



## Module Description/Course Syllabi

Study Programme : Magister of Soil Science  
Faculty of Agriculture  
Universitas Andalas

### 1. Course number and name

MIT 81207 Advanced Soil and Plant Analysis

### 2. Credits and contact hours/Number of ECTS credits allocated

3 sks (2-1)

### 3. Instructors and course coordinator

3. Prof. Dr. Ir. Yulnafatmawita, MSc; 2. Dr. Ir. Agustian; 3. Dr. Gusmini, SP, MP

### 4. Text book, title, outhor, and year

1. Chemical Analysis of *Soil, Plants*, Water and Fertilizers. Bogor: Agricultural Research and Development Agency of the Ministry of Agriculture. 211p.

Destina, Y. 2013. 2. BPMP Soil Physics. Department of Land, Faculty of Agriculture, Andalas University. Yulnafatmawita, 2013

3. Methods of Soil Anlyses Part 1. Physical and Mineralogical Methods. 2<sup>nd</sup> Edition ASA-SSSA Edited by A. Klute, 1986

4. Methods of Soil Anlyses Part 2. Chemical and Biological Analyses. ASA-SSSA Editedby A. Klute, 198

5. Yulnafatmawita dan Adrinal. 2014. PHYSICAL CHARACTERISTICS OFULTISOLS AND THE IMPACT ON SOIL LOSS DURING SOYBEAN (Glycine maxMerr) CULTIVATION IN WET TROPICAL AREA Agrivita J. A. S Vol. 36(1):57-64. <http://dx.doi.org/10.17503/Agrivita-2014-36-1-p057-064>

### 5. Specific course information

**A. Brief description of the content of the course (catalog description)**

This course will study, understand, and master theory in planning for taking (location, type, amount) of soil samples (physics, chemistry, and biology) and plant samples (leaves, stems, roots), preparing samples before analysis, carrying out analysis of soil and plants in the laboratory, data calculation and interpretation, as well as formulating recommendations for fertilization at certain locations for a plant

**B. Course Content**

**Week Course content**

- 1 The importance of soil and plant analyses to evaluate soil fertility
- 2 Soil sampling method: general principles for taking soil samples, types of soil samples, sampling preparation and storage
- 3 Methods of soil physical analyses:
  - 1) texture (qualitative and quantitative methods). Qualitative: using fingers at field
  - Quantitative methods: sieving and pipetting, Hydr. Bouyucous, etc at laboratory
- 4 2) Bulk density (BD) using gravimetric method
  - 3) Total soil pore : Calculation using BD ( $\rho_v$ ) and PD ( $\rho_s$ )
  - 4) Hydraulic conductivity (Constant Head Permeameter)
- 5 5) Aggregate stability index: using Dry & wet sieving; Valensky, dispersion methods
  - 6) Soil water potential: Pressure & Membrane Plate apparatus; filter paper methods
- 6 Methods of soil and plant chemical analyses:

Principles of soil and plant chemical analyses

  - 1). Soil pH : methods to measure soil pH, factors affecting soil pH
- 7 2). Soil organic matter: Organic-C and humic matter analyses 8 **Mid term exam**
- 9 3). Soil CEC, exchangeable cations (Ca, Mg, K, Na) analyses 4). Micro nutrients (Fe, Mn, Cu, Zn, B, Mo, Cl) : methods of analyses, factors affecting
- 10 5) N, P, S elements: forms in soils, methods for total-N,  $\text{NH}_4^+$ ,  $\text{NO}_3^-$  analyses.
  - 6) Total-P and available-P: methods of analyses

<p>7) Total-S and organic-S: methods of analyses</p> <p>11 Methods of soil biological analyses: principles, qualitative and quantitative methods</p> <p>12 1) Total microorganism population determination: bacteria, fungi, actinomycetes</p> <p>13 2) Population activity (respiration) measurement of microorganism : bacteria fixing nitrogen (BNF), fungi dissolving phosphate (PDF), bioremediation organism</p> <p>14 Plant tissue analyses: Principles, sampling techniques, sampling preparation, and methods of analyses</p> <p>15 Utilization of soil and plant analyses for fertilizer recommendation: data interpretation, analyses of plant nutrient need, determination of fertilizer recommendation.</p> <p>16 <b>Final Exam</b></p>
<b>C. Semester when the course unit is delivered</b>
Even semester
<b><i>D. Mode of delivery (face-to-face, distance learning)</i></b>
Face to face
<b>6. Intended Learning Outcomes (CPL)</b>
<p><b>ILO 3</b> : An ability to use technology in identifying and solving problems of soil, land resource, environment problems independently, eligibly, and accurately) <b>PI 1</b> : An ability to use technology to analyze soil</p> <p><b>PI 2</b> : An ability to work independently in determining soil properties</p> <p><b>PI 2</b> : An ability to analyze soil properties</p>

***7. Course Learning Outcomes (CPMK)***

*ex. The student will be able to explain the significance of current research about a particular topic.*

a. Students will be able to use program in analyzing soil data for land management

b. Students will be able to analyze soil independently either at laboratory or at field site

**8. Learning and teaching methods**

case Base Learning and Self Direct

**9. Language of instruction**

Bahasa Indonesia and English (English Class)

**10. Assessment methods and criteria**

**Summative Assessment :**

1. Tasks : 5%
2. Quiz : 5 %
3. Mid Semester : 25%
4. Final Semester : 25%
5. Praktikum :30%
6. Attendance : 5%

**Formative Assessment:**

1. Thumb up and thumb down
2. Minutes paper