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

**Course specifications**

**Programs on which the course is given:** Agricultural Biotechnology, Food safety and Agribusiness

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

**Department offering the programme:** General

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

**Academic Level/semester:** 3rd level/2nd Semester

**Date of specification approval: May 2014**

**A- Basic Information**

**Title:** Soil Biotechnology  **Code: SO 0503**

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

**B- Professional Information**

**1 – Overall aims of course**

Developing an in-depth understanding and knowledge on soil fertility and the capacity for crop yield .The course gives skills to evaluate the soil as a media in which bio-chemical and biological operations take place. Nutrient transformation and ion exchange and buffering capacity of soil are involved .Behavior of nutrients and contaminants in soils, kinds of soil conditioners and the mechanism of their reaction are also involved.

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

**a- Knowledge and understanding**:

a1- state soil fertility status

a2- define and categorize transformations taking place in soil.

a3.relate soil capability in crop production to soil health.

a.4.illustrate fertilizer use efficiency concerning fertilizer application.

**b- Intellectual skills**

b1- Select, an essential nutrient for extent of presence in soils

b2-compare macro with micro nutrients for plant growth.

b3-Solve problems involved in soil contamination.

**c- Professional and practical skills**

c1- judge and assess reports of soil and land suitability.

c2-Conclude soil status in view of relevant data.

c3- Select criteria for solving problems of non-fertile and contaminated soils

c4- Assess reports on land and soil from various viewpoints..

**d- General and transferable skills**

d1- Active participation within solve-problem panels.

d2- Use computer soft-ware in analysis processes

d3- Access to the Web-site on relevant subjects

d4- Solving problems by means of scientific methods.

**3- Contents:**

**Theoretical part :**

|  |  |  |
| --- | --- | --- |
| Lectures | Hours | Topic |
| 1 | 2 | Introduction to soil biotechnology |
| 1 | 2 | importance of soil technology |
|  |  | Soil chemical structure |
| 1 | 2 | Roles and functions of plant nutrients. |
| 1 | 2 | Symptoms of nutrient deficiency and their correction |
| 1 | 2 | Ion exchange and soil buffering . |
| 1 | 2 | Behavior of nutrients in soil |
| 1 | 2 | Contamination of soils |
| 1 | 2 | Soil conditioners as remediating agents |
| 1 | 2 | Soil humus and its essential role in cation exchange. |
| 1 | 2 | Soil bioactivity and behavior of biofertilizers. |
| 1 | 2 | Fertilization management for sustainable production |
| 1 | 2 | Overall Revision on soil biotechnology |
| 1 | 2 | Particular features for tropical and sub-tropical soils |
| 1 | 2 | Overall Revision on soil biotechnology |

**Practical part :**

|  |  |  |
| --- | --- | --- |
| **Sessions** | Hours | **Topic** |
| 1 | 2 | Soil texture and particle size distribution. |
| 1 | 2 | Insight of structure of soil minerals. |
| 1 | 2 | Soil Sample Collection. |
| 1 | 2 | Practical Determination of Soil Texture using Tex. Triangle |
| 1 | 2 | The three phases of soil and particular reference to the solid phase |
| 1 | 2 | Experimentation on soil moisture classes. |
| 1 | 2 | Determination of Available and Exchangeable Elements |
| 1 | 2 | Determination of Soil Salinity and Soluble Ions |
| 1 | 2 | Excursion to compost-making facilities in the region. |
| 1 | 2 | Specimens of nutrient deficiency symptoms. |
| 1 | 2 | Forms and classes of macro and micronutrient fertilizers. |
| 1 | 2 | Assessment soil fertility in view of relevant data of specific soils. |
| 1 | 2 | Examples of polluted and problem soils. |
| 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, understanding 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 Soil Science teaching staff.

6.2-Text books:

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

**Black, C.A. 1996.** Soil fertility evaluation and control. 2nd Ed. ,Lewis Publishers, London. UK.

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

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

**Course coordinators:Prof Dr Hythum S Salem.**

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

**Date: / /**

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| **Matrix for Soil Biotechnology course (Lecture Theoretical 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 | x | Introduction to soil biotechnology |
| x |  | x | x |  |  | x | x |  | | x | x | x | x |  | x | importance of soil technology |
|  |  | x | x | x |  | x |  | x | |  |  |  | x | x |  | Soil chemical structure |
| x |  | x | x |  | x | x |  |  | | x | x | x |  |  | x | Roles and functions of plant nutrients. |
|  |  | x | x |  | x | x |  |  | | x | x | x |  | x | x | Symptoms of nutrient deficiency and their correction |
|  | x | x |  | x | x |  | x |  | | x |  |  |  | x |  | Ion exchange and soil buffering . |
| x | x |  | x |  | x |  | x | x | | x |  | x |  | x | x | Behavior of nutrients in soil |
| x | x | x | x |  |  | x |  |  | |  |  |  | x |  |  | Contamination of soils |
| x | x | x | x |  | x | x | x | x | | x | x | x | x |  | x | Soil conditioners as remediating agents |
| x | x | x | x | x | x | x | x | x | | x | x |  | x | x | x | Soil humus and its essential role in cation exchange. |
| x | x |  | x | x | x |  | x |  | | x | x |  | x | x | x | Soil bioactivity and behavior of biofertilizers. |
| x | x | x | x |  | x | x | x |  | | x | x | x | x |  | x | Fertilization management for sustainable production |
|  | x | x |  | x |  | x | x | x | | x |  | x |  | x | x | Overall Revision on soil biotechnology |
| x | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | Particular features for tropical and sub-tropical soils |

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| **Matrix for Organo-biofertilization course (Practical 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 | x |  |  |  |  | x | x | Soil texture and particle size distribution. |
| x |  | x | x |  | x | x | x | x |  |  |  |  | x | x | Insight of structure of soil minerals. |
| x | x |  |  |  | x |  | x | x |  |  |  | x |  | x | Soil Sample Collection. |
|  |  | x | x |  | x | x |  | x |  |  |  |  | x |  | Practical Determination of Soil Texture using Tex. Triangle |
| x | x |  | x |  | x | x |  |  |  | x |  | x |  | x | The three phases of soil and particular reference to the solid phase |
|  | x |  | x | x |  |  | x |  | x |  |  | x |  | x | Experimentation on soil moisture classes. |
| x | x | x | x | x | x | x | x |  | x | x | x | x | x | x | Determination of Available and Exchangeable Elements |
|  | x | x |  |  | x |  | x |  |  |  |  |  |  | x | Determination of Soil Salinity and Soluble Ions |
|  |  |  | x |  |  |  | x | x |  |  |  |  |  | x | Excursion to compost-making facilities in the region. |
|  | x | x | x | x | x | x | x |  | x | x |  | x |  | x | Specimens of nutrient deficiency symptoms. |
| x |  | x | x |  | x | x | x |  | x | x | x |  |  | x | Forms and classes of macro and micronutrient fertilizers. |
| x | x | x | x | x | x |  | x |  | x | x | x |  | x | x | Assessment soil fertility in view of relevant data of specific soils. |
| x | x | x | x | x | x |  | x | x |  |  |  | x |  | x | Examples of polluted and problem soils. |
| x | x | x |  | x | x | x | x | x | x | x | x | x | x | x | General Revision |