Module Handbook:

Course Structure and Curriculum

for Doctoral Program of Environmental Science

By Course Pathway – 2020 Curricula

at the School of Postgraduate Studies, Diponegoro University

2020

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1. Introduction

1.1. About the Study Program

Carry out development that does not damage the environment and concern about the next generation have actually mandated by the State Policy Guidelines Republic of Indonesia in 1973. However, at implementation level, the implementation of development is a more focused aspect on economic growth and ignore the environmental as well as social aspects. This resulted in the depletion of natural resources, biodiversity, increasing pollution and environmental damage that trigger the environmental disasters such as floods, landslides and drought. Meanwhile, the various effects caused by global warming and climate change threat human life. In the era of globalization, free trade and regional autonomy, environmental aspects become central issues, in addition to the issue of depletion of energy reserves and declining water quality and quantity.

To respond the above issues, education that is able to instil knowledge, ethics and discovered a new theory in environmental management is necessary. Doctoral Program of Environmental Science (PDIL) Undip stands with license letter from Director General of Higher Education. 2782/D/T/2008 and pioneered by the Manager and Lecturer of Master Program of Environmental Science Diponegoro University, is facilitated to achieve that goal. Doctoral Program of Environmental Science establishment is in line with the vision towards the Research University.

1.2. Accreditation

Doctoral Program of Environmental Science had been accredited by Badan Akreditasi Nasional Perguruan Tinggi (National Accreditation Board for Higher Education) of Republic of Indonesia, ISO, and still in processed by ASIIN.

1.3. Key member of staff

Doctoral program

2. Title, Affiliation, and Language

2.1. Title

Doctoral program of Environmental Science leads to a Doctor in Environmental Science with the Indonesian title: Dr (*Doctor*).

2.2. Affiliation

Since 2006, this program becomes member of SEE (Sustainable Energy and Environment) Forum. SEE Forum is Asia Pacific Academic and Science and Technological Forum that brings forward dialogue on global climate and energy security issues.

2.3. Language

The program is conducted in Indonesian, but could also provide English-based learning, projects, theses, and etc by the request from international students.

3. Academic profile

3.1. Objective

The graduates of Doctoral Program of Environmental Science are expected to have capabilities in: (a) developing concept of science and technology in the field of environmental through research; (b) managing, leading, and developing a research program; (c) developing professional performance with interdisciplinary approach.

3.2. General structure of the programme

Doctoral Program of Environmental Science is set at 50 credits (Sistem Kredit Semester/SKS) or equivalent to 180 ECTS.

Doctoral Program consists of the following elements:

- Matriculation courses (No Credits).
- Compulsory courses (Credits: 50 SKS/ 180 ECTS), including the dissertation, research supervisory courses, and examination.

Doctoral Program of Environmental Science set the maximum study period is seven years or fourteen semesters, whereas the student could be dropped out.

3.3. Career opportunities

Doctoral Program of Environmental Science qualifies students to become professionals within business, management, and research functions and/ or areas such as:

- Academia as a Lecturer within universities.
- Researcher in any research institutions, varying from government's research body to the think tank institution.
- As a leading innovator and researcher in industries in improving environmentally sustainable product processes, promoting circular business, improving waste management, developing breakthrough solution and remediation technologies in achieving better environmental condition.
- As a consultant and/or advisor in national or international level with strong basis in environmental management and environmental protection.
- Public administration in municipalities working in environmental monitoring, assessment, and protecting local's region from any environmentally unsustainable land utilization.
- Policy maker and advocate working in policy assessment and development in promoting the value of sustainable development within the government (national and local), private organization, or international NGOs.

4. Description of Learning Outcome

The learning outcome from the academic structure in Doctoral Program of Environmental Science through the By Course pathway are as follows:

- Able to analyze, develop and apply the conceptual and theoretical thinking of environmental science in various environmental research.
- Able to parse theoretical abstractions in environmental science and its application through mastery of environmental management concepts along with rules and policies.
- Able to carry out stages in the environmental research process through problem identification, risk analysis, management concept, alternative solution, data analysis, conclusion and recommendation that are functional and efficient.
- Able to demonstrate scientific attitude and think critically in carrying out duties professionally through appreciation of religion, culture, humanity, morals and ethics.

5. Admission requirements

5.1. Education Requirements

Doctoral Program of Environmental Science is a multi-entry program. Entering the program, candidates should have graduated in any disciplines with:

- Holding a master's degree from any disciplines.
- Prior degree must be gained from B accredited universities (overseas graduates, diplomas must be equalized by the Directorate General of Higher Education).
- Minimum GPA of 3.00/4.00.
- Have working experiences in environment-related field would be a plus.

5.2. Language requirements

There are no minimum language requirements to enrol to this program.

5.3. Supplementary document requirements

Prospective students must prepare the following documents:

- Academic recommendation from Professor/Doctor (min. 2).
- Letter of guarantee for tuition fees.
- Synopsis of research proposals max. 5 pages.

5.4. Admission batch

Prospective students could enrol into two batch of admission per year. The first batch is for the prospective student who is preferring to enrol in the Odd Semester (July), whilst the second batch is for those who prefer to start their academic journey in the Even Semester (February).

5.5. Admission system

Detailed admission schedule, timeline, and submission system could be accessed through Diponegoro University's admission website.

- For national prospective students: https://pmb.undip.ac.id/
- For international prospective students: https://pmb.undip.ac.id/international/graduate-program/

5.6. Tuition fee

Prospective students are required to pay the tuition fee which shall be paid early at every semester. The amount might be differed from year to year. For the updated information, prospective students could access the information through this link: http://dil.pasca.undip.ac.id/tuition-fee-2/.

