives (PEOs) of Philosophy of Mathematics Education

PEO 1. Able to develop knowledge of mathematics education that is related to technology and professional practice creatively (Professional Accomplishment).

PEO 2. Able to solve mathematics education problems by using transdisciplinary approach in national and international level (Academic Accomplishment).

PEO 3. Having professional responsibility and academic ethics to manage the given task (General or Social Accomplishment).

A4.3. Mapping of Program Learning Outcomes (PLO) – Education Program Objectives (PEOs)

	PEO		
PLO	PEO-1	PEO-2	PEO-3
KNO-1	√	√	
KNO-2	√	√	
KNO-3	√	√	
SKI-1	√		
SKI-2	√	√	
SKI-3		√	
COM-1	√	√	
SOC-1			√
SOC-2			√

Note: √ = strong connection

B. COURSE ASSESSMENT

B.1. Assessment Rubric

Cognitive Criteria

1. The ability to give answers correctly
2. The ability to provide argumentation according to theory
3. The ability to provide systematic explanations
4. The ability to solve problems comprehensively

B.2. Assessment System

Final Assessment Course:

Group/Individuals Assignment : 30%
Midterm examination : 30%
Final examination : 40%

Distribution of the weight of the ability of the test item

	PLO 1 (KNO-1)	PLO 4 (SKI-1)	PLO 8 (SOC-1)	Total
Group/Individuals Assignment	40%	40%	20%	100%
Midterm examination	40%	40%	20%	100%
Final examination	40%	40%	20%	100%

Success Criteria of Program Learning Outcomes (PLO)

Excellence	≥ 85
Good	≥ 70
Satisfy	≥ 55
Fail	> 0

Final index for postgraduate program defined as follow:

Score Interval	Score	Grade
85 ≤ A ≤ 100	4	A
(80 ≤ A- < 85)	3,75	A-
(75 ≤ B+ < 80)	3,5	B+
(70 ≤ B < 75)	3	B
(65 ≤ B- <75)	2,75	B-
(60 ≤ C+ <65)	2,5	C+
(55 ≤ C <60)	2	C
1(40 ≤ D <55)	1	D
(0 ≤ E <40)	0	E

C. COURSE DEVELOPMENT

C.1. Academic Year 2018/2019 Odd Semester

Parameter	∑ of person	Percentage
Number or students taking this subject	12	100%
Number of students who pass at first attempt (>C+)	12	100%
Number of students who pass at first attempt (= C)	0	0%
Number of failed students after remedial (D & E)	0	0%

C.2. Problems Analysis

In 2018/2019 academic year in the Philosophy of Mathematics Education, there were 100% students had passed the examination at the first attempt. At the end of the Semester Examination there is not remedial test for students. Therefore, the improving learning strategies / methods were required to achieve the better results.

C.3. Solutive Strategy

New teaching and learning methods should be developed for the next academic years, consisting of improving and adjusting learning strategy with the context and content of the course.

D. APPENDICES

D.1. DOCUMENT OF COURSE ACTIVITY

D.1.1. Lecture's journal and student's attendance form siakadu.uneca.ac.id for DPME Class 2018A

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI

UNIVERSITAS NEGERI SURABAYA

Kampus Ketintang
Jalan Ketintang, Surabaya 60231
T: +6231-8293484
F: +6231-8293484
laman: unesa.ac.id
email : bakpk@unesa.ac.id

Aktivitas Perkuliahan

Nama Matakuliah : Filsafat Pendidikan Matematika **Dosen** : SITI KHABIBAH (197210012001122006)
SITI MAGHFIROTUN AMIN (195005311974032001)

Kelas : 2018A

Jadwal & Ruang : K02.01.06 (13.00 - 14.40) R.

No.	Tanggal	Pertemuan	Topik	Peserta	Status	Dosen
1	01-02-2019	Pertemuan ke 1	1. Pendahuluan, Ilmu dan Filsafat	11	Terjadwal	Siti Maghfirotun Amin
2	08-02-2019	Pertemuan ke 2	1. Persiapan makalah untuk presentasi	11	Terjadwal	Siti Maghfirotun Amin
3	15-02-2019	Pertemuan ke 3	1. Penyusunan makalah untuk presentasi	11	Terjadwal	Siti Maghfirotun Amin
4	22-02-2019	Pertemuan ke 4	1. Pengetahuan	11	Terjadwal	Siti Maghfirotun Amin
5	14-03-2019	Pertemuan ke 5	1. Ontologi	10	Ganti	Siti Maghfirotun Amin
6	15-03-2019	Pertemuan ke 6	1. Epistemologi	10	Terjadwal	Siti Maghfirotun Amin
7	22-03-2019	Pertemuan ke 7	Aksiologi	11	Terjadwal	Siti Maghfirotun Amin
8	29-03-2019	Pertemuan ke 8	Sarana berpikir ilmiah	10	Terjadwal	Siti Maghfirotun Amin

