



UNIVERSITI TEKNOLOGI MARA

AGR251: MANAGING PROBLEMATIC SOIL

Course Name (English)	MANAGING PROBLEMATIC SOIL APPROVED
Course Code	AGR251
MQF Credit	2
Course Description	This course will interactively engage students cognitively and scientifically to several aspects of soil management which cover fertilization techniques, control of soil erosion, methods of soil survey and soil classification. Deliberation and discussion will cover the topics on the properties of problem soils, their constraints and methods of improvement. The outcome shall be assessed through a variety of tools which include the traditional paper examination, tests, assignment, classroom discussion and laboratory engagement.
Transferable Skills	Demonstrate professional skills, knowledge and competencies.
Teaching Methodologies	Lectures, Field Trip, Discussion
CLO	CLO1 State and discuss the principles and theories in several practical aspects related to fertilizer, soil conservation, soil survey, soil classification and problem soil. CLO2 Represent and relate the concepts in aspects of soil management in achieving optimum crop production. CLO3 Apply the concept, principles and theories of soil science to manage and improve soil fertility and plant growth.
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.0 importance of carbon and nitrogen in soil 1.1) 1.1 Nitrogen 1.2) 1.1.1 Nitrogen cycle and its importance 1.3) 1.1.2 Processes of nitrogen cycle: 1.4) 1.1.2.1 Nitrogen fixation: symbiotic and nonsymbiotic 1.5) 1.1.2.2 Mineralization, nitrification, denitrification 1.6) and immobilization 1.7) 1.2 Carbon 1.8) 1.2.1 Carbon cycle and its importance 1.9) 1.2.2 Processes of carbon cycle 1.10) 1.2.3 Carbon sequestration	
2. 2.0 Fertilizers 2.1) 2.1 Types and characteristics: straight, mixture, compound, organic, slow release, foliar fertilizers 2.3) 2.2 Methods of application: broadcasting, soil injection, localized placement, banding, dressing, fertigation and foliar 2.6) 2.3 Fertilizer use efficiency 2.7) 2.4 Calculations on fertilizer requirement	
3. 3.0 Soil Erosion 3.1) 3.1 Definition and types of erosion: splash, sheet, rill, gully, accelerated and geological 3.3) 3.2 Factors affecting soil erosion 3.4) 3.2.1 Erosivity and erodibility 3.5) 3.2.2 Length and steepness of slope 3.6) 3.2.3 Crop management 3.7) 3.2.4 Erosion control practices 3.8) 3.3 Methods of controlling erosion	

- 3.9) 3.3.1 Strip and multiple cropping
- 3.10) 3.3.2 Cover crops
- 3.11) 3.3.3 Mulching
- 3.12) 3.3.4 Conservation/minimum tillage
- 3.13) 3.3.5 Soil amendments/conditioners
- 3.14) 3.3.6 Terracing
- 3.15) 3.3.7 Contour
- 3.16) 3.3.8 Drainage and barriers
- 3.17) 3.4 Erosion by wind and its control

4. 4.0 Soil Survey

- 4.1) 4.1 Importance of soil survey
- 4.2) 4.2 Types of soil survey: schematic, reconnaissance, generalized,
- 4.3) semi-detailed, detailed, intensive
- 4.4) 4.3 Methods of soil survey:
- 4.5) 4.3.1 Initial preparation/planning for field work
- 4.6) 4.3.2 Field work
- 4.7) 4.3.3 Soil examination
- 4.8) 4.3.4 Laboratory analysis
- 4.9) 4.3.5 Soil report and mapping

5. 5.0 Soil Classification

- 5.1) 5.1 Soil taxonomy: USDA (7th Approximation)
- 5.2) 5.2 Purpose of classification
- 5.3) 5.3 Diagnostic horizons of soil order: epipedon and
- 5.4) endopedon
- 5.5) 5.4 Temperature and water regimes
- 5.6) 5.5 Soil orders
- 5.7) 5.6 Description of several common orders in Malaysia:
- 5.8) Oxisols, Inceptisols, Spodosols, Ultisols, Entisols,
- 5.9) Alfisols and Histosols

6. 6.0 Soil Suitability Classification

- 6.1) 6.1 Purpose of classification
- 6.2) 6.2 Limitations (kinds and severity) influencing crop
- 6.3) growth
- 6.4) 6.3 Soil suitability classes
- 6.5) 6.3.1 Suitability classificatio

7. 7.0 Problem Soils

- 7.1) 7.1 Acid sulphate soils
- 7.2) 7.1.1 Characteristics and methods of overcoming
- 7.3) problems
- 7.4) 7.2 Sandy soils
- 7.5) 7.2.1 BRIS (Beach Ridges Interspersed with Swales)
- 7.6) 7.2.1.1 Characteristics and methods of
- 7.7) overcoming problems
- 7.8) 7.2.2 Tin tailings (Ex-mining soils)
- 7.9) 7.2.2.1 Characteristics and methods of
- 7.10) overcoming problems
- 7.11) 7.3 Organic soils
- 7.12) 7.3.1 Characteristics and methods of overcoming
- 7.13) problems

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Topics of assignment based on syllabus content	20%	CLO2 , CLO3
	Group Project	Students are expose to real field investigation.	10%	CLO2 , CLO3
	Test	Test 2	15%	CLO2 , CLO3
	Test	Test 1	15%	CLO1 , CLO2

Reading List	Recommended Text	• Brady, N.C. and R.R. Weil. 2008, <i>The Nature and Properties of Soils</i> , 14 Ed., Prentice Hall, New Jersey
	Reference Book Resources	<ul style="list-style-type: none"> • Jones, B.J 2001, <i>Laboratory Guide Conducting Soil Tests and PI</i>, CRC Press Ltd • Ashman, M.R. and Puri, G 2001, <i>Essential Soil Science</i>, Blackwell Publishing. United Kingdom • Coyne, M.S. and Thompson, J. A 2006, <i>Fundamental Soil Science</i>, Thomson Corporation. New York • Singer, M.J. and Munns, D.N. 2002, <i>Soils: An Introduction</i>, 5 Ed., Prentice Hall • Laegreid, M., Bockman, O.C. and Kaarstad, O 1999, <i>Agriculture fertilizers and Environment</i>, CABI Publishing, New York • Plaster, E.J. 1997, <i>Soil Science and Management</i>, 3 Ed., Delmar Publishers Inc., New York
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	