5.7. Scholarship

Diponegoro University provides a Master to Doctorate scholarship program which open every year. The updated information could be accessed through Institute for Research and Community Service's website. The opening for the 2020 batch information could be accessed through this link: https://lppm.undip.ac.id/2020/01/13/pengumuman-penerima-program-pendidikan-magister-doktor-menuju-sarjana-unggul-universitas-diponegoro-pmdsu-undip-tahun-2020/

6. Graduation requirements

To be qualified to be honoured the Doctoral Degree from Doctoral Program of Environmental Science, students must be fulfilled the publication and language requirements.

6.1. Publication requirements

Complying with the Indonesian Government regulation, the students must be able to publish at least three publications before being qualified to be promoted as a Doctor in Environmental Science, with the detail as follows:

- One academic article published as a conference proceeding from an international conference
- One academic article published in a national reputable journal
- One academic article published in an international reputable journal

6.2. Language for graduation requirements

To be able to graduate, students must be able to achieve language proficiency test with a minimum score of 500 for TOEFL ITP test or equivalent to 5.5 for IELTS test.

7. Structure of the programme

7.1. Matriculation

Due to various background of new students, it is required to have matriculation knowledge to give basic understanding of environment. Thus, Doctoral Program of Environmental Science is offering the Matriculation Course in the beginning of the semester. The subjects that would be taught in this course are as follows:

No	Code	Courses	Credits	
			SKS	ECTS
1	-	Basic Understanding of Ecology	NC	NC
2	-	Human Ecology	NC	NC
3	-	Industrial Ecology	NC	NC
4	-	Spatial and Environmental Dimensions	NC	NC
5	-	Dimensions of Pollution and Environmental Damage	NC	NC
Total			**NC: No Credits**	

7.2. Compulsory courses

By Course pathway in the Doctoral Program of Environmental Science offers compulsory courses as follows:

No	Code	Course	Credits	
			SKS	ECTS
1	LCIL 9131	Philosophy of Science and Research Methodology	3	9
2	PCIL 9132	Ecology and Global Environmental Change	3	9
3	PCIL 9133	System Analysis and Environmental Modelling	3	9
4	PCIL 9231	Proposal Writing	3	15
5	PCIL 9232	Research 1	3	10
6	PCIL 9233	Technique of Proposal Writing and Scientific Article	3	8
7	PCIL 9352	Research 2	5	30
8	PCIL 9452	Research 3	5	18
9	PCIL 9431	Scientific Publications 1	3	12
10	PCIL 9571	Scientific Publications 2	7	18
11	PCIL 9532	Seminar of Dissertation Research Result	3	12
12	PCIL 9631	Eligibility Exam	3	18
13	PCIL 9662	Dissertation Defence	6	12
Total			50	180

The detail of each course would be described in the following sub sections:

7.2.1. Philosophy of Science and Research Methodology

Module designation	Philosophy of Science and Research Methodology
Module level, if applicable	-
Code, if applicable	LCIL 9131
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	Prof. Sudharto Prawata Hadi, MES, Ph.D.
Lecturer	1. Prof. Sudharto Prawata Hadi, MES, Ph.D. 2. Prof. Dr. Ir. Purwanto, DEA 3. Dr. Dra. Henna Rya Abdurachim, Apt., MES
Language	*Indonesian and English*
Relation to curriculum	Students are able to understand the position of knowledge, study of knowledge and scientific perspectives and philosophy of science through lectures and discussion activities
Type of teaching, contact hours	• Regular meeting with Lecturer 16 times (40 hours with total contact hour per teaching is 2.5 hours weekly for 16 weeks). This activity consists of Lecture: 80 minutes; Q&A: 20 minutes; Discussion: 30 minutes; Presentation: 20 minutes) • Independent work on reading materials and literature review (48 hours, 3 hours weekly for 16 weeks) • Preparing paper and final personal assignment (96 hours, 6 hours weekly for 16 weeks) • Peer group discussion (24 hours, 1.4 hour weekly for 16 weeks) • Personal work on reflecting the course's gained knowledge to the student's research topic (±17 hours, 1.1 hours weekly for 16 weeks) Total contact hours in 1 semester = 225 hours
Workload	• Face-to-face lectures in class • Structured assignments (doing homework or assignments given by lecturers) • Independent work (reading books, papers, etc.)
Laboratory work	This course requires no laboratory work
Credit points	3 SKS which equivalent to 9 ECTS

Requirements according to the examination regulations	Minimum attendance of lectures 75%
Recommended prerequisites	-
Module objectives/ intendedlearning outcomes	• Have the ability to explore, integrate, and construct varioussources of knowledge in the reality of life into the scope ofscience • 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.
Content	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 relies on the integration of axiological anatraontology in building artifacts as scientific products.
Reading Materials	Amaratunga, D., Baldry, D., Sarshar, M., & Newton, R. (2002). Quantitative and qualitative research in the built environment: application of "mixed" research approach. Work study. Howell, K. E. (2012). An introduction to the philosophy of methodology. Sage. Kothari, C. R. (2004). Research methodology: Methods and techniques. New Age International. Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. Journal of business research, 104, 333-339.