9	04-04-2019	Pertemuan ke 9	1. Kritik terhadap kemutlakan Rekonseptualisasi filsafat	11	Terjadwal	Siti Khabibah
10	05-04-2019	Pertemuan ke 10	1. Konstruksi sosial sebagai filsafat matematika 2. Konstruktivisme dan pengetahuan subjektif	11	Ganti	Siti Khabibah
11	12-04-2019	Pertemuan ke 11	1. Paralel konstruktivisme sosial 2. tujuan dan ideologi pendidikan matematika	11	Terjadwal	Siti Khabibah
12	02-05-2019	Pertemuan ke 12	1. Perubahan ideologi sosil pendidik publik	11	Ganti	Siti Khabibah
13	02-05-2019	Pertemuan ke 13	1. Review kriti Cockcroft dan kurikulum nasional	11	Ganti	Siti Khabibah
14	03-05-2019	Pertemuan ke 14	1. Hirarki dalam matematika, belajar, kemampuan, dan masyarakat	11	Ganti	Siti Khabibah
15	03-05-2019	Pertemuan ke 15	1. Matematika, nila, dan kesempatan 2. Investigasi, pemevahan masalah, dan pedagogik	11	Terjadwal	Siti Khabibah

D.1.2. Example recap of student attendance at Philosophy of Mathematics Education for DPME Class 2018A

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,
RISET DAN TEKNOLOGI
UNIVERSITAS NEGERI SURABAYA

Jl. Lidah Wetan, Surabaya - 60213
Telepon :+6231-99424932
Faksimile :+6231-99424932
e-mail :bakpk@unesa.ac.id

PRESENSI KULIAH
Periode 2018/2019 Genap

Mata Kuliah : Aljabar Lanjut
Kelas : 2018A
Prodi : S3 Pendidikan Matematika
Dosen : Prof.Dr. Raden Sulaiman, M.Si.

No	NIM	Nama Mahasiswa	Pertemuan Ke															%
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
			31 Jan 19	07 Feb 19	14 Feb 19	21 Feb 19	28 Feb 19	07 Mar 19	14 Mar 19	21 Mar 19	28 Mar 19	04 Apr 19	11 Apr 19	11 Apr 19	18 Apr 19	06 May 19	13 May 19	
1.	17070936002	LULUK FARIDAH	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
2.	18070936001	ANING WIDA YANTI	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
3.	18070936002	HENRY PUTRA IMAM WIJAYA	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
4.	18070936003	ROSITA DWI FERDIANI	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
5.	18070936004	RACHMANIAH MIRZA HARIASTUTI	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
6.	18070936005	ERIK VALENTINO	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
7.	18070936006	SRI HARTATIK	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
8.	18070936007	MASLINA SIMANJUNTAK	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
9.	18070936008	ASEP SAHRUDIN	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
10.	18070936009	SULAIMAN	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
11.	18070936010	VIA YUSTITIA	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
12.	18070936011	ENDANG SUPRAPTI	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	100 %
Tanda Tangan Dosen / Asisten																		

D.2. SAMPLE OF STUDENT WORK

D.2.1. Sample of Test Paper

KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
UNIVERSITAS NEGERI SURABAYA
PASCASARJANA

Kampus Lidah Gedung CPD, Jalan Kampus Lidah Unesa, Surabaya 60213
Telepon: +6231 – 8293484, Faksimili: +6231 – 8293484
Laman : https://pasca.unesa.ac.id, email : pascasarjana@unesa.ac.id.

NASKAH UJIAN TENGAH SEMESTER GASAL TAHUN PELAJARAN 2022/2023

Mata Kuliah	:	**FILSAFAT PENDIDIKAN MATEMATIKA**
Dosen Pengampu	:	**Prof. Dr. Mega Teguh Budiarto, M.Pd. & Yusuf Fuad**
Program/Kelas	:	**S3 Pend. Matematika/2022**
Hari & Tanggal	:	**Senin, 26 Oktober 2022**
Durasi/Waktu	:	***Offline Test*** **(75 menit: 10.40 – 11.50)** ***Take Home Test*** **(Sesuai Petunjuk)**
Sifat	:	**Hybrid Test**

