MODUL
PHILOSOPHY OF SCIENCE AND RESEARCH METHODOLOGY

MASTER PROGRAM OF ENVIRONMENTAL SCIENCE
SCHOOL OF POSTGRADUATED STUDIES
DIPONEGORO UNIVERSITY

Module Description:

Module Name	Philosophy of Science and Research Methodology
Module level, if applicable	
Code, if applicable	P-CIL-8-101
Subtitles, if any	
Course, if applicable	
Semester(s) in which the module is taught	Semester 1
Module Responsible	Prof Drs. Sudharto Prawata Hadi, MES, Ph.D.
Teaching Lecturer	1. Prof Drs. Sudharto Prawata Hadi, MES, Ph.D. 2. Prof. Dr. Ir. Purwanto, DEA
Language	*Indonesian and English*
Relationship with curriculum	Students are able to understand the position of science, scientific studies and scientific perspectives and philosophy of science through lectures and discussions
Type of teaching, hours of contact	*Lectures: 1 x 180 minutes x 16 meetings = 48 hours/week* *Q&A: 1 x 30 minutes x 16 meetings = 8 hours/week* *Discussion: 1 x 30 minutes x 16 meetings = 8 hours/week* *Presentation: 1 x 30 minutes x 16 meetings = 8 hours/week* *Individual assignment: 60 minutes/day = 5 hours/week Total work for 1 semester = 150 hours = 6 ECTS*
Workload	*(Estimated) workload, divided into contact hours (lectures, exercises, laboratory sessions, etc.) and personal study, including test preparation, specified in hours,*[1]*and overall.*
credit points	*3 Credits / 6 ECTS*
Requirements according to the exam regulations	*Lecture attendance of at least 75%*
Recommended prerequisites	*For example, competence in...*

Modul the desired learning objectives/outcomes	• Have the ability to explore, integrate, and construct various sources of knowledge in the reality of life into the scope of science • Have the ability to choose and build linkages between; the uniqueness of various local wisdoms for scientific development according to scientific principles • Be able to describe the relationship between science, philosophy and philosophy of science of sociology, epistemology, and axiology.
Fill	The Philosophy of Science course discusses; position of knowledge, habits, beliefs of a person or group of people in science, science as a source of knowledge, scientific method, scientific results, scientific attitudes, sources of truth and limitations of knowledge, as well as the role of science and technology in the development of human civilization. This course trains students to think logically, critically, comprehensively, and contemplatively so that they can understand the interrelationships of various sources of knowledge in the past with the present and the future in the development of science and technology which is based on the integration of axiological anatraontology. in constructing artifacts as scientific products.
Study and examexam requirements and forms	• *Open the book and close the book* • *Multiple choice, case studies, interviews*
Media used	*Powerpoint, youtube, website*
Read reference	• Kant, Immanuel. 2004. Criticism of Practical Reasons. Mineola, NY.: Dover Publications, Inc. • Noeng Muhajir. 2011. Philosophy of Science: ontology, epistemology, axiology. Yogyakarta: Rake Sarasin. • Novikov, AM, & Novikov, DA 2013. Research Methodology: From Philosophy of Science to Research Design (1st ed.). CRC Press. • Pruzan, Peter. 2016. Research Methodology Objectives, Practice and Ethics of Science. Switzerland: Springer Cham.

	• Whitehead, N. Alfred. 2001. The Ratio Function. Translate. Yogyakarta: Kanisius Publisher. • Zainal Abidin. 2003. Human Philosophy: understanding humans through philosophy. Bandung: PT. Rosdakarya youth.

SEMESTER STUDY PLAN

Study program: Master of Environmental Science			**Faculty: School of Postgraduate**				
Subjects:	**Philosophy of Science and Research Methodology**	**Codes:** CIL-8-101		**Credits:3 (6 ECTS)**		**Smt:1**	**Subjects:**
Supporting lecturers:	**1. Prof. Drs. Sudharto Prawata Hadi, MES, Ph.D.** **2. Prof. Dr. Ir. Purwanto, DEA**						
Learning Outcomes Subjects:	• Have the ability to explore, integrate and construct various sources of knowledge in the reality of life into the scope of science • Have the ability to select and build linkages between; the uniqueness of various local knowledge for scientific development according to the rules of science • Able to describe the relationship between knowledge, philosophy and philosophy of science from sociology, epistemology, and axiology.						
Short Description of Courses:	The Philosophy of Science course discusses; the position of knowledge, habits, beliefs of a person or group of people in science, knowledge of sources of knowledge, scientific methods, scientific results, scientific attitudes, sources of truth and limitations of science, as well as the role of science and technology in the development of human civilization. This course trains students to think logically, critically, comprehensively, and contemplatively so that they can understand the interrelationships of various sources of knowledge in the past with the present and the future in the development of science and technology which is on the integration of axiological anatraontology in building artifacts as scientific products.						

1	2	3	4	5	6	7	
Week	**Final Ability of each learning stage**	**Study Materials/ Subjects**	**Learning methods**	**Workload**	**Student Learning Experience**	**Evaluation**	
						Criteria & Indicators	**Weight (%)**
1.	Able to understand the position of knowledge of the scope of science and the sources of knowledge sources as a whole in group activities	Introduction, concepts and philosophy of science,community group activities and scientific discovery inference	Lectures and discussions	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes	Understanding the activities and beliefs of community groupsas part of the source of knowledge	Students are able tounderstand the position of knowledge, study ofknowledge and scientific perspectives and philosophy of science through	5

				• Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)		lectures and discussion activities	
2.	Able to describe the relationship between the uniqueness of people's lives, the uniqueness of local knowledge in the unique geographical geological unit to the development of philosophy and philosophy of science in terms of ontology, epistemology, and axiology.	Source of Knowledge Truth Understanding Philosophy Understanding Science Understanding Philosophy of Science Benefits of Philosophy of Science	Lectures and discussions	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Analyzing and inferring the uniqueness of geographical geological environment units and local knowledge of the community in a scientific perspective	Analyze and select community activities and knowledge that can be appointed as a source of knowledge	5
3.	Analyze and select community activities and knowledge that can be appointed as a source of knowledge	The development of science / biology The development of philosophy The figures of philosophy and their thoughts Branches of philosophy The uniqueness and essence of various philosophical theories	Lectures and discussions	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Identifying the development of science/biology and the development of philosophy in a certain period of time or era	Analyze and select community activities and knowledge that can be appointed as a source of knowledge	5
4.	Analyzing the basics of empiricism, idealism, and existentialism	Knowledge of Science Scientific Truth Limitations of knowledge	Lectures and discussions	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes	Identifying the development of science/biology between the specifications of empiricism, idealism	The results of the analysis and selection of empiricism, idealism and existentialism	5

				• Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	and existentialism schools of thought	schools of thoughtin the development of science	
5.	Analyzing the basics of pragmatism in the history of the development of science	The development of science by era	Lectures and discussions	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Identifying pragmatism throughout the history of the development of science according to its era	The results of the pragmatism analysis of the development of science	5
6.	Understanding and Mastering the scientific method, truth and sources of truth in natural science	Scientific Method Induction Deduction Logic Reasoning	Lectures, discussions and presentations	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Understanding the uniqueness of the scientific method and the sources of truth in natural science	Ability to analyze and select between thoughts of empiricism, idealism, existentialism and pragmatism of the development of science	5
7.	Understanding and Mastering ethics and scientific attitude	Ethics and Scientific attitude	Lectures, discussions and presentations	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes	Understand ethics and scientific attitude	Ability to analyze the development of science based on ethics and scientific attitude	5

				• Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)			
8	**Mid Term Examination**	**Meeting Material 1-7**	**Independent Written Test**	**330 minutes of processing time or the equivalent of 0.25 ECTS**	**Students working on UTS questions**	**Quality of answers and timeliness of collection**	**10**
9.	Mastering the scientific method, truth and sources of truth in natural science	Syllogism Legal law deductive nomological (DN) inductive statistical (IS)	Lectures, discussions and presentations	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Understanding the truth and the sources of truth in natural science	Ability to understand and integrate the ability to draw deductive inductive conclusions and vice versa	5
10.	Describe and interpret the functions of language, mathematics, and statistics as a means of scientific thinking	Mathematical Language, Probability Theory and Statistical Theory	Lectures, discussions and presentations	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Understanding and placing the functions of language, mathematics and statistics as a means of scientific thinking	Ability to understand and integrate mathematical language skills, statistical theory and probability theory in various cases in real life	5

11.	Understanding and using information technology as a means of scientific thinking	Information and communication technology Research support software	Lectures, discussions and assignments	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Understand and use information technology as well as the use of research support software as a meansof scientific thinking.	Ability to understand and use information technology and the ability to apply research support software	5
12.	Get to know the branches of natural science and its philosophical foundations	Branch of Science	Lectures and discussions	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Knowing and understanding and the position of branches of science	Ability to integrate science into the realities of life	5
13.	Mastering the essence of scientific, positivistic and postivistic research	positivistic and post-positivistic philosophy	Lectures, discussions and assignments	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes	Knowing and understanding the essence of positivistic and post-positivistic logic	Ability to understand the positivistic and post-positivistic logic that underliesa research	5

				• Individual tasks : 60 minutes/day (16 weeks)			
14.	Mastering the essence of quantitative and qualitative research, as well as scientific work	Exploratory Research Qualitative and qualitative research philosophy	Lectures, discussions and presentations	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Knowing and understanding the specifications of exploratory research and quantitative and qualitative research	Model of qualitative and quantitative problem-solving ability integration	5
15.	Identify environmental problems and develop independentresearch	Background of the problem, objectives and research methods	Discussions and Assignments	330 minutes (0.375 ECTS) Consist of: • Lecture:180 minutes • Q&A: 30 minutes • Discussion : 30 minutes • Presentation : 30 minutes • Individual tasks : 60 minutes/day (16 weeks)	Identify environmental problems, understand causes and develop research	The ability to identify environmental problems, the ability to analyze the background of the problem and the suitability between research objectives and methods	5
16	**Final Examination**	**Meeting Materials 1-15 (resume material)**	**Written Test**	**330 minutes of processing time or the equivalent of 0.25 ECTS**	**Students working on UAS questions**	**Quality of answers and timeliness of collection**	**20**
8. Reference List:		1. Team of Lecturers of Philosophy of Science, Faculty of Philosophy, UGM. 2002. Philosophy of Science as the basis for the development of science. Yogyakarta: Liberty Publishers. 2. Noeng Muhajir. 2011. Philosophy of Science: ontology, epistemology, axiology. Yogyakarta: Rake Sarasin.					

	3. Jujun Suria sumantri. 1995. Science in Perspective: A collection of essays on the nature of science. Indonesian TorchFoundation. 4. Bronowski, Jacob. 1973. The Accent of Man. Boston: Little Brown, Company 5. Kant, Immanuel. 2004. Critique of Practical Reason. Mineola, NY.: Dover Publications, Inc. 6. Whitehead, N. Alfred. 2001. Ratio Function. Translation. Yogyakarta: Publisher Kanisius. 7. Zainal Abidin. 2003. Human Philosophy: understanding humans through philosophy. Bandung: PT. YouthRosdakarya. 8. Kattsoff, Louis O. 1992. Introduction to Philosophy. Translated by Soejono. Yogyakarta: Tiara Wacana