7.2.2. Ecology and Global Environmental Change

Module designation	Ecology and Global Environmental Change
Module level, if applicable	-
Code, if applicable	PCIL 9132
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	Prof. Dra. Norma Afiati, M.Sc., Ph.D.
Lecturer	1. Prof. Dra. Norma Afiati, M.Sc., Ph.D. 2. Prof. Ir. Didi Dwi Anggoro, M.Eng., Ph.D. 3. Dr. Ir. Hermawan, DEA.
Language	Indonesian and English
Relation to curriculum	-
Type of teaching, contact hours	• Regular meeting with Lecturer 16 times (40 hours with total contact hour per teaching is 2.5 hours weekly for 16 weeks). This activity consists of Lecture: 80 minutes; Q&A: 20 minutes; Discussion: 30 minutes; Presentation: 20 minutes) • Independent work on reading materials and literature review (48 hours, 3 hours weekly for 16 weeks) • Preparing paper and final personal assignment (96 hours, 6 hours weekly for 16 weeks) • Peer group discussion (24 hours, 1.4 hour weekly for 16 weeks) • Personal work on reflecting the course's gained knowledge to the student's research topic (±17 hours, 1.1 hours weekly for 16 weeks) Total contact hours in 1 semester = 225 hours
Workload	• Face-to-face lectures in class • Structured assignments (doing homework or assignments given by lecturers) • Independent work (reading books, papers, etc.)
Laboratory Work	This course requires no laboratory work
Credit points	3 SKS which equivalent to 9 ECTS
Requirements according to the examination regulations	Minimum attendance of lectures 75%
Recommended prerequisites	-

Module objectives/intended learning outcomes	• Able to describe the history of ecological development • Able to describe the interrelationships of living things andtheir environment • Able to describe important basic concepts in an ecosystem.
Content	The Ecology and Global Environmental Change course is a compulsory subject in the Environmental Science Doctoral study program. The material presented includes an explanation of the history and ecological approach, the concept of environmental factors and their effects on living things, habitats and niches, responses and adaptations, populations, communities, ecosystems and global environmental changes.
Study and examination requirements and forms ofexamination	• Open book and close book • Multiple choice, case study, interview, practice
Media employed	Power point, YouTube, website
Reading materials	Adger, W. N., Benjaminsen, T. A., Brown, K., & Svarstad, H. (2001). Advancing a political ecology of global environmental discourses. Development and change, 32(4), 681-715. Buechler, S., & Hanson, A. M. S. (Eds.). (2015). A political ecology of women, water and global environmental change (p. 99). New York: Routledge. Jasanoff, S. (2018). 8. Science and Norms in Global Environmental Regimes. In Earthly goods (pp. 173-197). Cornell University Press. Kasperson, J. X., Kasperson, R. E., Turner, B. L., Hsieh, W., & Schiller, A. (2022). Vulnerability to global environmental change. In The social contours of risk (pp. 245-285). Routledge.

7.2.3. System Analysis and Environmental Modelling

Module designation	System Analysis and Environmental Modelling
Module level, if applicable	
Code, if applicable	PCIL 9133
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	Prof. Dr. Ir. Purwanto, DEA
Lecturer	1. Prof. Dr. Ir. Purwanto, DEA 2. Prof. Dr. Sutrisno Anggoro, M.S.
Language	*Indonesian and English*
Relation to curriculum	Compulsory
Type of teaching, contact hours	• Regular meeting with Lecturer 16 times (40 hours with total contact hour per teaching is 2.5 hours weekly for 16 weeks). This activity consists of Lecture: 80 minutes; Q&A: 20 minutes; Discussion: 30 minutes; Presentation: 20 minutes) • Independent work on reading materials and literature review (48 hours, 3 hours weekly for 16 weeks) • Preparing paper and final personal assignment (96 hours, 6 hours weekly for 16 weeks) • Peer group discussion (24 hours, 1.4 hour weekly for 16 weeks) • Personal work on reflecting the course's gained knowledge to the student's research topic (±17 hours, 1.1 hours weekly for 16 weeks) Total contact hours in 1 semester = 225 hours
Workload	• Face-to-face lectures in class • Structured assignments (doing homework or assignments given by lecturers) Independent work (reading books, papers, etc.)
Laboratory Work	Students taking this course have the chance to utilize the computer laboratory within the Diponegoro University to practice the environmental modelling and simulation
Credit points	*3 SKS which equivalent to* 9 *ECTS*
Requirements according to the examination regulations	*Minimum attendance of lectures 75%*
Recommended prerequisites	

Module objectives/intended learning outcomes	• *Able to identify, formulate and analyze complex engineering problems on integrated systems based on analytical, computational or experimental approaches.* • *Mastering the principles and techniques of integrated system design with an environmental systems approach.* • *Able to research and investigate complex engineering problems on integrated systems using basic engineering principles and by carrying out research, analysis, data interpretation and information synthesis to provide solutions.*
Content	This course studies systems and system modeling, especially systems in the environment. This course studies the process/steps of mathematical modeling for problems in environmental systems, the process of model verification andvalidation, to finding solutions or model analysis.
Study and examination requirements and forms ofexamination	• *Open book and close book* • *Multiple choice, case study, interview, practice*
Media employed	*Power point, YouTube, website*
Reading Materials	Lee, G. Y., Hickie, I. B., Occhipinti, J. A., Song, Y. J. C., Skinner, A., Camacho, S., ... & Freebairn, L. (2022). Presenting a comprehensive multi-scale evaluation framework for participatory modelling programs: A scoping review. PloS one, 17(4), e0266125. Rahmati, O., Kornejady, A., Samadi, M., Deo, R. C., Conoscenti, C., Lombardo, L., ... & Bui, D. T. (2019). PMT: New analytical framework for automated evaluation of geo-environmental modelling approaches. Science of the total environment, 664, 296-311. Refsgaard, J. C., van der Sluijs, J. P., Højberg, A. L., & Vanrolleghem, P. A. (2007). Uncertainty in the environmental modelling process–a framework and guidance. Environmental modelling & software, 22(11), 1543-1556. Skidmore, A. (2017). Environmental modelling with GIS and remote sensing. CRC Press.