PETUNJUK:

a. Pelaksanaan UTS luring (*offline*) **HANYA 75 menit**.
b. Kerjakan semua 4 soal luring (*offline*) maupun 3 soal *take home test*.
c. Jawaban *offline test* **HARUS** ditulis dengan **ballpoint** *secara teratur, terbaca,* dan terukur argumennya.
d. Jawaban ***take home test*** dibolehkan dengan diketik pada kertas quarto A4, *font Times New Roman* dan spasi 1,15.
e. Tanpa toleransi apabila jawaban Anda dapat diidentifikasi hanya mengcopy dan/atau mencontek dari jawaban "*any alien*" dan otomatis maksimal nilai akhir adalah E.
f. Setiap pelanggaran dikenakan pemotongan nilai maksimal.
g. Tambahan skor maksimal 20% apabila *your aswer is fully written in English*.
h. Jawaban *take home test* harus dikirim dalam bentuk file ****.docx*** ke email megatbudiarto@unesa.ac.id dan yusuffuadmath@gmail.com dengan nama file: **Kelas_Tiga Angka Terakhir dari NIM_UTS Filsafat_Nama Lengkap_Universitas Pengirim** paling lambat **Selasa Oktober 01 Nopember 2022 pukul 09.00 WIB**.

SOAL

1. (*Offline*) Sebuah koin mata uang memiliki permukaan "filsafat matematika" dan "filsafat pendidikan matematika". Lemparkan dengan penuh cinta (*filo*) koin mata uang tersebut sangat tinggi ke udara. Apakah Anda akan menemukan sebuah kepastian ketika koin mata uang tersebut jatuh di tanah dalam posisi berdiri tegak? Dan apakah kondisi koin yang jatuh tegak tersebut menggambarkan kondisi filsafat pendidikan matematika? Deskripsikan jawaban Anda dengan argumen yang rasional. (*Skor 15*)

2. *(Offline) Dalam filsafat sering diperkenalkan Variis modes bene fit*. Sesuatu dapat berhasil melalui banyak cara yang berbeda. Sedangkan Pythagoras memperkenalkan pemikirannya bahwa *Number rules the Universe*. Bilangan memerintah/mengatur jagat raya ini. Akan tetapi Plato berpendapat bahwa *God ever geometrizes*. Tuhan selalu bertindak secara geometris. Mengapa ada perbedaan pemikiran antara Plato dan Pythagoras tentang konsep kesemestaan? Apakah dari visi filsafat pendidikan matematika, pemikiran Pythagoras dan Plato tersebut, masih relevan di era pesatnya perkembangan teknologi digital *smartphone–gadget* dan rencana berkehidupan *metaverse*? Uraikan argumen Anda secara rasional. (Skor 20)

3. (*Take home*) Ada empat aspek yang sering dikaitkan dengan kelahiran filsafat, yaitu ketakjuban, ketidakpuasan, hasrat ingin tahu, dan keraguan. Baca dan fahami baik-baik, dengan mengunduh dari internet, artikel dari Ernest, P. (2015): *The philosophy of mathematics education and Stephen Lerman's contributions.* Berdasarkan artikel Ernest, P. (2015) tersebut, diskusikan secara argumentatif rasional: (a) Mengapakah dalam artikel tersebut ada penekanan terkait kontribusi dari Stphen Lerman?; (b) Apakah Paul Ernest cenderung mendukung atau melakukan *academic-counter debate* terhadap pemikiran Stephen Lerman?; (c) Apakah yang dimaksud Paul Ernest terkait konsep *a broden sense dan a narrow interpretation of the philosophical of mathematics education*?; (d) Berdasarkan kontribusi Stephen Lerman, apakah konsep *top down perspective,* yang terkesan ditekankan dalam bagian simpulan artikel, masih cukup relevan dan layak (*feasible*) diadopsi dan diimplementasikan di Indonesia? (Skor 50)

4. (*Offline*) *Variis modes bene fit.* Dengan himpunan bilangan bulat sebagai *universum*, proposisi $\mathbf{1+4=5}$ selalu bernilai benar. Sangat mudah difahami bahwa $\mathbf{2+5=12}$, karena $\mathbf{5+2+5=12.}$ Bagaimanakah Anda menentukan hasil dari $\mathbf{9+12=\cdots}$? Apakah hanya ada ***satu dan hanya satu*** cara untuk menentukan hasil Anda tersebut? Berdasarkan epistemologi sederhana yang komunikatif, bagaimanakah Anda menjelaskan hasil tersebut kepada siswa SMP/MTs atau SMA/MA/SMK? (*Skor 20*)

5. (*Offline*) Perhatikan 7 tahap pada pola perhitungan berikut ini.

