



Module Description/Course Syllabi

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

1. Course number and name

MIT 82118 Advanced Soil Biology

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

3 sks (2-1)

3. Instructors and course coordinator

Dr. Ir. Agustian;

4. Text book, title, author, and year

1. Metting, F.B. Jr. 1993. Soil Microbial Ecology, Applications in Agricultural and Environmental Management
2. Paul, E.A and F.E Clark. 1996. Soil Microbiology and Biochemistry.
3. Sylvia, D.M. et.al. 1998. Principles and Applications of Soil Microbiology
4. Weaver, R.W. et al. 1994. Methods of Soil Analysis Part 2 (Microbiological and Biochemical Properties)
5. Bu'lock, J., and B. Kristiansen. 1987. Basic Biotechnology. Academic Press London.
6. Grainger, J.M., and J. M. Lynch. 1984. Microbiological Methods for Environmental Biotechnology. Academic Press Inc. London.
7. Johnson, L.F., E.A. Curl, H.H. Bond, H.A. Fribourg. 1959. Methods for Studying Soil Microflora-Plant Disease Relationships.
8. Articles published in research journals related to the subject / sub-topic of discussion

5. Specific course information

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

The role of the living bodies of the soil. Overview of the nature of the soil. Methods for measuring soil mass and activity. Carbon and nitrogen cycle. Efforts for maximizing biological N fixation. The role of mycorrhizae in nutrient absorption. P, Ca, S, Fe and Mn cycles related to microorganisms and nutrient uptake. High-quality composting process. Efforts to reduce the negative impact of pesticides on soil organisms. Prerequisites: General Microbiology, Fundamentals of Soil Science.

B. Course Content

Week Course Content

- 1 - The importance of Soil Biology in term of soil fertility for crop growth Reference 1,2,3
- 2 - The structure and function of organisms in the soil Reference 1,2,3
- 3- Eco-physiological factors affecting the activities and growth of soil biota Reference 1,2,3
- 4&5 - Methods and techniques in soil biology research Reference 1,2,3, 6 and 7
- 6 &7 - Decomposition of organic matter: toxic elements and utilization of Bioremediation Reference 1,2,3, 4 and 5
- 8 - The role of microbes in the humus formation process Reference 1,2,3, 4 and 5
- 9 The role of macro and microbiota in the decomposition of organic matter, the role of cellulolytic, lignolytic, and pectinolytic microbes Reference 1,2,3, 4 and 5
- 10 - Mechanism of production of phytohormones by microorganisms Reference 1,2,3, 4 and 5
- 11 - P solubilizing bacteria and fungi, Reference 1,2,3, 4 and 5
- 12 - The role of microbes in mutualistic symbiosis both between plant roots and bacteria as well as between plant roots and fungi Reference 1,2,3, 4 and 5
- 13 - Production of phytohormones and antibiotic substances as plant disease control substances Reference 1,2,3, 4 dan 5
- 14 - Role of soil microorganisms on environmental management (Bioremediation of pesticide contaminated, industry, and mining soils)
- 15&16 - **Assignment Presentation**

C. Semester when the course unit is delivered

Even Semester

D. Mode of delivery (face-to-face, distance learning)

Face to face

6. Intended Learning Outcomes (CPL)

ILO 1 : An ability to analyze and interpretate nature and characteristics of many soils indetermining the potency and the threat of the land and environment resources
PI 1 : An ability to identify soil properties

PI 2 : An ability to analyze soil properties

PI 3 : An ability to interpretate soil data

ILO 2 : An ability to classify soil, to evaluate land capability and suitability, as well as to determine the alternative utilization for sustainable agriculture and environment
PI 1 : An ability to classify soil properties

PI 2 : An ability to evaluate soil capability

ILO 3 : An ability to use technology in identifying and solving problems of soil, land resource, environment problems independently, eligibly, and accurately
PI 2 : An ability to work independently in determining soil properties

ILO 4 : ability to develop knowledge and professional carrier, as well as to be motivator in sustainable agriculture and development

PI 2 : An ability to do research and write the report

7. Course Learning Outcomes (CPMK) ex. The student will be able to explain the significance of current research about a particular topic.

1. Students will be able to identify properties of many soils

2. Students will be able to analyze properties of many soils

3. Students will be able to interpret data of many soils

4. Students will be able to use soil data to classify soils based on some methods of soil classification

5. Students will be able to use soil data to evaluate soil capability and land suitability

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

7. Students will be able to do research, analyze the data, and write scientific articles independently, eligibly, and accurately

8. Learning and teaching methods

Cooperative Learning and Project Base Method

9. Language of instruction

Bahasa Indonesia and English (English Class)

10. Assessment methods and criteria

Summative Assessment :

1. Assignment : 20 %

2. Mid Semester : 20%
3. Final Semester : 20%
4. Praktikum :20%

Process Assessment:

1. Interpersonal dimension skill : 5%
 2. Intrapersonal attributes softskill ; 5 %
- Dimensions of attitudes and values : 10%