



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

DEPARTMENT OF BIOLOGICAL SCIENCES

**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION
SCIENCES WITH IT**

2ND YEAR 1ST SEMESTER 2022/2023 ACADEMIC YEAR

MAIN CAMPUS - REGULAR

COURSE CODE: SPB 9204
COURSE TITLE: PLANT MINERAL NUTRITION
EXAM VENUE: STREAM: (BED)
DATE: EXAM SESSION:
TIME: 2 HOURS

Instructions:

- 1. Answer ALL questions in Section A and Any two questions in Section B**
 - 2. Candidates are advised not to write on question paper**
 - 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**
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SECTION A: SHORT ANSWER QUESTIONS (30 MARKS)

1. List the nine macronutrients required by plants. (3 marks)
2. Distinguish between macronutrient and micronutrient. (3 marks)
3. List the criteria for the essentiality of elements as nutrients in plants. (3 marks)
4. Explain how a nutrient's role and mobility determine the symptoms of a mineral deficiency. (3 marks)
5. Fill in the blank spaces (3 marks)

Micronutrient	Role in the Plants Life
	Pectin formation in the cell wall, Translocation of sugar, Absorption of water.
Manganese (Mn)	
Copper (Ca)	
	Maintains osmosis and ionic balance
	It synthesizes auxins and also acts as an activator.
Iron(Fe)	

6. Explain how hydroponic culture is used to determine which minerals are essential nutrients. (3 marks)
7. List three factors that govern nutrient uptake by plants. (3 marks)
8. Using a labeled diagram, describe the relationship between plant growth and amount of available nutrients. (3 marks)
9. Explain the differences between processed and organic fertilizers. (3 marks)
10. Explain three factors that affect nutrient release from organic fertilizers. (3 marks)

SECTION B: ESSAY QUESTIONS (40 MARKS)

11. Write an essay on methods of fertilizer application. (20 marks)
12. Discuss the ecological effects of land use system on plant minerals nutrition (20 marks)
13. Describe ten (10) soil types and their uses in Kenyan agroecosystems (20 marks)
14. Discuss Analytical techniques used in soil analysis (20 marks)



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY MAIN CAMPUS

DEPARTMENT OF BIOLOGICAL SCIENCES

COURSE OUTLINE

BACHELOR OF EDUCATION SCIENCE

CODE: SPB 9204: TITLE: Plant Mineral Nutrition

STUDENTS: Y2S1

Lecurer's name: DR. Maina Nyongesah

Mobile +254 702 469 532

Email: jnyongesah@jooust.ac.ke

Lecture time and place: As per the time table

Course Goals and Student Learning objectives:

To understand the principles of plant nutrition of higher plants based on our current knowledge and to understand how the subject area relates to other, closely related disciplines such as physiology, soil science and biochemistry. Specific topics include: nutrient availability in the soil, nutrient uptake and distribution in plants, nutrient functions in the plant and contributions to growth and yield, modeling nutrient accumulation to test the current understanding of mechanisms, root modification of the soil environment and ecological aspects of mineral nutrition. By the end of this course, the students should be able to:

1. Define and classify plant minerals and understand nutritional physiology
2. Understand soil nutrient supply, their availability and movement in soils, and root system.
3. Absorption, transport, assimilation and functions of mineral nutrients in plant metabolism.
4. Model nutrient accumulation by testing their understanding of mechanisms of plant nutrition
5. Understand ecological and genetic aspects of mineral nutrition and adaptation to deficiencies and toxicities.

EVALUATION

There will be: 1) One exam during the semester; 2) Continuous Assessment Tests (CATs); 3) Assignments; 4) Practicals. 2, 3, 4 will cover the material in a portion of the lectures, while the exams will be based on the materials covered during class and reading assignments.

The lecture notes and the recommended reading materials should be sufficient to study for the exams. The material covered in student presentations will also be part of the test. Exam will be two hour long while CATs will be one hour long.

CLASS SCHEDULE

The following is a tentative schedule of the topics to be covered in class.

WEEK	LECTURER TOPIC	HOURS
1	Introduction to plant nutrition.....	3
2	Mechanisms of nutrient absorption.....	3
3	Plant Nutrient deficiency.....	3
4	Soil types and fertility assessment.....	3
5	Field soil analysis.....	3

6	First CAT	1
7	Fertilizers and their properties.....	3
8	Soil conditions vs. Fertilizer types.....	3
9	Fertilizer Blending and Responses.....	3
10	Ecological aspects of mineral nutrition	3
11	Class presentation.....	3
12	Second CAT	1
13	Revision.....	3
14-15	Exams	2

GRADING

The main exam will account for 70% of the grade while CATs, assignments and practicals will account for 30%.

CLASS ETHICS

Students must attend lectures; Unnecessary movement while in class is prohibited; Silence must be maintained and all phones must be switched off/silent mode. Students of Plant mineral nutrition course must be committed to the principles of academic honesty and maintain a high standard of academic integrity. Students involved in academic dishonest through plagiarism or cheating in Exams shall be handled according to the JOOUST Exam regulations.

TEXT BOOKS:

1. Epstein, E. and A.J. Bloom. 2005. Mineral Nutrition of Plants: Principles and Perspectives (2nd ed.). Sinauer Associates, Inc., Massachusetts.
2. Marschner, H. 1995. Mineral Nutrition of Higher Plants (2nd Ed.). Academic Press, London.
3. Taiz, L. and E. Zeiger. 2006. Plant Physiology. (4th Ed..) Sinauer Associates, Inc., Massachusetts

These books are recommended mainly as resources to clarify the material covered in class. All additional required readings will be handed out in class.

CLASS ANNOUNCEMENTS

All announcements will be made in class concerning changes in the schedule, correction to the material presented or assignments. Students are therefore responsible for keeping abreast of these changes by coming to class. Major changes will always be announced a week in advance.

Prepared by: Course Lecturer

Signature.....Date.....

Approved by COD, BIO:

Signature.....Date.....