

## Environmental Physics Education

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| Module Name :                              | Environmental Physics Education  |            |
| Module Level :                             | Undergraduate  |            |
| Code :                                     | 32259012   |            |
| Sub-heading, if applicable :               |  |            |
| Classes, if applicable :                   |  |            |
| Semester :                                 | 5 <sup>st</sup> /6 <sup>st</sup> /8 <sup>st</sup>  |            |
| Module coordinator :                       | Prof. Dr. Sunaryo, M.Si.   |            |
| Lecturer(s) :                              | Prof. Dr. Sunaryo, M.Si.   |            |
| Language :                                 | Indonesian   |            |
| Classification within the curriculum :     | Compulsory course  |            |
| Type of Teaching                           | Contact hours per week during the semester   | Class Size |
| Lecture (Expository, discussion, exercise) | 100 minutes  | 40         |
| Workload                                   | Total workload of this course 90,6 hours (3 ECTS) per semester which consist of 26,67 hours (0,89 ECTS) classroom activity, 32 hours (1.06 ECTS) structured task, and 32 hours (1.06 ECTS) per semester.   |            |
| Credit points :                            | 3 ECTS   |            |
| Prerequisite course(s) :                   | -  |            |
| Course Outcomes :                          | <p>After taking this course the student have ability to :</p> <p>CLO145. Able to master the basic principles of physics, its development, and application comprehensively to reveal and explain various physical phenomena in nature</p> <p>CLO146. Able to solve Physics problems analytically, numerically, and experimentally</p> <p>CLO147. Able to apply basic mathematical principles and their applications in the field of Physics to model and describe various physical phenomena in nature</p> <p>CLO148. Able to solve physics problems logically - analytically with well-defined and procedural solutions</p> <p>CLO149. Able to master new scientific facts using the basic principles of Physics for community education</p> |            |
| Content :                                  | <ol style="list-style-type: none"> <li>1. Introduction <ol style="list-style-type: none"> <li>1.1. Macro Environment</li> <li>1.2. Energy Exchange</li> <li>1.3. Mass and Momentum Transport</li> <li>1.4. Application of Transport Laws</li> </ol> </li> <li>2. Temperature <ol style="list-style-type: none"> <li>2.1. Role of Temperature</li> <li>2.2. Atmospheric Characteristics and Temperature</li> </ol> </li> </ol>  |            |

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|  | <ul style="list-style-type: none"> <li>2.3. Vertical Variation Modeling of Air Temperature</li> <li>2.4. Changes in Ground Temperature with Depth and Time</li> <li>2.5. Thermal Time</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>3. Environmental Humidity <ul style="list-style-type: none"> <li>3.1. Specification</li> <li>3.2. Saturation Condition</li> <li>3.3. Partial Saturation Condition</li> <li>3.4. Atmospheric Water Vapor Density</li> <li>3.5. Liquid Phase Water</li> <li>3.6. Relationship between Liquid and Gas Phases of Water</li> </ul> </li> </ul> |
|  | <ul style="list-style-type: none"> <li>4. Wind <ul style="list-style-type: none"> <li>4.1. Characteristics of Atmospheric Turbulence</li> <li>4.2. Flux and Profile Equations</li> <li>4.3. Wind within Canopy</li> </ul> </li> </ul>  |
|  | <ul style="list-style-type: none"> <li>5. Heat, Mass, and Momentum Transfer <ul style="list-style-type: none"> <li>5.1. Molecular Diffusion</li> <li>5.2. Heat and Mass Transport Resistance</li> <li>5.3. Free Convection</li> <li>5.4. Molecular Transport</li> </ul> </li> </ul>  |
|  | <ul style="list-style-type: none"> <li>6. Sound Waves and Noise <ul style="list-style-type: none"> <li>6.1. Definition of Noise</li> <li>6.2. Types of Noise</li> <li>6.3. Sound Intensity Level</li> <li>6.4. Effects of Noise on Humans</li> </ul> </li> </ul>   |
|  | <ul style="list-style-type: none"> <li>7. Organic and Non-organic Waste Management <ul style="list-style-type: none"> <li>7.1. Types of Organic Waste</li> <li>7.2. Types of Non-organic Waste</li> <li>7.3. Organic Waste Processing Cycle</li> <li>7.4. Non-organic Waste Processing Cycle</li> </ul> </li> </ul>  |
|  | <ul style="list-style-type: none"> <li>8. Soil Physics, Flooding, and Earthquakes <ul style="list-style-type: none"> <li>8.1. Types of Soil</li> <li>8.2. Physical Properties of Soil</li> <li>8.3. Landslides</li> <li>8.4. Study of Landslide Dynamics</li> <li>8.5. Earthquakes</li> </ul> </li> </ul>  |
|  | <ul style="list-style-type: none"> <li>9. Atmosphere and Radiation <ul style="list-style-type: none"> <li>9.1. Structure and Composition of Earth's Atmosphere</li> <li>9.2. Layers of Earth's Atmosphere</li> <li>9.3. Photochemical Pollution</li> </ul> </li> </ul>   |

