**SSL 3102 Tropical Soils and Their Management**

**Lecturer** Dr. Lukman Nagaya Mulumba

 Prof. V.A.O. Ochwoh (PhD)

**Course Type**: **CORE (B LUM III.)**

**Course Credits (CU)**: **3 CU i.e. 45 Contact Hours per semester**

**Course Duration**: **15 weeks (45 contact hours)**

1. **COURSE DESCRIPTION:**

Major characteristics of a tropical environment. Tropical soils and major distinction from soils of other climatic regions. Dominant soil types (based on mineralogy) in the tropics, their characteristics and geographical distribution. Majorland use systems. Use potential and management requirements (physical, chemical and biological).

1. **Course Objectives:**

**General Objective (outcome)**

Student should be able to give practical guidelines in the management of tropical soils.

* Understand the interactions of the tropical environment on soil formation, soil management, food production potential and natural resource utilisation as contrasted in temperate environments.
* Understand the properties of the more important soil orders and how these relate to soil mgt and utilization in the tropics
* Comprehend the dynamics of SOM, clay minerals and ion exchange in tropical environments and the significance of this to better mgt of soils in the tropics.

**3. Recommended References**

Anthony. S. Juo., and Kathrin Franzluebbers. 2003. Tropical Soils: Properties and Management for Sustainable Agriculture.

**4. COURSE CONTENT, METHODS OF INSTRUCTION, TOOLS AND EQUIPMENT REQUIRED**

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| **WEEK/TOPIC** | **CONTENT** | **METHOD OF INSTRUCTION / Time allocated** | **TOOLS / EQUIPMENT NEEDED** |
| 1 and 2: The tropical Environment  | * Definitions
* Soil climate
	+ Soil temperature regimes
	+ Soil moisture regimes
* Soil climate and soil management
* Erosion hazards
 | Interactive lectures (3 x 2 hrs) | LCD projector, Chalk / BB or Markers / Flip charts |
| 3 and 4: Introduction to soil genesis and classification in the tropics | * Factors of soil formation
* Soil horizon formation
	+ Surface horizons
	+ Subsurface horizons
 | Interactive lectures (3 x 2 hrs) | LCD projector, Chalk / BB or Markers / Flip charts |
| 5 -9: Important Soil Orders | * Oxisols
* Vertisols
* Andisols
* Histosols
* Ulfisols/Altisols
* Alluvial soils
 | Interactive lectures (3 x 2 hrs) | LCD projector, Chalk / BB or Markers / Flip charts |
| 10 | * Midterm Exam
 | Interactive lectures (3 x 2 hrs) | LCD projector, Chalk / BB or Markers / Flip charts |
| 11. Organic Matter | * Organic matter content of tropical soils
* Calculating equilibrium soil organic matter content
* Continuous cropping vs crop rotation
* Beneficial effects of organic matter for no-fertilizer agriculture
* Animal manure versus inorganic fertilizers
* Physical effects of animal manure on soil
 | Interactive lectures (3 hrs) | LCD projector, Chalk / BB or Markers / Flip charts |
| 12 and 13: Clay Mineralogy and ion exchange | * Cation exchange capacity
* Effective cation exchange capacity
* Charge characteristics of clay minerals
* Permanent and variable charge minerals
* Soil mineralogy classes
* Permanent charge system of ion exchange
* Variable charge system of ion exchange
* Zero point of charge
* Management significance of variable charge soils.
 | Interactive lectures (3 x 2 hrs) | LCD projector, Chalk / BB or Markers / Flip charts |
| 14. Soil Acidity and liming | * Aluminium saturation and soil acidity
* Factors affecting Aluminium solubility
* Management of soil acidity
 | Interactive lectures (3 hrs) | LCD projector, Chalk / BB or Markers / Flip charts |
| 15. shifting Cultivation | * Definition
* Benefits of Shifting cultivation
* Challenges
* Alternatives to shifting cultivation
 | Interactive lectures (3 hrs) | LCD projector, Chalk / BB or Markers / Flip charts |

**5. SUMMARY OF TIME NEEDED**

Interactive lectures covering theory 45 hrs

**6. OVERALL COURSE EVALUATION**

Continuous Assessment Test 40%

Final examination 60%.