



## SEMESTER STUDY PLAN

**Study program: Master of Environmental Science**

**Faculty: Postgraduate**

|                                      |  |  |  |   |  |   |                   |
|--------------------------------------|--|--|--|---|--|---|-------------------|
| <b>Subject:</b>                      | <b>Ecology and Environmental Pollution</b>   | <b>Code:</b><br>CIL-8-104  |  | <b>Credit:3</b><br><b>(6 ECTS)</b>  |  | <b>smt:1</b>  |                   |
| <b>Supporting lecturer:</b>          | <ol style="list-style-type: none"> <li>1. Prof. Norma Afiati, M.Sc, PhD</li> <li>2. M. Arief Budihadrjo ST, M.Eng.Sc., Env.Eng. Ph.D</li> <li>3. Dr. Jafron Wasiq Hidayat, M.Sc</li> </ol>   |  |  |   |  |   |                   |
| <b>Learning Outcomes Subject:</b>    | <ul style="list-style-type: none"> <li>• Able to describe the history of ecological development</li> <li>• Able to describe the interrelationships of living things and their environment</li> <li>• Able to describe important basic concepts in an ecosystem.</li> <li>• Able to describe environmental pollution and its impact on living things</li> </ul>                                       |  |  |   |  |   |                   |
| <b>Short Description of Courses:</b> | Ecology and Environmental Pollution Courses are compulsory subjects in the Environmental Science master's 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 environmental pollution. |  |  |   |  |   |                   |
| <b>1</b>                             | <b>2</b>   | <b>3</b>   | <b>4</b>   | <b>5</b>  | <b>6</b>                                       | <b>7</b>  |                   |
| <b>Week</b>                          | <b>Final Ability of each learning stage</b>  | <b>Study Materials/ Subjects</b>   | <b>Learning methods</b>                          | <b>Workload</b>   | <b>Student Learning Experience</b>             | <b>Evaluation</b>   |                   |
|                                      |  |  |  |   |  | <b>Criteria &amp; Indicators</b>                            | <b>Weight (%)</b> |
| 1.                                   | Introduction/<br>Lecture contract  | Understand the preparation before face-to-face lectures and the obligation to report face-to-face lectures | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of:<br><ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> </ul> <i>Individual tasks: 60 minutes/day (16 weeks)</i> | Understand preparation and lecture obligations | The level of students' understanding of the course contract | 5                 |

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| 2. | Scope of Ecology                       | Each student gives an example of the scope of ecology  | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of:<br><ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | Read recommended Modules and libraries;<br>Discussion of learning outcomes;<br>Presentation of the results of the discussion  | Accuracy in explaining the scope of ecology  | 5 |
| 3. | Living Creatures and Their Environment | Read recommended Modules and libraries; Observe environmental conditions;<br>Discussion of learning outcomes;<br>Presentation of the results of the discussion | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of:<br><ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | a. Discussion of the previous week's homework<br>b. Students listen to the lecturer's explanation and answer the lecturer's questions, as well as discuss                         | Accuracy in explaining the components of environmental factors, the relationship between environmental factors | 5 |
| 4. | Living Creatures and Their Environment | Read recommended Modules and libraries; Observe environmental conditions;<br>Discussion of learning outcomes;<br>Presentation of the results of the discussion | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of:<br><ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | a. Students listen to the lecturer's explanation and answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments | Accuracy in explaining the interaction of animals and the environment  | 5 |
| 5. | Living Creatures and Their Environment | Read recommended Modules and   | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of:   | a. Students listen to the lecturer's explanation and  | Accuracy in explaining the interaction of  | 5 |

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|    |                            | libraries; Observe environmental conditions; Discussion of learning outcomes; Presentation of the results of the discussion  |  | <ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul>                                    | answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments  | plants with the environment  |   |
| 6. | Habitats and Niches        | Observe environmental conditions; discuss habitats and niches of living things, Discussion of learning outcomes; Presentation of results   | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of: <ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | a. Students listen to the lecturer's explanation and answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments (system characterization) | Accuracy in explaining the definition of Habitat, Niche and the Concept of Competitive Exclusion   | 5 |
| 7. | Individuals and Population | Observe environmental conditions regarding the interaction of living things, forms of adaptation; Read the recommended modules; Discussion of learning outcomes; Presentation of | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of: <ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | a. Students listen to the lecturer's explanation and answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments (influence diagram)       | Accuracy in explaining the response to living things, adaptations of living things, animal behavior, local populations and ecological races, | 5 |