|                          | <p>9.4. Aerosols<br/> 9.5. Ozone Layer<br/> 9.6. Global Warming<br/> 9.7. Physics Concept of Global Warming</p> <p>10. Renewable Energy Sources<br/> 10.1. Wind Energy Potential and its Conversion into Electricity<br/> 10.2. Geothermal Energy<br/> 10.3. Types of Earth Resources and their Conversion into Electrical Energy</p>  |  |                  |                     |        |   |                     |  |     |   |              |              |     |   |            |              |     |   |            |               |     |
|--------------------------|--|--|------------------|---------------------|--------|---|---------------------|--|-----|---|--------------|--------------|-----|---|------------|--------------|-----|---|------------|---------------|-----|
| Study/exam achievements: | <p>Examination are conducted as unit test, as following</p> <table border="1"> <thead> <tr> <th>No</th> <th>Assesment Object</th> <th>Assesment Technique</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Case-based learning</td> <td>Project Assessment (for group project assignments)</td> <td>55%</td> </tr> <tr> <td>2</td> <td>Midterm Test</td> <td>Written test</td> <td>15%</td> </tr> <tr> <td>3</td> <td>Final Test</td> <td>Written test</td> <td>20%</td> </tr> <tr> <td>4</td> <td>Attendance</td> <td>Presence list</td> <td>10%</td> </tr> </tbody> </table>  | No   | Assesment Object | Assesment Technique | Weight | 1 | Case-based learning | Project Assessment (for group project assignments) | 55% | 2 | Midterm Test | Written test | 15% | 3 | Final Test | Written test | 20% | 4 | Attendance | Presence list | 10% |
| No                       | Assesment Object   | Assesment Technique                                | Weight           |                     |        |   |                     |  |     |   |              |              |     |   |            |              |     |   |            |               |     |
| 1                        | Case-based learning  | Project Assessment (for group project assignments) | 55%              |                     |        |   |                     |  |     |   |              |              |     |   |            |              |     |   |            |               |     |
| 2                        | Midterm Test   | Written test                                       | 15%              |                     |        |   |                     |  |     |   |              |              |     |   |            |              |     |   |            |               |     |
| 3                        | Final Test   | Written test                                       | 20%              |                     |        |   |                     |  |     |   |              |              |     |   |            |              |     |   |            |               |     |
| 4                        | Attendance   | Presence list                                      | 10%              |                     |        |   |                     |  |     |   |              |              |     |   |            |              |     |   |            |               |     |
| Media :                  | Laptop/Computer, Smartphone, Camera, Tripod/Other Support.   |  |                  |                     |        |   |                     |  |     |   |              |              |     |   |            |              |     |   |            |               |     |
| Literatures :            | <ol style="list-style-type: none"> <li>1. RPS matatakuliah Fisika Lingkungan</li> <li>2. Nur'islamia, A. S., Indrasari, W., &amp; Budic, E. KARAKTERISASI SENSOR PH TANAH DAN SENSOR KONDUKTIVITAS PADA RANCANG BANGUN SISTEM PENGUKURAN KUALITAS TANAH.</li> <li>3. Sari, Z. A. K., Permana, H., &amp; Indrasari, W. (2017). Karakterisasi Sensor Photodiode, DS18B20, Dan Konduktivitas Pada Rancang Bangun Sistem Deteksi Kekeruhan Dan Jumlah Zat Padat Terlarut Dalam Air. Spektra: Jurnal Fisika dan Aplikasinya, 2(2), 149-156.</li> <li>4. Rukandar D. (2017). Pencemaran Air: Pengertian, Penyebab, dan Dampaknya. Jurnal Mimbar Hukum Vol.21, 1( 23-24).</li> <li>5. Jansen, Freddy dkk (2011). Tingkat Pencemaran Udara CO Akibat Lalu Lintas Dengan Model Prediksi Polusi Udara Skala Mikro.Jurnal Ilmiah Media Engineering. Vol 1, 2(119-126).</li> <li>6. Kencanawati, C. I. 2017. Bahan Ajar Mata Kuliah: Akustik, Noise dan Material Penyerap Suara. Denpasar: Universitas Udayana.</li> <li>7. Yulianto, Bambang &amp; Darjati. 2017. Fisika Lingkungan. Jakarta: PPSDM Kemenkes RI.</li> </ol> |  |                  |                     |        |   |                     |  |     |   |              |              |     |   |            |              |     |   |            |               |     |

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|  | <ol style="list-style-type: none"> <li>8. Andayani, M., Indrasari, W., &amp; Iswanto, B. H. (2016, October). Kalibrasi Sensor Ultrasonik HC-SR04 sebagai Sensor Pendeteksi Jarak pada Prototipe Sistem Peringatan Dini Bencana Banjir. In PROSIDING SEMINAR NASIONAL FISIKA (E-JOURNAL) (Vol. 5, pp. SNF2016-CIP).</li> <li>9. Sakinah, F., Indrasari, W., &amp; Umiatin, U. (2022). PENGUKURAN KUALITAS AIR TERCEMAR LIMBAH MIKROPLASTIK BERDASARKAN PARAMETER FISIKA. PROSIDING SEMINAR NASIONAL FISIKA (E-JOURNAL), 10(1), FA-89.</li> <li>10. Wirawan, R., Djamal, M., Hartono, A., Sanjaya, E., Indrasari, W., &amp; RAMLI, R. (2012). Aplikasi Sensor Ultrasonik Untuk Pengukuran Getaran Frekuensi Rendah.</li> <li>11. Purnomo, T. (2023). 4.2 Karakteristik Air. Pencemaran Lingkungan, 45.</li> </ol> |
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