



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

GENSS402

BASIC KNOWLEDGE OF SOIL SCIENCE

Apply basic knowledge of soil science.

Competence

RQF Level: 4

Learning Hours



Credits: 6

Sector: Agriculture and Food Processing

Trade: Forestry

Module Type: General

Curriculum: AFPFOR4002 - TVET Certificate 4 in Forestry

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Issue Date: June, 2023

Purpose statement	This module describes the skills, knowledge and attitude required to apply basic knowledge of soil science. It is designed for learner who has successfully completed level III in Forestry and pursuing level IV in Forestry. At the end of this module, learner will be able to describe soil formation process, describe physical properties of soil, describe chemical properties of soil and describe biological properties of soil. Qualified learner deemed competent may work in various places including open field and a range of tasks related to soil. She/he can work alone or with others under minimum supervision.					
Delivery modality	Training delivery		100%	Assessment		Total 100%
	Theoretical content		30%	Formative assessment	30%	50%
	Practical work:		70%		70%	
	• Group project and presentation	20%				
	• Individual project /Work	50%				
			Summative Assessment			50%

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria	
1. Describe soil formation process	1.1.	Soil profiles are correctly identified in accordance with soil horizons
	1.2.	Factors affecting soil formation are properly described through weathering
	1.3.	Soil formation is properly described with reference to the accumulation of materials
	1.4.	Soil fertility is properly characterized referring to soil origin
2. Describe physical properties of soil	2.1.	Soil texture is properly determined according to the requirements of the trees
	2.2.	Soil structure is properly determined according to the requirements of the trees
	2.3.	Soil moisture content is appropriately defined according to the requirements of the trees
	2.4.	Soil amendments are properly carried out according to the requirements of the trees
3. Describe chemical properties of soil	3.1.	Nutrients content is properly described in accordance with growth stages of the trees
	3.2.	Soil acidity is properly determined according to the requirements of the trees
	3.3.	Soil amendments are properly carried out according to the requirements of the trees
	4.1.	Soil fauna is properly identified according to the requirements of the trees

4. Describe biological properties	4.2. Soil flora is properly identified according to the requirements of the trees
	4.3. Soil amendments are properly carried out according to the requirements of the trees

Knowledge and Attitude

Knowledge	Skills	Attitude
✓ Description of soil profiles ✓ Identification of factors affecting soil formation ✓ Characteristics of soil fertility ✓ Identification of soil amendments ✓ Identification nutrient content in soil ✓ Description of soil living organisms ✓ Classification of soil living organisms based on their respective function in the soil	✓ Apply methods of soil amendments ✓ Determine soil acidity ✓ Determine soil moisture content ✓ Determine of cation exchange capacity based on their major groups ✓ Classify soil basing on its composition ✓ Classify soil basing on its arrangement	✓ Handle appropriately tools and equipment used in soil sciences ✓ Collaborate with others ✓ Respect hygiene and safety at the workplace. ✓ Work under minimum supervision ✓ Manage the time ✓ Report a hazard to the right person

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Describe soil formation process 2. Describe physical properties of soil 3. Describe chemical properties of soil 4. Describe biological properties of soil	
Learning outcome 1: Describe soil formation process.	Learning hours: 20	
Indicative content		
• Description of soil profiles ✓ Identification of soil horizons ✓ Characteristics of soil horizons • Identification of factors affecting soil formation ✓ Based on weathering process ✓ Based on material accumulation • Characteristics of soil fertility		
Resources required for the indicative content		
Equipment	Computer, Projector, Screen projector	
Materials	Wallcharts, Flip charts, papers, pH meter,	
Tools	Shovel, hoes,	
Facilitation techniques	Individual and group work, Individualized, trainer guided and Group discussion, Oral presentation	
Formative assessment methods	Written assessment, Oral assessment	
Learning outcome 2: Describe physical properties of soil.	Learning hours: 20	
Indicative content		
• Classification of soil basing on its composition • Classification of soil basing on its arrangement • Determination of soil moisture content • Identification of soil amendments • Application methods of soil amendments		
Resources required for the learning outcome		
Equipment	Soil grinder, soil centrifuges, oven, relative density mold, microscope, PPE	
Materials	pH meter, plastic tray, soil, water	

Tools	Sieve, electronic balance, soil auger, shovel, garden trowel, buckets, soil core sampler, soil moisture meter, tester
Facilitation techniques	Demonstration by viewing films and videos, Individual and group work, Individualized, trainer guided and Group discussion, Oral presentation
Formative assessment methods	Written assessment, Oral assessment
Learning outcome 3: Describe chemical properties of soil.	
Learning hours: 10	
Indicative content	
• Determination of soil acidity • Identification nutrient content in soil • Determination of cation exchange capacity	
Resources required for the indicative content	
Equipment	Soil grinder, soil centrifuges, oven, relative density mold, microscope, PPE
Materials	pH meter, plastic tray, soil, water
Tools	Sieve, electronic balance, soil auger, shovel, garden trowel, buckets, soil core sampler
Facilitation techniques	Individual and group work, Individualized, trainer guided and Group discussion, Oral presentation
Formative assessment methods	Written assessment, Oral assessment

Learning outcome 4: Describe biological properties of the soil	
Learning hours: 10	
Indicative content	
• Identification of soil living organisms based on their major groups ✓ Soil flora ✓ Soil fauna • Description of soil living organisms • Classification of soil living organisms based on their respective function in the soil	
Resources required for the indicative content	
Equipment	Soil grinder, soil centrifuges, oven, relative density mold, microscope, PPE
Materials	pH meter, plastic tray, soil, water
Tools	Sieve, electronic balance, soil auger, shovel, garden trowel, buckets, soil core sampler
Facilitation techniques	Individual and group work, Individualized, trainer guided and Group discussion, Oral presentation
Formative assessment methods	Written assessment, Oral assessment

Reference books:

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17. Books The Nature and Properties of Soils, 13th edition. N.C. Brady and R.R. Weil. 2002. Prentice Hall. Upper Saddle River, New Jersey. 960 p.
18. Soils In Our Environment, 10th edition. D.T. Gardiner and R.W. Miller. 2004. Pearson Education, Inc. Upper Saddle River, New Jersey. 641 p.

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