UNIVERSITY OF SARGODHA

DEPARTMENT OF SOIL & ENVIRONMENTAL SCIENCES, UNIVERSITY COLLEGE OF AGRICULTURE

COURSE OUTLINE **Fall 2020-21**

Course Title: Soil fertility evaluation

Course Code: SES-311

Credit Hours: 3(2-1)

Instructor: Dr. Noor-us-Sabah

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DESCRIPTION AND OBJECTIVES

The aim of this course is to develop an understanding of various tools and components of soil fertility evaluation among students. The students will be able to diagnose deficiency and toxicity symptoms of different nutrients on plants. The various objectives of this course is to develop an understanding about the methods of soil and plant sampling, samples handling, Samples preparation and analysis methods of various nutrients. Critical concentration of various nutrients in soil and plant will also be described.

INTENDED LEARNING OUTCOMES

After completion of this course, students will be able to diagnose the deficiency and toxicity symptoms of various macro and micro nutrients exerted in the field. Students will be handy in conducting soil and plant sampling and analysis in the laboratory.

COURSE CONTENTS

Theory

1. Introduction and Review
2. Objectives of soil fertility evaluation
3. Nutrient deficiency and toxicity symptoms and causes
4. Tissue testing in the field and in the laboratory
5. Method and time of sampling and handling
6. Critical concentration of nutrients in the plant
7. Biological testing: Laboratory, green house and field trials
8. Soil testing: Sampling, handling and analysis
9. Critical nutrient ranges in soils; Correlations, calibration and recommendations

Practical

1. Sampling, handling and analysis of plant tissues in the field and laboratory
2. Handling and analyses for plant nutrients
3. Soil sampling for plant nutrients
4. Soil test and plant analysis evaluation and interpretation

READINGS

1. Havlin, J.L., S.L. Tisdale, J.D. Beaton and W.L. Nelson. 2005. Soil Fertility and Fertilizers: An Introduction to Nutrient Management. 7th Ed. Pearson Education Inc., Upper Saddle River, NJ, USA.
2. Mengel, K. and E.A. Kirkby. 2005. Principles of Plant Nutrition. 5th Ed. Kluwer Academic Publishers, New York, USA.
3. Westerman, R.L. 1990. Soil Testing and Plant Analysis. Soil Science Society of America, Inc. Madison, WI, USA.

COURSE SCHEDULE			
Week	**Topics and Readings**	**Books with Page No.**	**Dates**
1.	Course Outlines: Introduction and importance of the course, Review of soil fertility evaluation	A handbook of soil, fertilizer and manure, P.K Gupta, Page 274-278	12-10-2020 to 16-10-2020
2.	What is soil fertility evaluation, objectives of soil fertility evaluation, Components of soil fertility evaluation	A handbook of soil, fertilizer and manure, P.K Gupta, Page 279-285	19-10-2020 to 23-10-2020
3.	Role of visual observation of deficiency symptoms of various nutrients in soil fertility evaluation, Soil testing, role in soil fertility evaluation,	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 3-10	26-10-2020 to 30-10-2020
4.	Tissue testing in the field and in the laboratory, Plant testing, importance and role in soil fertility evaluation, Method and time of sampling and handling, Biological testing role in soil fertility evaluation, Biological testing: Laboratory, green house and field trials	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 10-19	02-11-2020 to 06-11-2020
5.	Nitrogen; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 21-50	09-11-2020 to 13-11-2020
6.	Phosphorus; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 51-90	16-11-2020 to 20-11-2020
7.	Potassium; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 91-120	23-11-2020 to 27-11-2020
8.	Calcium; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 121-144	30-11-2020 to 04-12-2020
9.	Magnesium; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 145-182	07-12-2020 to 11-12-2020
10.	MID-TERM EXAMINATION		14-12-2020 to

			18-12-2020
11.	WINTER BREAK		21-12-2020 to 25-12-2020
12.	Sulfur; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 183-200	28-12-2020 to 01-01-2021
13.	Boron; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 241-260	04-01-2021 to 08-01-2021
14.	Copper and Cobalt; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 293, 499	11-01-2021 to 15-01-2021
15.	Iron and Zinc; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 329, 411	18-01-2021 to 22-01-2021
16.	Molybdenum and Manganese; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 351-385	25-01-2021 to 29-01-2021
17.	Nickle and Silicon; functions, deficiency and toxicity symptoms, critical concentrations in soil and plants	Handbook of plant nutrition, Allen V. Barker and David J. Pilbean, Page 395, 511	01-02-2021 to 05-02-2021
18.	Method and time of soil sampling and handling, Soil testing: Sampling, handling and analysis	ICARDA MANUAL, page 1-5	08-02-2021 to 12-02-2021
19.	FINAL TERM		15-02-2021 to 19-02-2021

RESEARCH PROJECT/PRACTICAL/LABS/ASSIGNMENTS

Practical

1. Sampling, handling and analysis of plant tissues in the field and laboratory
2. Handling and analyses for plant nutrients
3. Soil sampling for plant nutrients
4. Soil test and plant analysis evaluation and interpretation

Assignment

Preparation of herbarium sheets with plants parts showing deficiency or toxicity symptoms of nutrients

ASSESSMENT CRITERIA

Sessional: 12 (project, presentation, participation)
Project: 06
Presentation: 03
Participation: 03
Mid exam: 12
Final exam: 20
Practical exam: 20