

## Module Handbook

<b>Module Name</b>	Water, Soil, and Air Analysis Lab Work					
<b>Module Level</b>						
<b>Code, if applicable</b>	VKT 539					
<b>The subtitle, if applicable</b>						
<b>Courses, if applicable</b>						
<b>Semester(s) in which the module is taught</b>	5 <sup>th</sup> semester					
<b>A person responsible for the module</b>	Bayu Wiyantoko, M.Sc.					
<b>Lecturer</b>	Yuli Rohyami, M.Sc. Bayu Wiyantoko, M.Sc.					
<b>Language</b>	Bahasa Indonesia					
<b>Relation to curriculum</b>	Compulsory					
<b>Type of teaching, contact hours</b>	Laboratory Practice (teaching, preparation, lab work, data analysis and report) and Exams: 5.7 hours x 16 week					
<b>Workload</b>	Total Workload		91 hours; 2 CU			
		Face to face teaching	Laboratory preparation	Laboratory work	Data analysis and report	Exam (Theory and Practice)
	Hours	11	11	50	11	8
<b>Credit Points</b>	2 CU/3.4 ECTS					
<b>Requirements according to the examination regulations</b>	100% of requirements attendance in laboratory activities					
<b>Recommended prerequisites</b>	Laboratory Technique Lab Work					
<b>Module objectives/intended learning outcomes</b>	<p>PLO 5: Students able to contribute to solving problems in the scope of work</p> <p>PLO 7: Students able to select and carry out chemical analysis methods and operate instruments by applying the principles of chemical occupational health and safety</p> <p>PLO 9: Students able to carry out validation and verification of testing methods</p> <p>Subject LO:</p> <ol style="list-style-type: none"> <li>1. Students able to carry out procedures for the preparation of water, soil, and air samples</li> <li>2. Students able to apply water, soil and air testing procedures with standard and non-standard methods</li> <li>3. Students able to build teamwork in carrying out laboratory procedures</li> <li>4. Students able to apply principles and build a culture of chemical safety and health</li> <li>5. Students able to analyze (K3) water, soil, and air quality test</li> <li>6. Students are able to apply procedures for water, soil, and air quality test with standard and non-standard methods</li> </ol>					

	<ol style="list-style-type: none"> <li>7. Students able to determine and carry out test methods that are under the characteristics of the sample both instrumentally and non-instrumentally</li> <li>8. Students able to analyze data and report test results in writing and orally</li> </ol>		
<b>Content</b>	<ol style="list-style-type: none"> <li>1. Parameters and testing of water and wastewater quality parameters</li> <li>2. Parameters and testing of soil quality which includes macro and micronutrients</li> <li>3. Air quality parameters and testing include ambient air analysis, mobile emission gas, and stationary source emission gas</li> </ol>		
<b>Study and examination requirements and forms of examination</b>	Subject LO	Examination requirements and forms of examination	Percent
	1	Final exam (theory and practise)	10
	2	Pre-test, lab work, final exam (theory and practise)	10
	3	Teamwork : lab work, report, seminar	10
	4	Pre-test, lab work	10
	5	Lab work, final exam (theory and practise)	10
	6	Pre-test, lab work, final exam (theory and practise)	15
	7	Pre-test, lab work, final exam (theory and practise)	15
	8	Report, seminar	20
<b>Media employed</b>	Google classroom, youtube, zoom meeting, google form, google doc, standard method, laboratory handbook		
<b>Reading list</b>	<ol style="list-style-type: none"> <li>1. Alaerts, G., Santika, S.S., 1984, <i>Metode Penelitian Air</i>, Usaha Nasional Surabaya</li> <li>2. Balai Penelitian Tanah Badan Penelitian dan Pengembangan Pertanian Departemen Pertanian, 2005, <i>Petunjuk Teknis Analisis Tanah, Tanaman, Air, dan Pupuk</i></li> <li>3. Barcelo, D., Hennion, M.C., <i>Trace Determination of Pesticides and their Degradation Products in Water</i>, Elsevier Science</li> <li>4. Connel, D.W., dan Miller, G.J., 1995, <i>Kimia dan Ekotoksikologi Pencemaran</i>, Penerjemah Yanti Koestoer, UI press, Jakarta</li> <li>5. Furumai, H., Sato, S., Kamata, M., Yamamoto, K., 2010, <i>Advanced Monitoring and Numerical Analysis of Coastal Water and Urban Air Environment</i>, Springer Japan</li> <li>6. Hites, R.A., 2007, <i>Elements of Environmental Chemistry</i>, John Wiley &amp; Sons Inc., New Jersey</li> <li>7. Keith, L.H., 1991, <i>Environmental Sampling and Analysis: a Practical Guide</i>, RCR Press, Boca Raton</li> <li>8. Patnaik, P., 2010, <i>Handbook of Environmental Analysis: Chemical Pollutants in Air, Water, Soil, and Solid Wastes</i>, Second Edition [2 ed.], CRC Press, Boca Raton</li> <li>9. Perry, B.F., <i>Supplemental Guidance for the Determination of biochemical oxygen demand (BODs) and carbonaceous BOD (CBODs) in Water and Wastewater</i></li> <li>10. Quevauviller, P.P. and Thompson, C., 2006, <i>Analytical Methods for Drinking Water: Advances in Sampling and Analysis</i>, Wiley</li> <li>11. Reemtsma, T. and Jekel, M., 2006, <i>Organic Pollutants in the Water Cycle</i>, Wiley-VCH, Weinheim</li> <li>12. Standar Nasional Indonesia Air dan Air Limbah Bagian 1 – 75</li> <li>13. Standar Nasional Indonesia Kualitas Air Laut Bagian 1 – 7</li> </ol>		

	<ol style="list-style-type: none"><li>14. Standar Nasional Indonesia Kualitas Udara Emisi Gas Buang - Sumber Bergerak Bagian 1 – 2</li><li>15. Standar Nasional Indonesia Kualitas Udara Emisi Gas Buang - Sumber Tidak Bergerak bagian 1 – 20</li><li>16. Standar Nasional Indonesia Kualitas Udara Ambien Bagian 1 – 13</li><li>17. Standar Nasional Indonesia Pengujian B3 Bagian 1 - 8</li><li>18. Suharto, I., 2011, <i>Limbah Kimia dalam Pencemaran Udara dan Air</i>, Andi Offset, Yogyakarta</li><li>19. Weiner, E.R., <i>Aplication of Environmental Chemistry: A Practical Guide for Environmental Professionals</i>, Lewis Publisher Florida</li></ol>
--	--