

SYLLABUS


TLI 611 Pencemaran Tanah dan Air Tanah (Soil and Ground Water Pollution)

Lecturers:

Dr.Eng Shinta Indah

Dr.Puti Sri Komala

**MASTER STUDY PROGRAM OF ENVIRONMENTAL ENGINEERING
FACULTY OF ENGINEERING
UNIVERSITAS ANDALAS
2020**

	SYLLABUS SEMESTER	No.Dok :
	(TLI 611 Soil and Ground Water Pollution)	Revisi :
		Tanggal : June 2020
		Halaman:
Completed by:	Checked by:	Approved by:
Dr. Puti Sri Komala, Ir., MT NIP 196211281997022001	Reri Afrianita, MT NIP. 197704172006042002	Dr.Eng Zulkarnaini NIP 198004212009121003
Lecturer	Head of QC	Head of Master Study Program
SYLLABUS		
1. Lecture Information		
Study Program Name	: Environmental Sanitation Infrastructure	
Lecture Name	: Soil and Ground Water Pollution	
Lecture Code	: TLI 611	
Category	: Elective	
Unit	: 2 units	

Year	: Year 1
Semester	: 1 (one)
Prasyarat	: -
Status (required/elective)	: Elective
Lecturers	: 1. Dr.Puti Sri Komala 2. Dr.Eng Shinta Indah

2. Description of Lecture

The lecture discusses the issue of Soil and Groundwater Pollution. Characteristics and sources of soil and groundwater pollution. Regulations on soil and groundwater pollution. Risk assessment for soil and groundwater pollution. Site investigation and sampling analysis. Site investigation and monitoring. Method of remediation of polluted soils and groundwater.

3. Learning Achievement of Study Program

- Mastering the theory of engineering science, design engineering, methods and the latest techniques needed for the analysis and design of environmental management efforts;
- Mastering the contextual and current interdisciplinary approach related to the design of integrated environmental management systems.
- Able to solve engineering and technological problems and design systems, processes and components in environmental management efforts including management of drinking water, wastewater, solid waste, settlement drainage, liquid, solid and gas waste control systems, air pollution control and occupational health and safety (OHS) by utilizing other fields of science (if needed) and taking into account economic, health and public safety, cultural, social and environmental factors;

4. Learning Achievement of Lecture

1. Able to explain the characteristics and sources of soil and groundwater pollution.
2. Understand the contaminant transport in soil and groundwater
3. Understand the Risk assessment for soil and groundwater pollution
4. Understand the principle of the site investigation, sampling analysis and monitoring.
5. Able to explain the method of remediation of polluted soils and groundwater
6. Understand the basic of Bioremediasi
7. Understand the Bioremediation Design Concepts and Bioremediation Techniques
8. Understand managing a bioremediation project (Chapter 2 Bioremediation engineering)
9. Understand the Microbial Systems of bioremediation and optimizing microbial transformation of the hazardous chemical (Chapter 4 Bioremediation engineering)
10. Understand the Risk assessment in the remediation of hazardous waste sites (Buku Donald L. Wise)

11. Understand the Practical considerations during bioremediation (Donald L.Wise)
12. Able to explain Engineering Aspect of bioremediation (Donald L.Wise)
13. Application in situ and ex situ bioremediation with a case study

5. Description of Lesson Plan

Week	Indicator of Learning Achievements of Subjects	Topics	Method of Learning	Course Time	Assignment and Evaluation	Reference
1	Able to explain the characteristics and sources of soil and groundwater pollution.	Characteristics and sources of soil and groundwater pollution	Lecture and discussion	2x50 minutes	Mid-term exam	
2	Understand the contaminant transport in soil and groundwater	Contaminant transport in soil and groundwater	Lecture and discussion	2x50 minutes	Assignment	
3	Understand the Risk assessment for soil and groundwater pollution	Risk assessment for soil and groundwater pollution	Lecture and discussion	2x50 minutes	Presentation	
4	Understand the principle of the site investigation, sampling analysis and monitoring.	Site investigation, sampling analysis and monitoring.	Lecture and discussion	2x50 minutes	Assignment	
5	Able to explain the method of remediation	Method of remediation of polluted soils and groundwater	Lecture and discussion	2x50 minutes	Assignment	

Week	Indicator of Learning Achievements of Subjects	Topics	Method of Learning	Course Time	Assignment and Evaluation	Reference
	of polluted soils and groundwater					
6	Able to present a remediation method for polluted soil and groundwater	Discuss the case study of soil and groundwater pollution issues and propose a remediation method	Lecture and discussion	2x50 minutes	Mid-term exam	
7	Cont'd case study	Cont'd case study	Lecture and discussion	2x50 minutes	Mid-term exam	
8		Mid-term Examination				
9	Understand the Bioremediation Design Concepts	Bioremediation Design Concepts and Bioremediation Techniques	Lecture and discussion	2x50 minutes	Assignment	7
10	Understand managing a bioremediation project	Managing a bioremediation project	Lecture and discussion	2x50 minutes	Assignment	7
11	Understand the Microbial Systems of bioremediation	Microbial Systems of bioremediation and optimizing microbial transformation of the hazardous chemical	Lecture and discussion	2x50 minutes	Assignment	7

Week	Indicator of Learning Achievements of Subjects	Topics	Method of Learning	Course Time	Assignment and Evaluation	Reference
12	Understand the Risk assessment in the remediation of hazardous waste sites	Risk assessment in the remediation of hazardous waste sites: hazard evaluation, exposure assessment, risk characterization	Lecture and discussion	2x50 minutes	Final Exam	8
13	Understand the Practical considerations during bioremediation	Practical considerations during bioremediation: microbe isolation and identification, selection bacteria, biomass, application of the biomass to the contaminated soil, maintenance	Lecture and discussion	2x50 minutes	Final Exam	8
14	Able to explain Engineering Aspect of bioremediation	Engineering Aspect of bioremediation: goals and advantage of bioremediation, common source of contaminants, treatment alternative	Lecture and discussion	2x50 minutes	Final Exam	8
15	Understand the Application in situ and ex situ bioremediation with a case study	Application in situ and ex situ bioremediation with a case study	discussion	2x50 minutes	Report	

Week	Indicator of Learning Achievements of Subjects	Topics	Method of Learning	Course Time	Assignment and Evaluation	Reference
16	Final Examination					

6. References

1. Nazaroff, W.W., Alvarez-Cohen, L. (2001) Environmental Engineering Science. John Wiley & Sons, Inc.
2. Remediation Technologies for Soil and Groundwater, Bhandary, A., Surmapalli, R.Y. Et al, 2007, ASCE
3. Contaminated land and its reclamation Eds R E Hester & R M Harrison 1997 Royal Society of Chemistry Cambridge.
4. Contaminated land: Investigation, assessment and remediation; ICE design and practice guide M Harris & S Herbert 1994 Thomas Telford, London.
5. Methods and techniques for cleaning-up contaminated sites. NATO science for peace and security series. Series C, Environmental security, Dordrecht ; London : Springer, 2008
6. Environmental Contaminants: Assessment and Control Vallero, Daniel ; 2004; Publisher: Academic Press
7. John T. Cookson Jr. (1995).Bioremediation Engineering: Design and application. McGraw-Hill Inc.
8. Donald L. Wise. (1995). Remediation of Hazardous Waste Contaminated Soils (Environmental Science & Pollution) 1st Edition. CRC Press;CRC Press;
9. Another reference related to Sanitation Technology

7. Annex

Scoring Instrument: Mid-term examination : 25%; Final Examination: 30%; Assignment: 20%; Report 25%