	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Physics Education Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Physics Arguments	8420302268	Physics Education Philosophy and Curriculum	T=2	P=0	ECTS=3.18	4	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Setyo Admoko, S.Pd., M.Pd.	Prof. Nadi Suprapto, Ph.D.	Mita Anggaryani, M.Pd., Ph.D.

Learning model	**Project Based Learning**

Program Learning Outcomes (PLO)

PLO study program which is charged to the course

Program Objectives (PO)

PO - 1	Able to communicate effectively in reviewing the intellectual and historical background of physics arguments.
PO - 2	Able to collaborate in groups effectively in analyzing argument components in more detail and examining how these components work.
PO - 3	Able to explore strategies for constructing arguments in planning and implementing physics learning.
PO - 4	Able to assess the arguments presented using standard argumentation criteria.
PO - 5	Able to evaluate various practical implications for argumentation-based physics teaching.

PLO-PO Matrix

P.O
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	This Physics Argumentation course has eight main sections of discussion material, namely: (1) Understanding argumentation and its development in physics learning (2) Argumentation as part of the physics learning design process (3) The teacher‘s role in encouraging argumentation in physics learning (4) Teaching strategies which has the potential to teach and practice argumentation skills (5) Applying argument-based teaching in physics learning (6) Evaluating the quality of arguments in physics learning (7) Some practical implications for argumentation-based physics teaching and (8) Research on argumentation in physical science education. The lecture strategies used in this lecture are lecture methods, question and answer, discussion, assignments, presentations and mini projects.
References	**Main :**

1. S. Erduran and M. P. Jiménez-Aleixandre, Argumentation in science education. Springer, 2008.
2. C. Rapanta, Argumentation strategies in the classroom. Vernon Press, 2019.
3. D. Llewellyn, Teaching high school science through inquiry and argumentation. Corwin Press, 2013.
4. N. Pinkwart and B. M. McLaren, Educational technologies for teaching argumentation skills. Bentham Science Publishers, 2012.
5. P. Besnard and A. Hunter, Elements of argumentation, vol. 47. MIT press Cambridge, 2008
6. S. E. Toulmin, "The uses of argument (Updated edition, first published in 1958)," 2003.
7. D. Hitchcock and B. Verheij, Arguing on The Toulmin Model. Dordrecht, The Netherlands.: Springer, 2006.

Supporters:

1. Buku, artikel ilmiah, dan sumber lain yang relevan

Supporting lecturer	Dra. Suliyanah, M.Si. Setyo Admoko, S.Pd., M.Pd. Prof. Nadi Suprapto, S.Pd., M.Pd., Ph.D. Utama Alan Deta, S.Pd., M.Pd., 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	Understand the meaning of argumentation, argumentation skills and physics argumentation	1. Explain the essence of the meaning of argumentation. 2. Explain argumentation skills. 3. Explaining physics arguments	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers on topics/materials 2 x 50 minutes	Lectures, discussions and questions and answers on topics/materials 2 x 50 minutes	**Material:** Understanding Argumentation, argumentation skills and Physics argumentation **Reference:** *S. Erduran and MP Jiménez-Aleixandre, Argumentation in science education. Springer, 2008.*	5%
2	Understanding the Relationship between Science-Physics and Argumentation and the Role of argumentation in science-physics education	1. Explaining the Relationship between Physics and Argumentation 2. Explain the role of argumentation in physics education	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers on topics/materials 2 x 50 minutes	Lectures, discussions and questions and answers on topics/materials 2 x 50 minutes	**Material:** Relationship between Science (Physics) and Argumentation The role of argumentation in science education (physics) **References:** *S. Erduran and MP Jiménez-Aleixandre, Argumentation in science education. Springer, 2008.*	5%
3	Understanding Argumentation as part of the Physics learning design process	1. Explaining the argumentation-based physics learning design process 2. Implementing an argumentation-based physics learning design process.	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	**Material:** Argumentation as part of the Physics learning design process. **Reference:** *S. Erduran and MP Jiménez-Aleixandre, Argumentation in science education. Springer, 2008.*	5%

4	Understanding the teacher's role in encouraging argumentation in physics learning	1. Explain the role of teachers in encouraging argumentation in physics learning 2. Able to carry out the teacher's role in encouraging argumentation in physics learning	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	**Material:** The role of the teacher in encouraging argumentation in physics learning. **Reference:** *C. Rapanta, Argumentation strategies in the classroom. Vernon Press, 2019.*	5%
5	Understand various teaching strategies that have the potential to teach and practice argumentation skills	1. Explains various teaching strategies that have the potential to teach and practice argumentation skills 2. Able to apply TAP in arguing	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	**Material:** Teaching strategies that have the potential to teach and practice argumentation skills (Use of TAP in arguing) **Library:** *Books, scientific articles and other relevant sources*	5%
6	Understanding argument-based teaching and learning in physics learning	1. Explains various argumentation-based learning models 2. Able to design argumentation-based learning models 3. Able to implement argumentation-based learning models	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	**Material:** Argument-based teaching and learning in physics learning (Argument-based learning models) **Library:** *Books, scientific articles and other relevant sources*	5%
7	Understand various criteria in evaluating the quality of students' arguments in physics learning	1. Explain the various criteria for evaluating the quality of students' arguments in physics learning 2. Able to use TAP in evaluating the validity of arguments	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	Lectures, discussions and questions and answers about topics/materials	**Material:** Evaluating the quality of students' arguments in physics learning (Use of TAP in evaluating the validity of arguments) **References:** *S. Erduran and MP Jiménez-Aleixandre, Argumentation in science education. Springer, 2008.*	5%