7.2.4. Proposal Writing

Module designation	Proposal Writing
Module level, if applicable	-
Code, if applicable	PCIL 9231
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	2nd
Person responsible for the module	Principal Supervisor
Lecturer	Principal Supervisor and Co-Supervisor
Language	*Indonesian and English*
Relation to curriculum	Compulsory
Type of teaching, contact hours	• Discussion with Principal Supervisor (16 hours, 1 weekly for 16 weeks) • Discussion with Co-Supervisor (16 hours, 1 hour weekly for 16 weeks) • Independent work on reading materials and literature review (144 hours, 4 hours weekly for 16 weeks) • Independent work on writing proposal draft (160 hours, 6.5 hours weekly for 16 weeks) • Writing progress report (39 hours, 2.4375 hours weekly for 16 weeks) Total hours in 1 semester = 375 hours
Workload	• Regular meeting with Supervisors and Co Supervisor • Preparing dissertation proposal report • Preparing presentation materials
Laboratory Work	*This course requires no laboratory work*
Credit points	*3 SKS which equivalent to 15 ECTS*
Requirements according to the examination regulations	*The principal supervisor and co-supervisor have been approved the research proposal*
Required and recommended prerequisites for joining the module	*The students have taken and passed the philosophy of science and research methodology course*
Module objectives/intended learning outcomes	*-Able to compose a complete research proposal in accordance with thesis guidelines* *-Able to present a thesis proposal in the form of a seminar*

Content	*Dissertation proposal mentoring includes literature study, research topic selection, research title, research background, research questions, research objectives, state of the art and novelty, research design and framework, and research methods.*
Exams and assessment formats	*Seminar and in-depth interview*
Study and examination requirements	*The final grade in the module consists of 80% in-depth interviews, 20% participation in monitoring and evaluating the progress report of the dissertation proposal. Students are required to submit a portfolio of progress reports and a dissertation draft according to the targeted stages to their respective supervisors.*
Reading list	Agus Salim. (2006). Teori dan paradigma penelitian sosial. Yogyakarta: Tiara Wacana. Bryman, Alan. (2001). Social research methods. New York: Oxford University Press. Glatthorn, A. A., & Joyner, R. L. (2005). Writing the winning thesis or dissertation: A step-by-step guide. Corwin Press. Miles, Matthew B. & Huberman, A. Michael. (1992). Analisis data kualitatif, (Penterjemah: Tjetjep Rohendi Rohidi). London: Sage Publication. (Buku asli diterbitkan pada tahun 1984). Sudjana. (2002). Metoda statistika. Bandung: Tarsito. Sugiyono. (2007). Metode penelitian pendidikan: pendekatan kuantitatif, kualitatif, dan R & D. Bandung: ALFABETA Sumadi Suryabrata. (1983). Metodologi penelitian. Jakarta: Rajawali.

7.2.5. Research 1

Module designation	Research 1
Code, if applicable	PCIL 9232
Semester(s) in which the module is taught	3rd
Person responsible for the module	Head of Study Program; Promotor & Co-Promotor.
Language	*Indonesian and English*
Relation to curriculum	*Compulsory*
Teaching methods	*Progress Report, Presentation, Discussion.*
Type of teaching, contact hours	• Discussion with Principal Supervisor (16 hours, 1 hour weekly for 16 weeks) • Discussion with Co-Supervisor (16 hours, 1 hour for 16 weeks) • Independent work on reading materials and literature review (80 hours, 5 hours weekly for 16 weeks) • Developing research proposal (±106 hours, 8 hours weekly for 16 weeks) • Preparing progress report (16 hours, 1 hour weekly for 16 weeks) • Preparing presentation materials (16 hours, 1 hour weekly for 16 weeks) Total hours in 1 semester = 250 hours
Workload	• Regular meeting with supervisor and co-supervisor • Creating research proposal • Progress report and presentation • Initial stage to prepare manuscript and conference
Laboratory Work	Students taking this course have the chance to utilize the laboratory within the Diponegoro University according to each student's research needs
Credit points	*3 SKS which equivalent to 10 ECTS*
Requirements according to the examination regulations	*Participate in monitoring and evaluating progress of the preparation of the dissertation organized by the Study Program; Collecting of portfolio of progress report for dissertation.*
Required and recommended prerequisites for joining the module	*Existing competencies in literature review and scientific writing.*

Module objectives/intended learning outcomes	- *Able to compile research plan.* - *Able to compile proposal dissertation.*
Content	*Concepts of Abiotic, Biotic and Culture at dissertation research in the field of environmental science; Problem statements in dissertation research; Formulation of objectives; Formulation of research hypotheses; Literature Review; Originality of dissertation research; State of the art and novelty; Research methodology in dissertation research; Objects and variables of dissertation research; Portfolio of progress reports of the dissertation proposal.*
Exams and assessment formats	*Mid-semester progress report assessment, final progress report assessment.*
Study and examination requirements	*Requirements for successfully passing the module* *The final grade in the module is composed of 80% performance on portfolio of progress reports, 20% participation in monitoring and evaluating. Students must submit a portfolio of progress reports and a draft dissertation according to the targeted stages as a minimum achievement to pass.*
Reading list	Modul of Writing Dissertation DES Kasperson, J. X., Kasperson, R. E., Turner, B. L., Hsieh, W., & Schiller, A. (2022). Vulnerability to global environmental change. In The social contours of risk (pp. 245-285). Routledge. Louv, R., & Fitzpatrick, J. W. (2012). Citizen science: Public participation in environmental research. Cornell University Press. Pohl, C. (2005). Transdisciplinary collaboration in environmental research. Futures, 37(10), 1159-1178. Svarstad, H., Petersen, L. K., Rothman, D., Siepel, H., & Wätzold, F. (2008). Discursive biases of the environmental research framework DPSIR. Land use policy, 25(1), 116-125.