$$\left(5^{\frac{1}{4}}-1\right)\left(5^{\frac{3}{4}}+5^{\frac{1}{2}}+5^{\frac{1}{4}}+1\right)=$$
$$\left(5^{\frac{1}{4}}-1\right)\left[\left(5^{\frac{1}{4}}\right)^{3}+\left(5^{\frac{1}{4}}\right)^{2}+\left(5^{\frac{1}{4}}\right)+1\right]=$$
$$\left(5^{\frac{1}{4}}-1\right)\left[\left(5^{\frac{1}{4}}\right)^{2}\left(5^{\frac{1}{4}}+1\right)+5^{\frac{1}{4}}+1\right]=$$
$$\left(5^{\frac{1}{4}}-1\right)\left(5^{\frac{1}{4}}+1\right)\left[\left(5^{\frac{1}{4}}\right)^{2}+1\right]=$$
$$\left[\left(5^{\frac{1}{4}}\right)^{2}-1\right]\left[\left(5^{\frac{1}{4}}\right)^{2}+1\right]=$$
$$\left[\left(5^{\frac{1}{4}}\right)^{4}-1\right]=$$
$$5-1=4$$

Jadi, $\left(5^{\frac{1}{4}}-1\right)\left(5^{\frac{3}{4}}+5^{\frac{1}{2}}+5^{\frac{1}{4}}+1\right)=4$

Berdasarkan ontologi–epistemologi di atas, kesimpulan apakah yang dapat Anda jelaskan tentang hasil perhitungan berikut ini (*Skor 15*).

$$\left(30^{\frac{1}{4}}-1\right)\left(30^{\frac{3}{4}}+30^{\frac{1}{2}}+30^{\frac{1}{4}}+1\right) \text{ dan } \left(100^{\frac{1}{4}}-1\right)\left(100^{\frac{3}{4}}+100^{\frac{1}{2}}+100^{\frac{1}{4}}+1\right)$$

6. (*Take Home*) Sebuah teorema matematis menyatakan bahwa: "*Terdapat bilangan real positif yang kuadratnya sama dengan* π". Teorema tersebut menjamin eksistensi/keberadaan dari bilangan irasional $\sqrt{\pi}$. Dari aspek pendidikan matematika, jelaskan apa (ontologi) yang Anda ketahui tentang bilangan $\sqrt{\pi}$. Bagaimana (epistemologi) bahwa terdapat eksistensi/keberadaan dari bilangan $\sqrt{\pi}$. Deskripsikan pula manfaat (aksiologi) dari eksistensi/keberadaan dari bilangan $\sqrt{\pi}$. (*Skor 20*).

7. (*Offline*) Coba ikuti apa yang pernah dinyatakan oleh Georg Cantor (1845-1918). Pikirkan ruas garis yang panjangnya satu satuan, dengan titik ujung 0 dan 1 sehingga dipunyai interval tutup $[0,1]$. Bagi ruas garis tersebut menjadi tiga bagian dan tinggalkan/buang pertiga bagian tengahnya, sehingga

diperoleh dua subinterval $\left[0,\frac{1}{3}\right]$ & $\left[\frac{2}{3},1\right]$. Cermati bahwa pertiga bagian tengah $\left[\frac{1}{3},\frac{2}{3}\right]$ sudah ditinggalan/dibuang, berarti panjang ruas garis tinggal $\frac{1}{3}+\frac{1}{3}=\frac{2}{3}$, karena sudah berkurang $\frac{1}{3}$ –nya. Bagi masing-masing subinterval menjadi tiga sub-subinterval dan buang masing-masing bagian tengahnya sehingga diperoleh sub-subinterval berikut: $\left[0,\frac{1}{9}\right]$,$\left[\frac{2}{9},\frac{1}{3}\right]$, $\left[\frac{2}{3},\frac{7}{9}\right]$, $\left[\frac{8}{9},1\right]$. Cermati bahwa dua bagian dari msding-masing pertiga bagian tengah sudah ditinggalkan/dibuang, berarti panjang ruas garis berkurang lagi dengan $(2\times\frac{1}{9}=\frac{2}{9}$)-nya. Lanjutkan cara pembuangan pertiga bagian tengah sampai tak berhingga proses. Maka diperoleh panjang ruas garis yang dibuang adalah

$$\frac{1}{3}+\frac{2}{9}+\frac{4}{27}+\cdots$$

Ternyata jumlahan di atas merupakan suatu deret geometri. Mudah dihitung bahwa penjumlahan dari bentuk di atas adalah $\frac{a}{1-r}=\frac{\frac{1}{3}}{1-\frac{2}{3}}=1$. Karena panjang ruas awal adalah satu satuan dan panjang ruas garis yang dibuang ternyata juga satu satuan, menurut pemikiran Anda, apakah benar pola pembuangan ruas garis yang dilakukan oleh Georg Cantor menghasilkan sesuatu yang tidak bersisa? Jelaskan jawaban Anda dengan argumen yang rasional. (*Skor 20*)

