**University** Benha **Faculty** Agriculture

**Course specifications**

**Programs on which the course is given:** Agricultural Biotechnology.

**Major or minor element of programmes:** Minor

**Department offering the programme:** General

**Department offering the course:** Soil and water ..

**Academic Level/semester:** 4th level/1st semester

**Date of specification approval: May 2014**

**A- Basic Information**

**Title:** Plant Nutrition Biotechnology **Code: SO 0505**

**Weekly Teaching Hours Lecture:** 28hours **Practical or** tutorial**:** 28hours **Total:** 56 hours

**B- Professional Information**

**1 – Overall aims of course**

Acquaint students with knowledge, understanding and skills on importance of plant nutrients essential for healthy plant growth. Functions of nutrients and deficiency symptoms are included. Assessing different theories of mechanism of supply and nutrient uptake by plant is involved. Knowledge of preparation of nutrient solutions for different crops is included . Types of fertilizers, their production and manufacture methods and techniques of application. Properties and modes of action of nutrient sources are described.

**2 – Intended learning outcomes of course (ILOs)**

**a- Knowledge and understanding**:

a1- state classification of plant nutrients.

a2- define and categorize macro and micro nutrients.

a3.relate soil microbiology and microbial biomass to soil fertility.

a.4.illustrate methods of nutrient acquisition by plant.

**b- Intellectual skills.**

b1-Compare healthy from non-healthy plants and crops.

b2-Contrast various nutrient-deficiency symptoms in plant parts.

b3-Classify fertilizers and manures and their use and suitability

**c- Professional and practical skills**

c1- Judge, evaluate and recognize sources of fertilizers.

c2-Conclude suitability and evaluate data on nutrition methods.

c3- Select criteria for assessing classes of nutrient sources.

c4- Assess reports on plant nutrition and soil fertility purposes.

**d- General and transferable skills**

d1- Effective work as a part solve-problem panels and committees.

d2- Use computer soft-ware in analysis processes

d3- Access to the Web-site on relevant topics.

d4- Solving problems using logic scientific approach.

**3- Contents:**

|  |  |  |
| --- | --- | --- |
| **Theoretical part :** | | |
| Lectures | Hours | Topic |
| 1 | 2 | Introduction on essentiality of plant nutrients. |
| 1 | 2 | Roles and functions of plant nutrients |
| 1 | 2 | Theories of nutrient movement to and within plant. |
| 1 | 2 | Symptoms of nutrient deficiency in plant. |
| 1 | 2 | Factors affecting nutrient uptake by plant. |
| 1 | 2 | Theories of nutrient movement to and through plants. |
| 1 | 2 | Special plant needs for particular nutrients. |
| 1 | 2 | Assessment of Nutrient efficiency supplied to plants. |
| 1 | 2 | Organic manuring and essentiality for plant health. |
| 1 | 2 | Bio-manuring and role of microorganisms in plant nutrition. |
| 1 | 2 | Compost and composting methods and techniques. |
| 1 | 2 | Validity and practicality of organic and biological manuring. |
| 1 | 2 | Fertilizer consumption: international and local. |
| 1 | 2 | Overall Revision |

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| **Practical part :** | | |
| **Sessions** | Hours | **Topic** |
| 1 | 2 | Soil and its components (solid, liquid and gaseous) |
| 1 | 2 | Practical Demonstration on plant nutrition |
| 1 | 2 | Plant Sample Collection. |
| 1 | 2 | Practical observation of healthy plants and specimen gallery. |
| 1 | 2 | Organic matter determination in soil. |
| 1 | 2 | Determination of contents of nutrients in plant tissues |
| 1 | 2 | Nutrient determination in Available and total forms in soil |
| 1 | 2 | Types of chemical salt fertilizers and nutrients involved |
| 1 | 2 | Compost and composting methods and techniques |
| 1 | 2 | Excursion visits to a near-by compost and biogas establishment |
| 1 | 2 | Components biofertilizers and their types. |
| 1 | 2 | Liquid fertilizers and spray application of nutrients. |
| 1 | 2 | Water and plant nutrition |
| 1 | 2 | General Revision |

**4– Teaching and learning methods**

4.1- Lectures

4.2-Assignments

4.3-Tutorials and written case-solving exercise.

4.4- Field visits and excursions

4.5- Practical and Laboratory work

**5- Student assessment methods**

5.1:Semester performance to assess knowledge and intellectual skills

5.2 :Follow-up and Practical exams to assess practical skills

5.3: Oral exam to assess intellectual , general and transferable skills

5.4 Final exam to assess knowledge, comprehending and intellectual skills

**Assessment schedule**

Assessment 1 Semester performance exams Weeks 8th and 12th.

Assessment 2 Practical exam Week 15th.

Assessment 3 Oral exam Week 15th.

Assessment 4 Semester Terminal Week 16th.

**Weighing of assessments**

Follow-up & Practical exams 30% (follow-up, Mid-term and practical)

Oral exam. 10 %

Semester Terminal Exam 60%

Total 100%

**Any formative-only assessment(s) to be described**

**6- List of references**

6.1- Course notes: Specialized notes by teaching staff.