7.2.6. Technique of Proposal Writing and Scientific Article

Module designation	Technique of Proposal Writing and Scientific Article
Module level, if applicable	
Code, if applicable	PCIL 9233
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	2nd
Person responsible for the module	Prof. Dr. Ir. Hadiyanto, S.T., M.Sc., IPU
Lecturer	1. Prof. Dr. Ir. Hadiyanto, S.T., M.Sc., IPU 2. Prof. Dr. Istadi, S.T., M.T.
Language	*Indonesian and English*
Relation to curriculum	*Compulsory*
Type of teaching, contact hours	• Discussion with Principal Supervisor (16 hours, 1 hour weekly for 16 weeks) • Discussion with Co-Supervisor (16 hours, 1 hour weekly for 16 weeks) • Independent work on reading materials and literature review (64 hours, 4 hours weekly for 16 weeks) • Independent work on writing manuscript draft (104 hours, 6.5 hours weekly for 16 weeks) Total hours in 1 semester = 200 hours
Workload	• Face-to-face lectures in class • Structured assignments (doing homework or assignments given by lecturers) • Independent work (reading books, papers, etc.)
Laboratory Work	*This course requires no laboratory work*
Credit points	*3 SKS which equivalent to 8 ECTS*
Requirements according to the examination regulations	*Minimum attendance of lectures 75%*
Required and recommended prerequisites for joining the module	*The students have taken and passed the philosophy of science and research methodology course*
Module objectives/intended learning outcomes	*-Able to understand systematic guidelines for writing scientific articles* *-Able to compile scientific articles*

Content	*Analysis of research topics, data processing techniques using origin software, compilation of bibliography and citations using mendeley software, and software introduction to check the level of plagiarism.*
Exams and assessment formats	*Minimum attendance of lectures 75%*
Study and examination requirements	*The final grade in the module consists of 50% of scientific article draft and 50% of in-depth interviews*
Reading list	Badley, G. F. (2022). Common—Reading—Placing—Writing. Qualitative Inquiry, 10778004221077711. Day R.A., 1998. How to write & publish a scientific paper. Oryx Press. Arizona Hailman J.P., Strier K.B, 2006. Planning, Proposing, and Presenting Science Effectively, 2nd Edition. Cambridge University Press. Cambridge. McMillan V.E. 2001. Writing papers in the Biological Sciences. Bedford/St. Martins. New York. Raimes, A. (1983). Techniques in teaching writing. Oxford University Press, 200 Madison Ave., New York, NY 10016 (ISBN-0-19-434131-3, $5.95).

7.2.7. Research 2

Module designation	Research 2
Code, if applicable	PCIL 9352
Semester(s) in which the module is taught	3rd
Person responsible for the module	Head of Study Program; Promotor & Co-Promotor.
Language	*Indonesian and English*
Relation to curriculum	*Compulsory*
Type of teaching, contact hours	• Discussion with Principal Supervisor (32 hours, 2 hours weekly for 16 weeks) • Discussion with Co-Supervisor (32 hours, 2 hours weekly for 16 weeks) • Reading materials and literature review (160 hours, 10 hours weekly for 16 weeks) • Developing data collection strategy (160 hours, 10 hours weekly for 16 weeks) • Developing data analysis strategy (160 hours, 10 hours weekly for 16 weeks) • Preparing progress report (78 hours, 4.875 hours weekly for 16 weeks) • Writing dissertation draft (128 hours, 8 hours weekly for 16 weeks) Total hours in 1 semester = 750 hours
Workload	• Meeting with Supervisors and Co-supervisor • Developing research conceptual and pathway framework in data collection and data analysis • Preparing progress report • Preparing presentation materials for result and progress presentation
Laboratory Work	Students taking this course have the chance to utilize the laboratory within the Diponegoro University according to each student's research needs
Credit points	*5 SKS which equivalent to 30 ECTS*
Requirements according to the examination regulations	*Participate in monitoring and evaluating progress of the preparation of the dissertation organized by the Study Program; Collecting of portfolio of progress report for dissertation.*

Required and recommended prerequisites for joining the module	*Existing competencies in research methodology and scientific writing.*
Module objectives/intended learning outcomes	- *Able to design research according to scientific research methodology.* - *Able to carry out scientific research for doctoral program dissertation.*
Content	*Operational definitions, indicators, and research variables; Theoretical framework and research concept framework; Population, sample & research variables; Techniques of data collection; Methods of research data analysis; Portfolio of progress reports of the dissertation draft.*
Exams and assessment formats	*Mid-semester progress report assessment, final progress report assessment.*
Study and examination requirements	*Requirements for successfully passing the module* *The final grade in the module is composed of 80% performance on portfolio of progress reports, 20% participation in monitoring and evaluating. Students must submit a portfolio of progress reports and a draft dissertation according to the targeted stages as a minimum achievement to pass.*
Reading list	Modul of Writing Dissertation DES Glatthorn, A. A., & Joyner, R. L. (2005). Writing the winning thesis or dissertation: A step-by-step guide. Corwin Press. Kasperson, J. X., Kasperson, R. E., Turner, B. L., Hsieh, W., & Schiller, A. (2022). Vulnerability to global environmental change. In The social contours of risk (pp. 245-285). Routledge. Louv, R., & Fitzpatrick, J. W. (2012). Citizen science: Public participation in environmental research. Cornell University Press. Pohl, C. (2005). Transdisciplinary collaboration in environmental research. Futures, 37(10), 1159-1178. Randolph, J. (2009). A guide to writing the dissertation literature review. Practical Assessment, Research, and Evaluation, 14(1), 13. Svarstad, H., Petersen, L. K., Rothman, D., Siepel, H., & Wätzold, F. (2008). Discursive biases of the environmental research framework DPSIR. Land use policy, 25(1), 116-125