8. (*Take Home*) Cermati dan pilih salah satu dari ungkapan filsafati di bawah ini

Engkaukah Cinta nan Pasti

Fly away, fly away, and so far away
Begitu selalu bisikan manjamu ketika aku mulai lelah menggapai
Banyak kata terbentang bagai pujangga bermimpi
Menyiram kegalauan tan bertepi
Mengaduk ambisi sepi

Shine on you crazy diamond
Ketika kegelapan kata-kata membelenggu sikapku yang kekanakan dan bloon
Padahal belajar seharusnya membentang seluas horizon
Haruskah aku mundur kembali
Melepasmu melesat bagai ilusi

Can anyone motivate me?
Hausku akan cinta yang berujung pasti
Teduh berhangat dalam senyum indah berwewangi
Selalu melangkah meskipun terjatuh dan terjatuh lagi
Dalam tatap kedua matamu yang penuh cinta sejati
Yang selalu hangat menebar pesona diskusi
Memahami dan selalu mengisi
Tanpa henti angkah kaki *whenever I must fly away and again so far away*

Apa komentar Anda tentang "filsafati" di atas? Cinta siapakah yang dikejar dan dirindukan tersebut? (*Skor 15*)

==0o0 God Bless Mathematics Educators 0o0==

D.2.2. Sample of Student's Work from DPME Class-2018A

UTS Filsafat Pendidikan Matematika
Soffil Widadah (22070936004)
S3-Pendidikan Matematika, 2022 A

3. (a) Dalam artikel tersebut ada penekanan terkait kontribusi dari Stephen Lerman, karena adanya pendekatan *top down* dalam filsafat Pendidikan matematika yang dikembangkan oleh Stephen Lerman, dimana pendekatan *top down* terhadap filsafat dalam penelitian Pendidikan matematika menggunakan cabang abstrak filsafat yang menyediakana kerangka kerja konseptual untuk dianalisis. Stephen Lerman menganggap bahwa penelitian Pendidikan matematika mangacu pada ontologi dan metafisika, epistemologi, filsafat sosial, stika, estetika metodologi atau cabang filsafat lainnya. Sedangkan menurut Ernest 2012 ontologi dan metafisika belum banyak diterapkan dalam penelitian Pendidikan matematika, lebih pada penggambaran estetikanya. Namun epistemology, filsafat sosial, etika dan metodologi telah digunakan dalam penelitian Pendidikan matematika waktu itu. Dalam hal ini Stephen Lerman memberikan kontribusi yang signifikan. Lerman menentang pembelajaran yang hanya berpusat pada pengetahuan, lerman lebih menekankan pembelajan investigasi dan pemecahan masalah.

(b) Paul Ernest cenderung mendukung pemikiran Stephen Lerman, sesuai dengan pernyataan "*In my view it is easier to locate Stephen Lerman's contribution to the philosophy of mathematics education by using such a 'top down' approach*". Menurut Paul Ernest, pendekatan *top down* dimungkinkan untuk mendefinisikan filosofi Pendidikan matematika secara ekstensif karena banyaknya pertanyaan dalam pendekatan *bottom up*, di mana topik dan masalah yang dibahas dalam penelitian Pendidikan matematika digunakan sebagai kerangka kerja untuk memetakan berbagai peranan dalam filsafat Pendidikan matematika. Hal ini dilakukan sebagai pengambilan sudut pandang dari cabang filsafat yang berbeda sebagai kerangka dan analisis.

(c) Interpretasi sempit dari filosofi pendidikan matematika menyangkut tujuan dan dasar pemikiran dari praktik belajar mengajar matematika. Hal ini berpengaruh pada peran guru, pembelajar, dan matematika dalam masyarakat dan nilai-nilai yang mendasari kelompok sosial yang relevan, di samping pengajaran dan pembelajaran matematika. Namun pandangan yang lebih luas tentang sifat filsafat pendidikan matematika menimbulkan pertanyaan yang lebih luas. Apa itu matematika? Bagaimana matematika berhubungan dengan masyarakat? Apa itu belajar (matematika)? Apa

itu mengajar (matematika)? Bagaimana status pendidikan matematika sebagai bidang pengetahuan?

Pengertian sempit yang bisa diterapkan dalam mengartikan kata 'filsafat' dan 'pendidikan matematika'. Pendidikan matematika dipahami dalam pengertian paling sederhana dan paling konkret menyangkut kegiatan atau praktik mengajar matematika. Jadi arti sempit dari 'filsafat pendidikan matematika' menyangkut tujuan atau alasan di balik praktik pengajaran matematika 'Apa tujuan dari pengajaran dan pembelajaran matematika?' merupakan pertanyaan yang penting dipertanyakan. Masalah belajar mengajar matematika, tujuan dan alasan belajar matematika, peran guru, peserta didik, dan matematika dalam masyarakat dan nilai-nilai yang mendasari pendidikan matematika, serta kelompok sosial yang terlibat.

