**SOS 2201 INTEGRATED SOIL FERTILITY MANAGEMENT**

Instructor: Lukman Mulumba Nagaya (B.Sc Agric, MSc, PhD)

Course type: Core course for BARI II

Credit Units: 3 Credit Units – 45 contact hours

Course duration:

* 30 Lecture Hours
* Tutorial Hours
* Practical Hours

Course Description:

Definition and concepts of integrate soil fertility management (ISFM). Diagnosis of soil fertility constraints – field and laboratory approaches. Identify, analysis, prioritisation of constraints and interventions. Principles of integrated soil fertility management. Participatory design and implementation of ISFM programs. Methodologies and tools for assessing suitability, economic feasibility and impacts of ISFM on agricultural production. Promotion of ISFM practices.

Overall Goal of the Course:

**Course Objectives:**

This course will enable students to learn the basic principles of various soil management techniques used for sustainable land management-. Students will gain an insight and appreciate the challenges faced in getting solutions to ever increasing land/soil degradation, low agricultural production and poverty despite all efforts made towards modernizing agriculture in developing countries. Participation in the course should enable a student to acquire understanding, knowledge and skills in management of soils in more integrated and sustainable manner. By the end of the course, a student should be able to solve and give guidance in solving soil management-based agricultural production problems.

Specific Objective:

By the end of the course students will:

* Gain knowledge about the basic principles and concepts of integrated soil fertility management
* Appreciate the various types of soil management techniques, their appropriateness and applicability in real life situations
* Gain hands on experience on how to use soil fertility management techniques and participatory approaches to integrated soil fertility management

Reference Materials (Please use the APA style to write out the references)

FAO, 2000. Guidelines and reference material on integrated soil and nutrient management and conservation for farmer field schools.

Brady,….. The nature and properties of soils

Agriculture in Uganda

Supplementary Reading List

Course Outline:

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| --- | --- | --- | --- |
| **Week** | **Course topic** | **Instruction content** | **Mode of delivery** |
| 1 | Course overview and Description | * Class expectations and class overview
* What is soil?
* Characteristics of good soils
* What is soil fertility?
 | 2 hr instructor-student interactive session using discussions, brainstorming to clarify the course syllabus and expectations |
| 2 & 3 | Concepts and principles of soil fertility management  | * Plant nutrition
* Soil formation & taxonomy
	+ Factors of soil formation
* Soil organic matter
* Soil organisms
* Soil physical properties,
	+ Soil texture
	+ Soil structure
* Soil chemical properties
	+ soil pH,
	+ Cation Exchange capacity
* Tillage practices
* Soil fertility
 | A 4 hr interactive lecture involving class discussions to enable students understand the concepts of SFM and how soil fertility is affected by the various soil properties and processes4 hour tutorial on the interactions between soil properties and soil productivity, |
| 4 | Diagnosis of soil nutrient problems  | * Indicators of soil nutrient problems
* Methods of diagnosing soil nutrient problems
	+ Yield gap analysis
	+ Soil testing
	+ Plant tissue analysis
	+ Field observations
	+ Diagnostic keys
	+ Nutrient flow analysis
	+ Resource flow mapping
* Computer based diagnostic tools
 | A 2 hr interactive lecture (peer to peer interaction, class discussions) to introduce students to indicators and methods of diagnosing soil nutrient problemsA 3 hour practical session involving real hands on experience for students to diagnose soil nutrient problems using various methods |
| 5 | Soils in Uganda | * The soil fertility status of the different types of Ugandan soils
* Problems associated with Uganda soils
	+ Environmental issues
	+ Political issues
	+ Nutrient and fertility management
	+ Socio-economic issues
 | A 2 hr tutorial involving group work for students to look at soil maps for Uganda. A plenary session will be incorporated with the tutorial to identify the problems of Ugandan soils A 3hr lecture involving class discussion and peer to peer interaction to introduce students to problems associated with Ugandan soil.A 2 hr tutorial using a seminar approach for various guest speakers to give their view on soil problems in Uganda |
| 6 and 7 | Introduction to Soil Fertility management Strategies  | * Use of organic techniques to manage soils fertility
* *Advantages and disadvantages of using organic fertilizers*
* Use of inorganic techniques to manage soil fertility
* *Advantages and disadvantages of using inorganic fertilizers*
* Using ISFM techniques to manage soil fertility
* *Advantages and Disadvantages*
* *Agroforestry*
* *Soil and water conservation*
 | A 2 hr interactive lecture session to introduce the students to various strategies used to curb soil problems in Uganda. Case studies in Uganda will be used to emphasize the pros and cons of using the methods in questionA 3 hr practical session involving a tour on farm that uses organic farming for sustainable soil production (Kasenge Organic Farm in Mukono District). A 3 hr practical session involving a tour to a farm that uses inorganic inputs to sustainable soil production (arrangements will be made with horticultural farms through AMA consultants)Two reports per students to provide an overview of the study tour using a semi-structured checklist. |
| 8 and 9 | Integrated Soil Fertility Management | * Integrated soil and nutrient management (ISFM) defined
* Basic Terminologies in ISFM
* Fundamentals of ISFM
* The role of ISFM in agriculture
* The evolution of ISFM
* IFDC’s Logical framework for implementing ISFM
 | A 2 hr lecture involving class discussions to introduce students to the concept of integrated soil fertility management. A hand out defining the basic terminologies in ISFM will be given to student for independent reading.A 2 hr lecture involving class discussions and answer-question sessions to introduce students to the ISFM. A guest speaker session will also be incorporated in the lecture to introduce students to IFDC logical framework for implementing ISFMA 3 hr practical on identification of different types of fertilizers, methods of application of fertilizers and manures |
| 10 and 11 | Categories of existing ISFM technologies | * What are ISFM technologies?
* Types of ISFM technologies
* Appropriateness of ISFM technologies for Ugandan soils
* Integration of ISFM technologies with the indigenous soil management practices
 | A 4 hr lecture involving class discussions and answer-question sessions to introduce students to the categories of existing ISFM technologiesA 4 h tutorial involving case studies to show success stories and as well failures of ISFM technologies. Students in group discussions will discuss the scenarios and give presentations |
| 12 | General Requirements for ISFM | * Physical resource requirements for ISFM
* Skill-related requirements for ISFM
* Developing farm resource flow maps
* Compositing making skills
* Improved crop residue management
* Establishment of grass barriers
* Improved pasture management
 | A 2 hr lecture involving class discussions and answer-question sessions to introduce students to the general requirements for ISFMA 3 hr practical session to teach students skills necessary for ISFM  |
| 13 | Pre-plan Activities for ISFM technologies use | Diagnosis of farmingenvironment and observation of field problems.* Identifying soil nutrient problems and opportunities
* Identifying causes of soil nutrient problems
* Identifying possible solutions to soil nutrient problems
* Assessment and selection of best practices to be tested
 | A 2 hr lecture involving class discussions and answer-question sessions to introduce students to pre-planning activities for ISFM technology use.A 3 hrs field exercusion of students and rural communities to plan for ISFM use using participatory approaches |
| 14 | Factors affecting the adoption of ISFM technologies | * Labour requirements for ISFM technologies
* Capital investment and economics of ISFM technologies
* Adaptability of ISFM to certain environment
* Acceptability of ISFM technologies to farming communities
* Gender and social economic issues
 | A 2 hr lecture involving class discussions, brainstorming and answer-question sessions to introduce students to factors affecting the adoption of ISFM technologiesA 2hr tutorial involving case studies, group discussions and presentation for students to identify factors affecting adoption of ISFM in real life situations |
| 15 | The role of farming communities in ISFM | * The need for farmer involvement in ISFM activities
* Using participatory approaches for farming communities to implement ISFM technologies
 | A 2 hr lecture involving class discussions and answer-question sessions to introduce students to the role of communities in ISFMA 3 hr field exercusion for student to use the various participatory approaches in implementing ISFM technologies |

Course Assessment

* Continuous Assessment (40%)
	+ Written reports for practical sessions (5%)
	+ (15%)
	+ Mid-term test (20%)
* FinalUniversity Examination (60%)

A comprehensive final university exam (60%)