7.2.8. Research 3

Module designation	Research 3
Code, if applicable	PCIL 9452
Semester(s) in which the module is taught	4th
Person responsible for the module	Head of Study Program; Promotor & Co-Promotor.
Language	*Indonesian and English*
Relation to curriculum	*Compulsory*
Teaching methods	*Progress Report, Presentation, Discussion.*
Type of teaching, contact hours	• Discussion with Principal Supervisor (32 hours, 2 hours weekly for 16 weeks) • Discussion with Co-Supervisor (32 hours, 2 weekly for 16 weeks) • Data analysis (128 hours, 8 hours weekly for 16 weeks) • Developing research result discussion (128 hours, 8 hours weekly for 16 weeks) • Preparing progress report (32 hours, 2 hours weekly for 16 weeks) • Preparing presentation materials (34 hours, 2.125 hours weekly for 16 weeks) • Developing dissertation report (64 hours, 4 hours weekly for 16 weeks) Total hours in 1 semester = 450 hours
Workload	• Regular meeting with Supervisors and Co-supervisor • Validating research data • Developing analysis • Developing result and discussion • Preparing progress report
Laboratory Work	Students taking this course have the chance to utilize the laboratory within the Diponegoro University according to each student's research needs
Credit points	*5 SKS which equivalent to 18 ECTS*
Requirements according to the examination regulations	*Participate in monitoring and evaluating progress of the preparation of the dissertation organized by the Study Program; Collecting of portfolio of progress report for dissertation.*

Required and recommended prerequisites for joining the module	*Existing competencies in data analysis and scientific writing.*
Module objectives/intended learning outcomes	- *Able to display research results visually and in writing.* - *Able to perform data analysis of scientific research results.* - *Able to draw conclusions on research results.*
Content	*Primary and secondary data collection; Presentation of data in the form of tables and graphs; Research data processing; Analysis of data processing results; Compilation of conclusions on the dissertation; Portfolio of progress reports of the dissertation draft.*
Exams and assessment formats	*Mid-semester progress report assessment, complete dissertation draft, eligibility test.*
Study and examination requirements	*Requirements for successfully passing the module* *The final grade in the module is composed of 70% performance on complete draft dissertation, 30% performance on the eligibility test. Students must submit a complete dissertation draft and are required to take the eligibility test as a minimum achievement to pass.*
Reading list	Modul of Writing Dissertation DES Allison, B., & Race, P. (2004). The student's guide to preparing dissertations and theses. Routledge. Arrows, F. (2008). The authentic dissertation. London: Routledge. Joyner, R. L., Rouse, W. A., & Glatthorn, A. A. (2018). Writing the winning thesis or dissertation: A step-by-step guide. Corwin press. Ramlaul, A. (2020). Dissertation Structure and Presentation. In Medical Imaging and Radiotherapy Research: Skills and Strategies (pp. 363-380). Springer, Cham.

7.2.9. Scientific Publication 1

Module designation	Scientific Publication 1
Code, if applicable	PCIL 9431
Semester(s) in which the module is taught	4th
Person responsible for the module	Head of Study Program; Promotor & Co-Promotor.
Language	Indonesian and English
Relation to curriculum	Compulsory
Type of teaching, contact hours	• Discussion with Principal Supervisor (32 hours, 2 hours weekly for 16 weeks) • Discussion with Co-Supervisor (32 hours, 2 hours weekly for 16 weeks) • Preparing manuscript (160 hours, 10 hours weekly for 16 weeks) • Preparing presentation materials (32 hours, 2 hours weekly for 16 weeks) • Finding suitable conference (44 hours, 2.75 hours weekly for 16 weeks) Total hours in 1 semester = 300 hours
Workload	• Regular meeting with Supervisor and Co-supervisor • Creating manuscript and conference presentation
Laboratory Work	There is no required laboratory work for this course. On the other hand, student taking this course might utilize the Diponegoro University's Library, Manuscript Consultation Center from LPPM, and the School of Postgraduate Studies' Library
Credit points	*3 SKS which equivalent to 12 ECTS*
Requirements according to the examination regulations	*Collecting of progress report for scientific publication and the proof*
Required and recommended prerequisites for joining the module	*Existing competencies in scientific writing*
Module objectives/intended learning outcomes	- Able to compile scientific articles based on research results. - Able to communicate research results in written and or oral form.

Content	Identification of national and international scientific publications; Progress reports of writing scientific publications; Progress reports of the submission process to the seminar/journal.
Exams and assessment formats	Mid-semester progress report assessment, final progress report assessment.
Study and examination requirements	Requirements for successfully passing the module The final grade in the module is composed of 60% performance on progress reports, 20% the kinds of publication (seminar or journal), 20% the publication level (national or international). Students must have a complete draft of publication as a minimum reached to pass.
Reading list	Grech, V. and Cuschieri, S., 2018. Write a scientific paper (WASP)-a career-critical skill. *Early Human Development*, *117*, pp.96-97. Black, M., 2018. *Critical thinking: An introduction to logic and scientific method*. Pickle Partners Publishing. Jirge, P.R., 2017. Preparing and publishing a scientific manuscript. *Journal of Human Reproductive Sciences*, *10*(1), p.3. Parija, S.C. and Kate, V., 2017. Why write a scientific research paper. In *Writing and publishing a scientific research paper* (pp. 3-8). Springer, Singapore. Paul, J. and Criado, A.R., 2020. The art of writing literature review: What do we know and what do we need to know?. *International Business Review*, *29*(4), p.101717. Alspach, J.G., 2017. Writing for publication 101: Why the abstract is so important. *Critical Care Nurse*, *37*(4), pp.12-15.