(d) Menurut saya, konsep *top down perspective* masih cukup relevan dan layak diadopsi dan diiplementasikan di Indonesia, karena **epistemologi** menyangkut teori pengetahuan dan dapat diambil untuk memasukkan sifat pengetahuan matematika, termasuk sarana verifikasi, dan proses menjadi tahu, atau belajar. Jadi pertanyaan yang diajukan (Apa itu matematika?) dan (Apa itu belajar matematika?) bisa terjawab. Di mana epistemologi memeriksa beberapa pertanyaan utama mengenai kebenaran, makna dan kepastian, dan cara-cara berbeda untuk menafsirkannya. **Filsafat sosial,** Lerman 1998, Lerman 2006, berpendapat bahwa banyak pertanyaan dan masalah dalam penelitian Pendidikan matematika dapat didekati dari landasan sosial dan budaya. Hal ini sesuai dengan keragaman budaya yang ada di Indonesia. **Etika** masuk ke dalam penelitian pendidikan matematika dengan beberapa cara termasuk perhatian dengan nilai-nilai, dengan pendekatan keadilan dan kesetaraan sosial, dan melalui etika metodologi penelitian. Dalam Lerman (1992), Steve mengacu pada filosofi emansipatoris Paulo Freire untuk menyatakan bahwa belajar matematika dapat menjadi kegiatan revolusioner dalam perjuangan untuk keadilan sosial dan kesetaraan. **Metodologi**, menurut Steve ada kerangka yang berbeda dan filosofi yang mendasari gaya penelitian Pendidikan matematika serta sikap filosofis dari peneliti Pendidikan matematika, baik sebagai intelektual yang kritis maupun akademisi fungsional.

Dengan demikian, konsep *top down perspective* perlu diadopsi dan diiplementasikan di Indonesia karena sesuai dengan kondisi sosial budaya rakyat Indonesia.

6. Secara **ontologi**, apakah bilangan $\sqrt{\pi}$ ada? Tentu ada , sesuai dengan pernyataan/teorema "Terdapat bilangan real positif yang kuadratnya sama dengan π. Berdasarkan teoerma ini, maka tentu ada bialngan $\sqrt{\pi}$. Dan bagaimana cara saya menjelaskan kepada siswa tentang $\sqrt{\pi}$

Jika saya menjelaskan kepada siswa SMP, maka $\sqrt{\pi}$ **gantilah** dengan $\sqrt{3{,}14}$ atau $\sqrt{\frac{22}{7}}$

Jika saya menjelaskan kepada siswa SMA, maka $\sqrt{\pi}$ **dekatilah** dengan $\sqrt{3{,}14}$ atau $\sqrt{\frac{22}{7}}$

Jika berbicara dengan mahasiswa, maka $\sqrt{\pi}$ **adalah** $\sqrt{\pi}$

Jadi $\sqrt{\pi}$ **adalah** $\sqrt{\pi}$

Secara **Epistemologi**, bagaimana membuktikan $\sqrt{\pi}$?

Bilangan $\sqrt{\pi}$ karena adanya penyataan matematis:"Terdapat bilangan real positif yang kuadratnya sama dengan π "

Bukti:

Misalkan $S = \{S \in \mathbb{R} | S > 0 \wedge S^2 < \pi\}$

$1 \in S$ karena $0 < 1^2 < \pi$, jadi $S \neq \emptyset$

$2 \notin S$ karena $4 > \pi$, berarti 2 adalah batas atas S, karena $S \neq \emptyset$ dan S batas atas, maka S mempunyai Supremum.

$$Misalkan\ x = supremum\ S$$

Klaim: $x^2 = \pi$

Misalkan $x^2 < \pi$

Maka $\pi - x^2 > 0$

karena $x > 0$, maka $2x + 1 > 0$

Sehingga $\frac{\pi - x^2}{2x+1} > 0$

Maka ada n ∈ N ∋ $\frac{1}{n} < \frac{\pi - x^2}{2x+1}$

Perhatikan bahwa untuk suatu n ∈ N diperoleh:

$$\begin{aligned}(x + \frac{1}{n})^2 &= x^2 + 2\frac{1}{n}x + \frac{1}{n^2} \\ &< x^2 + 2\frac{1}{n}x + \frac{1}{n} \\ &< x^2 + \frac{1}{n}(2x + 1) \\ &< x^2 + \frac{1}{n}(2x + 1) \\ &< x^2 + \frac{\pi - x^2}{2x + 1}(2x + 1) \\ &< \pi\end{aligned}$$

