University of Ruhuna

Faculty of Agriculture- Department of Soil Science

B.Sc. in Agricultural Resource Management and Technology

 SS 1251 – FUNDAMENTALS OF SOIL SCIENCE (Semester 2)

**Course evaluation:** Final Examination (Theory) 50%

 Final Examination (Practical) 20%

 Continuous evaluations 30%

**Course Coordinator:** Dr. S. R. Amarasinghe

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**Teaching panel:** Prof. D.A.L. Leelamanie

Prof. B.C. Walpola

Dr. S.R. Amarasinghe

Mr. Sandun Piyaruwan

**Course overview:**

The fundamentals of soil science course is designed to provide an overview of the fundamental

concepts in soil science.

**Intended Learning Outcomes (ILOs):**

1. Recognize the value of soil and dependence of social system on the soil as a natural resource.
2. Define minerals, rocks and identify the importance of studying them.
3. Explain the physical properties of soil.
4. Describe the minerological and chemical properties affecting plant nutrient availability.
5. Identify soil as an ecosystem, a dynamic body where there is an inflow and outflow of energy

and material.

1. Describe the soil genesis, processes of soil formation and basic soil classification.

**Teaching/Learning Methods:** Lectures, Group discussions, Practical classes

**Evaluation Methods:** Continuous Evaluation, End Semester Theory Examination, End Semester Practical Examination

## Course outline:

# Soil as a natural resource (Prof. D. A. L. Leelamanie)-1 hr

* Importance of soil as a natural resource: *introduce soil as a renewable resource (over time), and what are the non-renewable components in soil*.
* Functions of soils in our ecosystem
* Major constituents of soil: *minerals, organic matter, air, and water.*

# Minerals, rocks and weathering (Mr. Sandun Piyaruwan)-6 hrs

* Minerals: *classification and basic properties of minerals*
* Rock formation: *Igneous, sedimentary and metamorphic rocks*
* Rocks of Sri Lanka: *only handout*
* The Rock Cycle
* Physical and chemical weathering: *Including Integrated weathering processes, Factors affecting weathering.*
* Parent materials in soil formation: *Including* *Classification of parent materials*

#### Physical properties of soils (Prof. D.A.L Leelamanie)-6 hrs

* Soil texture*: Including primary particles, specific surface area, particle size distribution and soil separates, Stalk’s Law.*
* Soil Structure: Introduction and basic
* Soil densities and porosity: *Bulk density, Particle density, and porosity with calculations*
* Soil color: *Munsell color system*
* Soil air/aeration: *basics, color changes in soil with aeration status*
* Soil water: *how to measure, explain gravimetric method*
* Soil temperature*: how to measure, variation with day time and soils depth, introduce term “temperature regime”*

#### Mineralogical and chemical properties of soils (Dr. B.C. Walpola) 6 hrs

* Soil colloids
* Clay minerals and their structure*: include Sources of negative and positive charges in soils basic introduction including pH dependent charges, ionization*…
* Cation exchange capacity of soils
* Anion exchange
* Base saturation
* Soil reaction: *Including Classification of soil acidity, Buffering of soils*

#### Biological properties of soil (Mr. Sandun Piyaruwan) 4 hrs

* Organisms and ecology of the soil: *earthworms, termites, nematodes, algae, fungi, actinomycetes, and Soil Bacteria*
* Introduction to soil organic matter: *including composition, decomposition and accumulation*
1. **Soil genesis** (Dr. S.R. Amarasinghe)- 2 hrs
* Factors of soil formation
* Soil profile
* Formation of soil horizons*: basics about master horizon and diagnostic horizons*
* Processes of soil formation: *Name the processes and explain only two processes that are important.*

# Soil Taxonomy (Dr. S.R. Amarasinghe)-3 hrs

* USDA system of soil classification (Soil Taxonomy): *bases of classification, explain the use of diagnostic surface and sub-surface horizons*
* Categories and nomenclature of Soil Taxonomy
* Soil orders.

# Soils of Sri Lanka (Dr. S.R. Amarasinghe)-2 hrs

* Great soil groups of Sri Lanka and their placement in US Soil Taxonomy
* Soils of the dry zone, wet zone, and semi-wet intermediate zone: *introduction with giving the reference on books (R.B. Mapa et al.)*

**General Policies and expectations:**

1. Required to submit all the assignments and 40% in continuous assessment is required for

attempting the final examination

2. Students should receive greater or equal marks of 40% for the end semester examination for

theory and practical components

3. The final marks of the module should be greater or equal to 40% to pass the course.

**Recommended reading materials**

1. The nature and properties of soils. N.C. Brady, and R.R. Weil, 2007. 12th Edition. Pearson

Prentice Hall.

2. Soils of the Wet Zone of Sri Lanka, R. B. Mapa, S. Somasiri, S. Nagarajah, Soil Science

Society of Sri Lanka, 1999, ISBN 995-8124-001

3. Soils of the Intermediate Zone of Sri Lanka , Ranjith Mapa, A.R. Dassanayake, H.B.

Nayakekorale ISBN: 955-8124-03-6

4. Soils of the Dry Zone of Sri Lanka, Ranjith Mapa, S.Somasiri, A.R. Dassanayke, ISBN: 978-

955-8124-11-