7.2.10. Scientific Publication 2

Module designation	*Scientific Publication 2*
Code, if applicable	PCIL 9571
Semester(s) in which the module is taught	*5th*
Person responsible for the module	*Head of Study Program; Promotor & Co-Promotor.*
Language	*English*
Relation to curriculum	*Compulsory*
Type of teaching, contact hours	• Discussion with Principal Supervisor (16 hours, 1 hours weekly for 16 weeks) • Discussion with Co-Supervisor (16 hours, 1 hours weekly for 16 weeks) • Preparing manuscript (128 hours, 8 hours weekly for 16 weeks) • Finalizing research result for publication (128 hours, 8 hours weekly for 16 weeks) • Preparing presentation materials (32 hours, 2 hours weekly for 16 weeks) • Proofreading (64 hours, 4 hours weekly for 16 weeks) • Choosing and selecting reputable journal (32 hours, 2 hours weekly for 16 weeks) • Submitting and reviewing article submission to reputable journal (34 hours, 2.125 hours weekly for 16 weeks) Total hours in 1 semester = 450 hours
Workload	• Regular meeting with Supervisor and Co-supervisor • Creating manuscript • Submitting and publishing manuscript
Laboratory Work	There is no required laboratory work for this course. On the other hand, student taking this course might utilize the Diponegoro University's Library, Manuscript Consultation Center from LPPM, and the School of Postgraduate Studies' Library
Credit points	*7 SKS which equivalent to 18 ECTS*
Requirements according to the examination regulations	*Collecting of progress report for scientific publication and the proof*
Required and recommended prerequisites for joining the module	*Existing competencies in scientific writing for international publication.*

Module objectives/intended learning outcomes	- *Able to compile scientific articles for international publication based on research results.* - *Able to communicate research results in written and or oral form in international journals or seminars.*
Content	*Identification of international scientific publications (seminar and journal); Progress reports of writing scientific publications; Progress reports of the submission process to the seminar/journal.*
Exams and assessment formats	*Mid-semester progress report assessment, final progress report assessment.*
Study and examination requirements	*Requirements for successfully passing the module* *The final grade in the module is composed of 60% performance on progress reports, 20% the kinds of publication (seminar or journal), 20% the publication level (reputable or not). Students must have a complete draft of publication as a minimum reached to pass.*
Reading list	Grech, V. and Cuschieri, S., 2018. Write a scientific paper (WASP)-a career-critical skill. *Early Human Development*, *117*, pp.96-97. Black, M., 2018. *Critical thinking: An introduction to logic and scientific method*. Pickle Partners Publishing. Jirge, P.R., 2017. Preparing and publishing a scientific manuscript. *Journal of Human Reproductive Sciences*, *10*(1), p.3. Parija, S.C. and Kate, V., 2017. Why write a scientific research paper. In *Writing and publishing a scientific research paper* (pp. 3-8). Springer, Singapore. Paul, J. and Criado, A.R., 2020. The art of writing literature review: What do we know and what do we need to know?. *International Business Review*, *29*(4), p.101717. Alspach, J.G., 2017. Writing for publication 101: Why the abstract is so important. *Critical Care Nurse*, *37*(4), pp.12-15.

7.2.11. Seminar of Dissertation Research Result

Module designation	Seminar of Dissertation Research Result
Module level, if applicable	-
Code, if applicable	PCIL 9532
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Principal supervisors
Lecturer	Principal Supervisors and Co-supervisors
Language	*Indonesian and English*
Relation to curriculum	-
Type of teaching, contact hours	• Discussion with Principal Supervisor (32 hours, 2 hours weekly for 16 weeks) • Discussion with Co-Supervisor (32 hours, 2 hours weekly for 16 weeks) • Data analysis (80 hours, 5 hours weekly for 16 weeks) • Developing research result discussion (96 hours, 6 hours weekly for 16 weeks) • Preparing progress report (44 hours, 2.75 hours weekly for 16 weeks) • Preparing presentation materials (16 hours, 1 hour weekly for 16 weeks) Total hours in 1 semester = 300 hours
Workload	• Regular meeting with Supervisors and Co-supervisor • Validating research data • Developing analysis • Developing result and discussion • Preparing progress report
Laboratory Work	Students taking this course have the chance to utilize the laboratory within the Diponegoro University according to each student's research needs
Credit points	3 SKS which equivalent to 12 ECTS
Requirements according to the examination regulations	Participate in monitoring and evaluating progress of the preparation of the dissertation organized by the Study Program; Collecting of portfolio of progress report for dissertation.
Recommended prerequisites	Existing competencies in data analysis and scientific writing.
Module objectives/intended	- Able to display research results visually and in writing. - Able to perform data analysis of scientific research

learning outcomes	results. - Able to draw conclusions on research results.
Content	Primary and secondary data collection; Presentation of data in the form of tables and graphs; Research data processing; Analysis of data processing results; Compilation of conclusions on the dissertation; Portfolio of progress reports of the dissertation draft.
Study and examination requirements and forms ofexamination	The final grade in the module is composed of 80% performance on portfolio of progress reports, 20% participation in monitoring and evaluating. Students must submit a portfolio of progress reports and a draft dissertation according to the targeted stages as a minimum achievement to pass.
Reading Materials	Modul of Writing Dissertation DES Allison, B., & Race, P. (2004). The student's guide to preparing dissertations and theses. Routledge. Arrows, F. (2008). The authentic dissertation. London: Routledge. Joyner, R. L., Rouse, W. A., & Glatthorn, A. A. (2018). Writing the winning thesis or dissertation: A step-by-step guide. Corwin press. Ramlaul, A. (2020). Dissertation Structure and Presentation. In Medical Imaging and Radiotherapy Research: Skills and Strategies (pp. 363-380). Springer, Cham.