Maka $(x + \frac{1}{n})$ adalah elemen dari S

Berarti $x + \frac{1}{n} < x \leftrightarrow \frac{1}{n} < 0$ (tidak mungkin terjadi atau kontradiksi)

Jadi $x^2 < \pi$ tidak mungkin

Misalkan $x^2 > \pi$

Maka $x^2 - \pi > 0$

karena $x > 0$, maka $2x > 0$

Sehingga $\frac{\pi - x^2}{2x} > 0$

Maka ada m ∈ N ∋ $\frac{1}{\mathrm{m}} < \frac{x^2 - \pi}{2x}$

Perhatikan bahwa untuk suatu m ∈ N diperoleh:

$$\begin{aligned}(x - \frac{1}{m})^2 &= x^2 - 2\frac{1}{m}x + \frac{1}{m^2} \\ &> x^2 - 2\frac{1}{m}x \\ &= x^2 - \frac{1}{m}(2x) \\ &> x^2 - \frac{x^2 - \pi}{2x}(2x) \\ &> \pi\end{aligned}$$

Maka $(x - \frac{1}{m})$ adalah suatu batas atas dari *S*

Berarti $x < x - \frac{1}{m} \leftrightarrow 0 < \frac{1}{m}$ (tidak mungkin terjadi atau kontradiksi)

Jadi $x^2 > \pi$ tidak mungkin

Karena tidak mungkin $x^2 < \pi$ dan $x^2 > \pi$ haruslah $x^2 = \pi$

$$x^2 = \pi \rightarrow x = \sqrt{\pi}$$

Manfaat keberadaan/eksistensi $\sqrt{\pi}$ adalah sebagai **bukti** bahwa **tidak ada** bilangan rasional yang kuadratnya sama dengan π atau dengan kata lain **tidak ada bilangan rasional r** sedemikian hingga $r^2 = \pi$, artinya kemungkinan kecil kebehasilan untuk membuktikan bahwa π merupakan bilangan rasional atau tidak akan pernah terbukti meskipun menggunakan alat yang canggih..

Tetapi memang **π** selalu menarik karena telah memperdaya ahli matematika terhebat terpesona oleh simbol ini. Daya tarik ini bersifat universal dan telah ada selama hampir 4000 tahun. π benar-benar istimewa, sifat-sifatnya yang luar biasa dan kehadirannya dalam sains dan juga dalam kehidupan sehari-hari memberi π tempat special, dan penemuan matematika terbesar bahwa hari π tanggal 14 Maret **(Kurniawan, 10 Maret 2021)**

8. *Shine on you crazy diamond* (bersinar pada anda berlian gila)
   Ketika kegelapan kata-kata membelenggu sikapku yang kekanakan dan bloon
   Padahal belajar seharusnya membentang seluas horizon
   Haruskah aku mundur kembali Melepasmu melesat bagai ilusi

Pengetahuan menjadi dasar dalam berpikir untuk membuat generalisasi dalam mendapatkan kesimpulan ilmiah yang relative. Kekomplekan kehidupan manusia dan alam semesta menjadikan pengetahuan dan ilmu mengenai obyek yang ingin kita ketahui merupakan abstraksi yang disederhanakan. Oleh karena itu, kita harus banyak belajar dan berpikir, karena akal/pikiran merupakan satu-satunya cara untuk memperoleh ilmu pengetahuan yang benar. Francis Bacon mengatakan; "***Pengetahuan adalah Kekuasaan***" Ungkapan itu bermaksud menjelaskan bahwa Ilmu pada dasarnya bersifat netral, yang tidak memihak pada kebaikan

atau keburukan, Manusia yang menguasai ilmu yang menentukan kegunaannya sebagai kekuasaan untuk mewujudkan kesejahateraan atau menghancurkan kehidupan yang indah ini. Ketika kita sudah memperoleh ilmu/pengetahuan, kita tidak boleh melepasakannnya atau melupakannya, melainkan harus dikembangkan dan didiskusikan dengan orang lain serta terus berfilsafat. Jika kita banyak berpikir dan menemukan kebenaran yang menghasilkan ilmu yang bermanfaat, maka kehidupan kita akan bersinar.
Sebalikya, jika ilmu pengetahuan tidak dijaga dan tidak diamalkan, maka dia akan melesat pergi bagai unta yang lepas dari ikatannya. (Hadits Shahih).