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|     |                             | the results of the discussion  |  |  |   |   |           |
| 8   | <b>Mid Term Examination</b> | <b>Meeting Material 1-7</b>  | <b>Independent Written Test</b>                  | <b>330 minutes of processing time or the equivalent of 0.25 ECTS</b>   | <b>Students working on UTS questions</b>  | <b>Quality of answers and timeliness of collection</b>  | <b>10</b> |
| 9.  | Individuals and Population  | Observe environmental conditions regarding the interaction of living things, forms of adaptation; Read the recommended modules; Discussion of learning outcomes; Presentation of the results of the discussion | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of:<br><ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | a. Students listen to the lecturer's explanation and answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments | Accuracy in explaining population characteristics and variations, population calculation methods, population interactions | 5         |
| 10. | Community Structure         | Read the recommended modules; Observe environmental conditions; Discussion of learning outcomes; Presentation of the results of the discussion   | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of:<br><ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | a. Students listen to the lecturer's explanation and answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments | Accuracy in explaining Definition of community, Ecological Succession   | 5         |
| 11. | Ecosystem                   | Read the recommended modules;  | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of:<br><ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> </ul>   | a. Students listen to the lecturer's explanation and  | Accuracy in explaining the concept of   | 5         |

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|-----|-----------|---|--|---|---|--|---|
|     |           | Observe environmental conditions;<br>Discussion of learning outcomes;<br>Presentation of the results of the discussion                                  |  | <ul style="list-style-type: none"> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul>  | answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments  | ecosystems, energy flow in ecosystems, ecosystem productivity              |   |
| 12. | Ecosystem | Read the recommended modules;<br>Observe environmental conditions;<br>Discussion of learning outcomes;<br>Presentation of the results of the discussion | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of: <ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | a. Students listen to the lecturer's explanation and answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments                                     | Accuracy in explaining the types of food and how to obtain food in animals | 5 |
| 13. | Ecosystem | Read the recommended modules;<br>Observe environmental conditions;<br>Discussion of learning outcomes;<br>Presentation of the results of the discussion | Lectures, questions and answers, and discussions | 330min (0.375 ECTS)<br>Consist of: <ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | a. Students listen to the lecturer's explanation and answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments (model verification and validation) | Accuracy in explaining processes in biogeochemical cycles                  | 5 |

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| 14.                       | Ecosystem                | Read the recommended modules;<br>Observe environmental conditions;<br>Discussion of learning outcomes;<br>Presentation of the results of the discussion   | Lectures, questions and answers, and discussions              | 330min (0.375 ECTS)<br>Consist of:<br><ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | a. Students listen to the lecturer's explanation and answer the lecturer's questions, as well as discuss<br>b. Discussion of the results of the previous week's group assignments (model analysis)                        | Accuracy in explaining ecosystem types   | 5         |
| 15.                       | Environmental pollution  | Read the recommended modules;<br>Observe environmental conditions;<br>Discussion of learning outcomes;<br>Presentation of the results of the discussion   | Student presentations, discussions, and questions and answers | 330min (0.375 ECTS)<br>Consist of:<br><ul style="list-style-type: none"> <li>• <i>Lecture:180 minutes</i></li> <li>• <i>Q&amp;A: 30 minutes</i></li> <li>• <i>Discussion : 30 minutes</i></li> <li>• <i>Presentation : 30 minutes</i></li> <li>• <i>Individual tasks: 60 minutes/day (16 weeks)</i></li> </ul> | Final presentation of group assignments. Each group presents the results of their assignments for 1 semester followed by discussion and question and answer with other groups of students. Lecturer guides the discussion | Accuracy in explaining the definition of environmental pollution, its causes and impacts on living things on earth | 5         |
| 16                        | <b>Final Examination</b> | <b>Meeting Materials 1-15 (resume material)</b>   | <b>Written test</b>   | <b>330 minutes of processing time or the equivalent of 0.25 ECTS</b>   | <b>Students working on UAS questions</b>  | <b>Quality of answers and timeliness of collection</b>   | <b>20</b> |
| <b>8. Reference List:</b> |                          | <ol style="list-style-type: none"> <li>1. Campbell, Neil A. 2012. Biology. Edition 8. Erlangga, Jakarta.</li> <li>2. Dasman F. 1980. Principles of Ecology for Development. grammar. Jakarta.</li> <li>3. 3. Lakshmi, Prihantoro. 1989. Man and Environment (Man and Environmental). FPMIPA IKIP Bandung. Bandung.</li> <li>4. Soerjani, Moh., et al.; 1987. Environment: Natural Resources and Population in Development. University of Indonesia. Jakarta.</li> </ol> |   |  |   |  |           |

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|  | <ol style="list-style-type: none"><li>5. Ryadi, ALS 1983. Ecology, Environmental Science, Fundamentals and Understanding. National Effort. Surabaya.</li><li>6. Soeriatmadja. 1987. Environmental Science. ITB. Bandung.</li><li>7. Satrawijaya, A. Tresna. 1991. Environmental Pollution. Rineka Cipta. Jakarta</li></ol> |
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