8	U.S.S	1. Explain the essence of the meaning of argumentation 2. Explain argumentation skills 3. Explaining physics arguments 4. Explaining the Relationship between Physics and Argumentation 5. Explain the role of argumentation in science-physics education 6. Explaining the argumentation-based physics learning design process 7. Implementing an argumentation-based physics learning design process 8. Explain the role of teachers in encouraging argumentation in physics learning 9. Able to carry out the teacher's role in encouraging argumentation in physics learning 10. Explains various teaching strategies that have the potential to teach and practice argumentation skills 11. Able to apply TAP in arguing 12. Explains various argumentation-based learning models 13. Able to design argumentation-based learning models 14. Able to implement argumentation-based learning models 15. Explain the various criteria for evaluating the quality of students' arguments in physics learning 16. Able to use TAP in evaluating the validity of arguments	**Criteria:** Quantitative **Form of Assessment** : Test	Written Test 2x50 minutes	Written Test 2x50 minutes	**Material:** UTS **Bibliography:** *S. Erduran and MP Jiménez-Aleixandre, Argumentation in science education. Springer, 2008.*	10%

9	Understanding the Practical Implications of argumentation-based Physics learning	Explaining the Practical Implications of argumentation-based Physics learning	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	**Material:** Practical Implications of argumentation-based Physics learning **Reference:** *D. Llewellyn, Teaching high school science through inquiry and argumentation. Corwin Press, 2013.*	5%
10	Explains the development of science-physics argumentation research globally	Explains the development of science-physics argumentation research globally	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers on topics/materials 2x50 minutes	Lectures, discussions and questions and answers about topics/materials	**Material:** Development of scientific (physics) argumentation research globally. **Library:** *Books, scientific articles and other relevant sources*	5%
11	Carry out a mini project on Physics in the context of physical arguments	1. Design and implement a mini project on Physics in the context of physics argumentation 2. Exploring research ideas, collecting references and preparing literature reviews	**Criteria:** Qualitative	2x50 minute project assignments	2x50 minute project assignments	**Material:** Mini Project on Physics in the context of physical arguments. **Literature:** *Books, scientific articles and other relevant sources*	5%
12	Carry out a mini project on Physics in the context of physical arguments	1. Design and implement a mini project on Physics in the context of physics argumentation 2. Develop research methods and create research instruments	**Criteria:** Qualitative	2x50 minute Project Assignment	2x50 minute Project Assignment	**Material:** Mini Project on Physics in the context of physical arguments. **Literature:** *Books, scientific articles and other relevant sources*	5%
13	Carry out a mini project on Physics in the context of physical arguments	1. Design and implement a mini project on Physics in the context of physics argumentation 2. Carry out research data collection and analysis	**Criteria:** Qualitative	2x50 minute Project Assignment	2x50 minute Project Assignment	**Material:** Mini Project on Physics in the context of physical arguments. **Literature:** *Books, scientific articles and other relevant sources*	5%
14	Reporting a mini project on Physics in the context of physics arguments in the form of a scientific article	Create scientific articles based on mini projects that have been implemented	**Criteria:** Qualitative **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers 2x50 minutes	Lectures, discussions and questions and answers 2x50 minutes	**Material:** Scientific articles about physics in the context of physical arguments. **Literature:** *Books, scientific articles and other relevant sources*	5%

15	Reporting a mini project on Physics in the context of physics arguments in the form of a scientific article	Create scientific articles based on mini projects that have been implemented	**Criteria:** Qualitative	Lectures, discussions and questions and answers 2 x 50 minutes	Lectures, discussions and questions and answers 2 x 50 minutes	**Material:** Scientific articles about physics in the context of physical arguments. **Literature:** *Books, scientific articles and other relevant sources*	5%
16		Present scientific articles based on mini projects that have been implemented	**Criteria:** Quantitative	presentation, discussion and question and answer 2x50 minutes	presentation, discussion and question and answer 2x50 minutes	**Material:** Final Semester Evaluation **Literature:** *Books, scientific articles and other relevant sources*	20%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	50%
2.	Test	10%
		60%

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.