19. Module Handbook of Applied Geohydrology

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<tr><td>Module designation</td><td colspan="3">The Applied Geohydrology course in the Master of Geography Study Program is a compulsory subject with a weight of 2 credits offered in even semesters. This course discusses the application of groundwater concepts and theories, the application of groundwater survey techniques and groundwater management itself. This subject is a continuation of the Geohydrology course which discusses the basics of groundwater in the Environmental Geography Undergraduate Study Program.

The Applied Geohydrology course has learning objectives (1) to foster a caring and critical attitude of students towards groundwater resource problems, (2) to provide provisions for the concept of groundwater management in the preparation of a thesis and when entering the world of work, (3) to understand the application and output obtained during the learning process which includes providing material, discussions and presentations related to groundwater problems and (4) cultivating strong and confident character as candidates with a master's degree in Geography in the academic world and in society.

With the increasing human attention and awareness of water resources problems, this Applied Geohydrology course is important for its position in the Master of Geography Study Program. Many thesis themes are related to this course, including groundwater availability, groundwater quality and pollution and seawater intrusion. The themes of this thesis show the contribution of this course in efforts to manage the geosphere and especially the hydrosphere as an object of study of Geography.</td></tr>
<tr><td>Semester(s) in which the module is taught</td><td colspan="3">Even</td></tr>
<tr><td>Person responsible for the module</td><td colspan="3">Prof. Dr. Ig.L.Setyawan Purnama, M.Si.
Dr. Tjahyo Nugroho Adji, S.Si., M.Sc.Tech.</td></tr>
<tr><td>Language</td><td colspan="3">Indonesian</td></tr>
<tr><td>Relation to curriculum</td><td colspan="3">Compulsory Courses</td></tr>
<tr><td>Teaching methods</td><td colspan="3">SCL: Team-based Project/Case-based Learning/PBL</td></tr>
<tr><td rowspan="5">Workload (incl. contact hours, self-study hours)</td><td>CLO1</td><td>Interactive discussions in class</td><td>3 meetings
6 x 50 minutes of classroom lectures and discussions</td></tr>
<tr><td>CLO2</td><td>Interactive discussions in class and assignments</td><td>2 meetings
4 x 50 minutes of classroom lectures and discussions
2 x 60 minutes of self-paced tasks</td></tr>
<tr><td>CLO3</td><td>Interaction discussions in class and assignments</td><td>2 meetings
4 x 50 minutes of classroom lectures and discussions
2 x 60 minutes of self-paced tasks</td></tr>
<tr><td>CLO4</td><td>Interaction discussions in class and assignments</td><td>3 meetings
6 x 50 minutes of classroom lectures and discussions
2 x 60 minutes of independent assignment (literature study and evaluation of literature study results in writing)</td></tr>
<tr><td>CLO5</td><td>Interaction discussions in class and assignments</td><td>4 meetings
8 x 50 minutes of classroom lectures and discussions
3 x 60 minutes of self-assignment (case study and evaluation of results in writing and presentation)</td></tr>
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<tr><td rowspan="7">Credit points</td><td>Assessment Techniques</td><td>Percentage of Assessment (%)</td><td>Criteria/ Indicators</td><td colspan="5">CLO (%)</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Participatory Activities</td><td>10</td><td>Contribution of class discussion activities in each subject matter of the lecture</td><td></td><td>10</td><td></td><td></td><td>10</td></tr>
<tr><td>Project Results/ Case Study Results/ PBL Results</td><td>50</td><td>Natural Resource Problem Analysis
Economic review
Case study and PBL assessment rubric</td><td></td><td>10</td><td></td><td>40</td><td>50</td></tr>
<tr><td colspan="8">Cognitive</td></tr>
<tr><td>Assignment</td><td>20</td><td>Task command conformance and task results
Task rubric</td><td></td><td>10</td><td></td><td>10</td><td>20</td></tr>
<tr><td>Final Exam</td><td>20</td><td>Answer key
Final Exam assessment rubric</td><td></td><td>10</td><td></td><td>10</td><td>20</td></tr>
<tr><td>Total</td><td colspan="6">100</td></tr>
<tr><td>Required and recommended prerequisites for joining the module</td><td colspan="7">Taken after taking compulsory courses and adapted to the theme of the thesis</td></tr>
<tr><td rowspan="8">Module objectives/intended learning outcomes</td><td>ELO A2</td><td colspan="6">Understand and comprehend the methods and techniques of geographical analysis for managing human resources, watersheds, coasts, seas, disasters, and environmental and socio-economic issues in regional development.</td></tr>
<tr><td></td><td colspan="6"></td></tr>
<tr><td>CLO1</td><td colspan="6">Understand the basic concept of groundwater [CPL A2]</td></tr>
<tr><td>CLO2</td><td colspan="6">Understand how to calculate groundwater volume [CPL A2]</td></tr>
<tr><td>CLO3</td><td colspan="6">Understand how to evaluate groundwater quality [CPL A2]</td></tr>
<tr><td>CLO4</td><td colspan="6">Understanding groundwater problems [CPL A2]</td></tr>
<tr><td>CLO5</td><td colspan="6">Understand how to conduct groundwater surveys and investigations [CPL A2}</td></tr>
<tr><td>CLO6</td><td colspan="6">Understand how groundwater management and conservation {CPL A2]</td></tr>
<tr><td rowspan="2">Content</td><td>CLO1</td><td colspan="6">1. Understanding and zoning of groundwater
2. Aquifer systems and characteristics</td></tr>
<tr><td>CLO2</td><td colspan="6">1. Groundwater flow
2. Groundwater discharge</td></tr>
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	CLO3	Hydrogeochemistry and groundwater quality
	CLO4	Seawater intrusion
	CLO5	1. Basics of groundwater parameter survey and groundwater potential zoning 2. Aquifer hydrostratigraphy 3. Pumping test to obtain aquifer parameters
	CLO6	1. Groundwater Management 2. Groundwater Conservation 3. Understanding groundwater basins and their management
Examination forms	Final Exam	
Study and Examination Requirements	The examination is carried out offline and the questions are made in the form of a case study and covers CLO1, CLO2 and CLO3; The assessment based on results Participatory Activities 10%, Project result 50%, Assignment 20%, Summative Test (Mid-term and Final Exam) 20%.	
Reading list	**Main:** 1. Davie, T. 2008. Fundamentals of Hydrology. Routledge, Taylor & Francis Group, London 2. Fetter, C.W. 2001. Applied Hydrogeology. Prentice-Hall, Inc, Upper Saddle River New Jersey. 3. Rushton, K.R. 2003. Groundwater Hydrology : Conceptual and Computational Models. John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex 4. Todd, D.K. and L.W. Mays. 2005. Groundwater Hydrology. John Wiley & Sons, New York. 5. Zohdy, A.A.R, Eaton, G.P & Mabey, D.R. 1980. Application of Surface Geophysics to Groundwater Investigation. United States Department of The Interior, Washington.	
	Additional: -	