**CRS 1101 AGRICULTURAL BOTANY AND PLANT PHYSIOLOGY**

**Lecturers** Dr. J. Bisikwa (BSc. Agric, MUK; MSc Univ. of Minnesota; PhD University of Minnesota)

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**Course Type**: **CORE (B.Sc. Agric. I, B.Sc. FST I, B. Hort, BSc. LUM)**

**1. COURSE STRUCTURE**

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

**Course Duration**: 15 weeks (45 hours) i.e. 30 LH, 30 PH, 2 weeks for end of semester examination

**2. COURSE DESCRIPTION**

This course introduces beginners to the plant. It is divided into two parts: Agricultural botany and Plant physiology. The first part of the course covers plant anatomy and morphology with emphasis on form and function. The course introduces learners to the taxonomy of plants with particular emphasis on groups with agricultural importance as producers of food, feed, fibre and wood or as weeds or pests. The second part introduces the learner to the functioning and control of plant biochemical processes.

**2. COURSE OBJECTIVES**

The **overall objective** of this course is to introduce the student to the structure and function of the plant and also to relate plant form to environment.

The **specific objectives** are to:

* to introduce beginners to form, functions and processes within the plant.
* to allow learners relate plant form to environment
* to allow learners understand the physiological processes within plants so that they can appreciate the diversity in plants and hence crops.
* to allow them make informed choices of crops for different environments

**3. RECOMMENDED REFERENCES FOR READING**

* Mauseth J.D. 2003. Botany: An introduction to Plant Biology. Jones and Bartlett Publishers. ISBN 0-7637-2134-4
* Berrie, G.K., A Berrie, and J.M.O. Eze 1987. Tropical Plant Science. Longman and Scientific Technical. ISBN 0-582-64705-3
* Kochhar, S.L. 1981. Tropical Crops: a textbook of economic botany. MacMillan Publishers. ISBN 0-333-39241-8
* Laetsch, W.M. 1979. Plants: Basic concepts in Botany. Little, Brown and Company, Toronto, USA. Library Catalog Card No. 78-64497

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

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| **TOPIC** | **CONTENT** | **METHOD OF INSTRUCTION / Time allocated** | **TOOLS / EQUIPMENT NEEDED** |
| 1. Introduction | * Definition of botany; * Description of a plant; * Approaches to studying botany * The concept of ‘agricultural botany; * Why study Agricultural botany. * Components of agricultural botany | Interactive lectures (2 hrs) | Chalk / BB and LCD projector |
| 2. The Vegetative Morphology of Flowering Plants | * The root structure; * Root functions; * Root systems | Interactive lectures (2 hrs)  Laboratory Practical 1: Root systems (3 hrs) | Chalk / BB and LCD projector, Transport to collect plant samples, knives and pangas |
| 3. Plant morphology contd. | * Stem types, * Stem functions and modifications * Leaf functions and morphology, * Relationship between morphology and environment; * The concept of phylotaxy | Interactive lectures (2 hrs)  Laboratory Practical 2: Stem type and modifications (3 hrs) | Chalk / BB and LCD projector  Transport to collect plant samples, knives and pangas |
| 4. Plant reproduction | * Reproduction in gymnosperms and angiosperms * Flower morphology * Types of inflorescences * Flower symmetry | Interactive lectures (1 hr)  Laboratory Practical 3: Flower morphology (3 hrs) | Chalk / BB and LCD projector, Transport to collect plant samples, knives and pangas |
| * Course Assessment 1 | (1 hr) |
| 5. Plant reproduction contd. | * Pollen, structure and pollination * Fruits and fruit classification | Interactive lectures (2 hrs)  Laboratory Practical 4: Types of inflorescences (3 hrs) | Chalk / BB and LCD projector,  Transport to collect plant samples, knives and pangas |
| 6. Plant taxonomy | * Historical aspects: Linnaeus and the Plant Kingdom * The binomial system * Herbarium and plant sample preservation | Interactive lectures (2 hrs)  Laboratory Practical 5: Fruit types and classification (3 hrs) | Chalk / BB and LCD projector,  Transport to collect plant samples, knives and pangas |
| 7. Plant taxonomy and families of agricultural significance | * Graminae and Cyperaceae * Commelinaceae and Leguminoseae * Compositae and Commelinaceae * Solanaceae and Malvaceae * Crucifereae * Eurphorbiaceae | Interactive lectures (2 hrs)  Field Practical 6: Visit to Botanical Garden either at Makerere or NARO Entebbe (3 hrs) | Chalk / BB and LCD projector,  Transport for 180 students, entry fees |
| 8. Pant families of agricultural significance cont. | * Agavaceae and Araceae * Dioscoraceae and Bromeliaceae * Musaceae and Orchidaceae * Convolvulaceae and Alliacea * Zingiberaceae and Curcubitaceae | Interactive lectures (1 hrs)  Field Practical 7: Campus walk for Plant Identification  (3 hrs) | Chalk / BB and LCD projector, |
| * Course Assessment 2 | (1 hr) |
| 9: Introduction to plant physiology | * Definition and importance * The plant cell structure and basic cell types; * Morphogenesis | Interactive lectures (2 hrs) | Chalk / BB and LCD projector, |
| 10. The plant seed dormancy | * Seed structure; * The physiology of seed germination * Requirements for germination * Steps in seed germination | Interactive lectures (2 hrs)  Laboratory Practical 8: Seed viability | Chalk / BB and LCD projector,  Seed samples,  Petri-dishes,  Tetrazolium chloride, compound microscope |
| 11. Respiration and Photosynthesis | * Respiration; Requirements for photosynthesis; * The role of light; Photophosphorylation | Interactive lectures (2 hrs)  Laboratory Practical 9: Seed imbibition | Chalk / BB and LCD projector,  Seed samples,  Petri-dishes,  Tetrazolium chloride, compound microscope |
| 12. The Calvin Cycle | * The C4 pathway of photosynthesis; * The Krantz anatomy of C4 plants; Significance of the C4 photosynthesis * The Crassulacean Acid Metabolism photosynthetic pathway | Interactive lectures (2 hrs) | Chalk / BB and LCD projector,  Handouts |
| 13. Plant water relations | * Soil factors affecting water and mineral absorption; * Temperature * Osmotic potential, * Aeration, * CO2 concentration * Water movement | Interactive lectures (1 hr)  Laboratory Practical 10: Cell and tissue relation | Chalk / BB and LCD projector,  Handouts |
| * Course Assessment 3 | 1 hr |
| 14: Transpiration | * Definition of transpiration * Types of transpiration * Theories of transpiration * Control and role of transpiration | Interactive lectures (2 hrs) | Chalk / BB and LCD projector,  Handouts |
| 15: Translocation | * Definition of translocation * Mechanism of phloem translocation * Phloem loading and unloading | Interactive lectures (2 hrs) |  |
| 16 and 17 | * Student’ individual revision * End of semester exam |  |  |

**5. SUMMARY OF TIME NEEDED**

Interactive lectures and continuous course assessments covering theory 30 hrs

Laboratory based practical sessions 21 hrs

Field visits 6 hrs

Evaluation 03 hrs

**6. OVERALL COURSE EVALUATION**

Continuous Assessment Test 30%

Laboratory and Field practicals 10%

Final examination 60%