6.2-Text books:

**Brady, N.C.,Weil, R.R. 2001**. The nature and properties of soil. Prentice-Hall, London.UK.

**Kanniyan, S. 2002.** Biotechnology of biofertilizers. Kluwer Acad. Publ., Dordrecht, Netherlands.

**Fossel, P.V. 2007.** Organic farming: Everything you need to know. Voyageur Press, St. Paul, MN, USA.

**7- Facilities required for teaching and learning**

Transport means for visits and excursions, white board and board ink-marker, data-show facility, laboratory specimens of studied subjects, pipettes glassware filter paper, chemicals**,** flame emission spectrometry, reference materials, refrigerators, gloves, masks, chemicals.

**Course coordinator:** **Prof Dr. Abo-El-Nasr H. Abdel-Hamid**

**Head of Department:** **Prof Dr. Abo-El-Nasr H. Abdel-Hamid.**

**Date: / /**

**Matrix for Plant Nutrition Biotechnology course (Lecture part)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| d | | | | | c | | | | | b | | | a | | | | Lectures |
| D4 | D3 | d2 | d1 | c4 | c3 | c2 | c1 | b3 | | b2 | b1 | a4 | a3 | a2 | a1 |  |
| x |  |  | x |  |  | x | x |  | | x | x |  | x |  | x | Introduction on essentiality of plant nutrients. |
|  |  | x | x | x |  | x | x | x | | x | x |  |  | x | x | Roles and functions of plant nutrients |
|  |  | x | x | x |  | x |  | x | |  |  | x |  | x | x | Theories of nutrient movement to and within plant. |
|  |  | x | x | x |  | x |  | x | |  | x |  |  | x | x | Symptoms of nutrient deficiency in plant. |
|  |  | x | x | x |  | x | x | x | |  | x |  | x | x |  | Factors affecting nutrient uptake by plant. |
| x |  | x | x | x |  | x |  |  | | x |  | x |  |  | x | Theories of nutrient movement to and through plants. |
| x |  | x | x |  | x |  | x |  | | x | x | x |  | x | x | Special plant needs for particular nutrients. |
| x |  | x | x | x |  | x | x |  | | x | x |  | x |  | x | Assessment of Nutrient efficiency supplied to plants. |
| x |  | x | x |  |  | x | x |  | | x | x |  | x |  | x | Organic manuring and essentiality for plant health. |
| x |  | x | x | x | x | x | x | x | | x | x |  | x | x | x | Bio-manuring and role of microorganisms in plant nutrition. |
| x |  |  |  |  | x |  | x |  | | x |  | x |  |  | x | Compost and composting methods and techniques. |
| x |  | x | x |  | x | x |  |  | |  | x | x | x |  | x | Validity and practicality of organic and biological manuring. |
| x |  | x |  | x |  |  |  | x | |  |  | x |  |  |  | Fertilizer consumption: international and local. |
| x |  | x | x | x | x | x | x | x | | x | x | x | x | x | x | Overall Revision |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Matrix for Soil and water Science course (Practical Part)؛ part)** | | | | | | | | | | | | | | | | | |
| **d** | | | | | **c** | | | | | **b** | | | **a** | | | | **Practicals** |
| d 4 | D3 | D2 | d1 | c 4 | | c 3 | c 2 | c1 | b 3 | | b 2 | b1 | a 4 | a 3 | a 2 | a1 |
|  |  | x | x | x | |  | x |  |  | |  |  |  | x |  | x | Soil and its components (solid, liquid and gaseous) |
|  | x | x | x |  | |  | x | x | x | | x | x |  |  | x | x | Practical Demonstration on plant nutrition |
| x |  |  | x | x | | x |  |  |  | | x | x |  | x |  |  | Plant Sample Collection. |
|  | x | x |  |  | |  | x |  | x | |  |  |  |  | x |  | Practical observation of healthy plants and specimen gallery. |
| x |  | x |  |  | | x | x |  |  | |  |  | x | x |  | x | Organic matter determination in soil. |
| x |  | x | x |  | |  |  |  |  | | x |  |  |  |  |  | Determination of contents of nutrients in plant tissues |
| x | x | x |  | x | |  | x | x |  | | x |  | x | x |  | x | Nutrient determination in Available and total forms in soil |
| x | x | x | x | x | | x |  | x | x | |  |  |  |  | x | x | Types of chemical salt fertilizers and nutrients involved |
| x | x | x | x |  | | x |  | x | x | |  |  |  |  | x | x | Compost and composting methods and techniques |
| x | x | x | x | x | | x |  | x | x | |  |  |  |  |  | x | Excursion visits to a near-by compost and biogas establishment |
| x | x | x | x |  | | x |  | x |  | | x |  | x | x | x | x | Components biofertilizers and their types. |
| x |  | x |  | x | | x |  |  |  | |  |  | x |  | x | x | Liquid fertilizers and spray application of nutrients. |
| x |  | x |  | x | |  |  |  | x | |  | x |  |  |  | x | Water and plant nutrition |
|  |  |  |  |  | | x | x | x | x | | x | x | x | x | x | x | General Revision |