Cinta yang dikejar dan dirindukan adalah cintanya orang yang ber-ilmu pengetahuan, karena dengannya kita bisa mendiskusikan banyak hal, dan orang yang ber-ilmu pengetahuan selalu gigih tidak pernah putus asa dalam menghadapi masalah. Dia selalu memikirkan sesuatu yang menjadi masalah dan selalu berharap akan kepastian pemecahan masalah.

D.3. RECAPITULATION OF ASSESSMENT

D.3.1. Validate Test Item

The test for the end of semester evaluation consists of questions in the form of essays which have been analyzed by the lecturer in the Philosophy of Mathematics Education. The essay question is validated by paying attention to several aspects, namely the suitability of the problem with indicators, language, content and construct.

D.3.2. Evaluation Results of Philosophy of Mathematics Education for DPME Class 2018A

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,
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Daftar Nilai
Periode 2018/2019 Genap

Mata Kuliah : **Filsafat Pendidikan Matematika**
Kelas : 2018A
Prodi : S3 Pendidikan Matematika

Dosen : Dr. Siti Khabibah, M.Pd.
Prof. Dr. Hj. Siti Maghfirotun Amin, M.Pd.

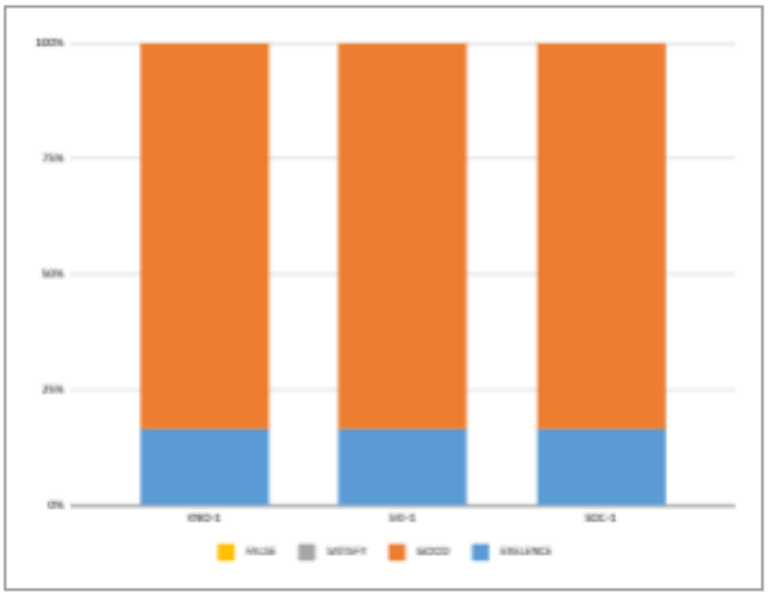
No.	N I M	Nama Mahasiswa	Partisipasi	Tugas	UTS	UAS	NA	NH	Kehadiran
1.	18070936001	ANING WIDA YANTI	80.00	78.00	80.00	75.00	77.9	B+	100 %
2.	18070936002	HENRY PUTRA IMAM WIJAYA	80.00	79.00	80.00	76.00	78.5	B+	93.3 %
3.	18070936003	ROSITA DWI FERDIANI	85.00	80.00	80.00	85.00	82.5	A-	100 %
4.	18070936004	RACHMANIAH MIRZA HARIASTUTI	75.00	80.00	78.00	80.00	78.6	B+	100 %
5.	18070936005	ERIK VALENTINO	83.00	80.00	80.00	80.00	80.6	A-	100 %
6.	18070936006	SRI HARTATIK	75.00	80.00	77.00	80.00	78.4	B+	100 %
7.	18070936007	MASLINA SIMANJUNTAK	80.00	85.00	88.00	88.00	85.5	A	100 %
8.	18070936008	ASEP SAHRUDIN	78.00	80.00	82.00	78.00	79.4	B+	100 %
9.	18070936009	SULAIMAN	75.00	85.00	86.00	85.00	83.2	A-	100 %
10.	18070936010	VIA YUSTITIA	78.00	80.00	79.00	80.00	79.4	B+	100 %
11.	18070936011	ENDANG SUPRAPTI	80.00	78.00	80.00	75.00	77.9	B+	100 %

D.3.3. Percentage of PLO achievements of Philosophy of Mathematics Education at Academic Year 2018/2019 for DPME Class 2018A

PLO ASSESSMENT

Lecture : Philosophy of Mathematics Education
Code :
Department : Doctoral Programme of Mathematics Educa
Total of Student : 12

	KNO-1	SKI-1	SOC-1					
EXELENCE	17%	17%	17%					
GOOD	83%	83%	83%					
SATISFY	0%	0%	0%					
FALSE	0%	0%	0%					
	100%	**100%**	**100%**					



created by: Sukarmin