7.2.12. Eligibility Exam

Module designation	Eligibility Exam
Module level, if applicable	-
Code, if applicable	PCIL 9631
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Principal supervisor
Lecturer	• Principal supervisor • Co-supervisor
Language	*Indonesian and English*
Relation to curriculum	Students are able to eligibility examination
Type of teaching, contact hours	• Discussion with Principal Supervisor (32 hours, 2 hours weekly for 16 weeks) • Discussion with Co-Supervisor (32 hours, 2 hours weekly for 16 weeks) • Preparing dissertation full report (192 hours, 12 hours weekly for 16 weeks) • Preparing presentation (160 hours, 10 hours weekly for 16 weeks) • Preparing progress report (34 hours, 2.125 hours weekly for 16 weeks) Total hours in 1 semester = 450 hours
Workload	• Regular meeting with Supervisors and Co-supervisor • Preparing dissertation full report • Preparing presentation materials
Laboratory Work	*There is no required laboratory work for this course.*
Credit points	*3 credits which is equivalent to 18 ECTS*
Requirements according to the examination regulations	Minimum attendance of lectures 75% Further detail on examination regulation could be accessed through this link: http://dil.pasca.undip.ac.id/dissertation-feasibility-exam/
Recommended prerequisites	-
Module objectives/intended learning outcomes	-
Content	-

Study and examination requirements and forms ofexamination	• *Open book and close book* • *Journal publications, case studies, interviews*
Media employed	Power point, YouTube, website
Reading Materials	Happell, B. (2009). Presenting with precision: Preparing and delivering a polished conference presentation. Nurse Researcher, 16(3). Jackson, D., Davidson, P. M., & Usher, K. (2022). Preparing for Examination. In Successful Doctoral Training in Nursing and Health Sciences (pp. 119-131). Springer, Cham. Matteson, S. M., & DeLozier, R. W. (2022). Insights Into Undertaking a Three-Article Dissertation. In Methodological Innovations in Research and Academic Writing (pp. 240-259). IGI Global.

7.2.13. Dissertation Defence

Module designation	Dissertation Defence
Module level, if applicable	
Code, if applicable	PCIL 9662
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which themodule is taught	6th Semester
Person responsible for the module	• Main advisory lecturer
Lecturer	• Supervisor 1 • Supervisor 2
Language	*Indonesian and English*
Relation to curriculum	-
Type of teaching, contact hours	• Discussion with Principal Supervisor (16 hours, 1 hour weekly for 16 weeks) • Discussion with Co-Supervisor (16 hours, 1 hour weekly for 16 weeks) • Revising and finalizing dissertation full report (80 hours, 5 hours weekly for 16 weeks) • Proofreading and copy-editing dissertation (80 hours, 5 hours weekly for 16 weeks) • Preparing presentation (72 hours, 4.5 hours weekly for 16 weeks) • Administrative work (36 hours, 2.25 hours weekly for 16 weeks) Total hours in 1 semester = 300 hours
Workload	• Regular meeting with Supervisor and Co-supervisor • Finalizing dissertation text • Presentation
Laboratory Work	*There is no required laboratory work for this course*
Credit points	*6 SKS or equivalent to 12 ECTS*
Requirements according to the examination regulations	Minimum attendance of lectures 75% Further detail on the requirements for taking Doctoral Defence could be accessed through this link: http://dil.pasca.undip.ac.id/dissertation-defence/
Recommended prerequisites	-
Module objectives/intended	-

learning outcomes	
Content	-
Study and examination requirements and forms ofexamination	• *Open book and close book* • *Journal publications, case studies, interviews*
Media employed	Power point, YouTube, website
Reading Materials	Madsen, D. (1983). Successful Dissertations and Theses: A Guide to Graduate Student Research from Proposal to Completion. Matteson, S. M., & DeLozier, R. W. (2022). Insights Into Undertaking a Three-Article Dissertation. In Methodological Innovations in Research and Academic Writing (pp. 240-259). IGI Global. Rockinson-Szapkiw, A. J., & Spaulding, L. S. (2014). Navigating the doctoral journey: A handbook of strategies for success. Rowman & Littlefield. Tribe, R., & Marshall, C. (2020). Preparing for a conference, doctoral or professional presentation. Counselling Psychology Review, 35(2), 30-39.

Appendix 1 Recommended Academic Progression

Semester 1				
No	Code	Course	Credits	
			SKS	ECTS
1	LCIL 9131	Philosophy of Science and Research Methodology	3	9
2	PCIL 9132	Ecology and Global Environmental Change	3	9
3	PCIL 9133	System Analysis and Environmental Modelling	3	9
		Total Credit Semester	9	27

Semester 2				
No	Code	Course	Credits	
			SKS	ECTS
1	PCIL 9231	Proposal Writing	3	15
2	PCIL 9232	Research 1	3	10
3	PCIL 9233	Technique of Proposal Writing and Scientific Article	3	8
		Total Credit Semester	9	33

Semester 3				
No	Code	Course	Credits	
			SKS	ECTS
1	PCIL 9352	Research 2	5	30
		Total Credit Semester	5	30

Semester 4				
No	Code	Course	Credits	
			SKS	ECTS
1	PCIL 9452	Research 3	5	18
2	PCIL 9431	Scientific Publication 1	3	12
		Total Credit Semester	8	30

Semester 5				
No	Code	Course	Credits	
			SKS	ECTS
1	PCIL 9571	Scientific Publication 2	7	18
2	PCIL 9532	Seminar of Dissertation Research Result	3	12
		Total Credit Semester	10	30

Semester 6				
No	Code	Course	Credits	
			SKS	ECTS
1	PCIL 9631	Eligibility Exam	3	18
2	PCIL 9662	Dissertation Defence	6	12
		Total Credit Semester	9	30
		Total Credit	50	180