MODULE HANDBOOK

SOIL SCIENCE STUDY PROGRAM
FACULTY OF AGRICULTURE
SRIWIJAYA UNIVERSITY

MODULE HANDBOOK

Module Designation	Mathematics
Code	PER 11516
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	Dr Ir Herlina Hanum, MSi and Mathematic Team Teaching
Language	Indonesian
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Workload (incl. Contact hours, self-study hours)	6 hours and 20 minutes of total workload: 100 minutes for Contact Study; 160 Minutes for practicum, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Explain the concept of the real number system; Solving operations on real numbers. 2. Distinguish between rational and irrational numbers; Understand and apply field characterisitic 3. Explain the concept of inequality; Finding the solution to a simple inequality, absolute value, square root and square 4. Draw quadrilateral coordinates and the given points 5. Determine the point of intersection of the curve on the coordinate axis; Drawing equation graph 6. Able to determine function value; Drawing function; Completing operations on functions 7. Understand and solve trigonometric function problems 8. Define Understanding the concept and limit theorem ; Determining the continuity of the function 9. Understand the meaning of derivative; Understand the relationship between limits and derivatives ; Determine the derivative of sinus and cosinus 10. Understand the concept of the chain rule; Solving the derivative of the composition function ; Write down the chain rule in the Leibniz way 11. Determine the maximum/minimum critical points of a function 12. Understand the concept of integrals and understand the rules for determining integrals 13. Understand the concept of replacement method;

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	Determine the integral function of the composition 14. Form a matrix with a certain ordo; Performing operations on matrices 15. Form a system of linear equations from the given case
Content	1. Real numeral system; Rational and irrational numbers; Operations on real numbers; Characteristif of Field 2. Inequality ; Absolute value; square root; square 3. Quadrilateral coordinate system, point distance, straight line, slope of line 4. The point of intersection of the curve; Draw an equation graph 5. Definition of function; Drawing function; Sum operation and multiplication, Composition of functions and trigonometric functions 6. Definition of limit; limit theorem; Continuity of function 7. Definition of derivative through limit; derivate search rules; derivate sinus dan cosinus 8. Leibniz Writing chain rule; High-level derivative 9. Maximum-minimum function; monotony; Concavity 10. Integral concept; Integral determination rule 11. Integral of composition function (Replacement method 12. Area of flat area 13. Ordo matrix ; Transpose, sumation, multiplication; Determinant ; ajoin, dan kofactor Invers matrix 14. System linear Of equations ; Form matrix from System linear of equations ; Solution System linear Of equations ; Notation sigma
Examination forms	1. Essays questions 2. Pratical works
Reading list	1.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Agricultural Chemistry**
Code	PAG 11115
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	Prof. Dr. Ir. Rujito Agus Suwignyo, M. Agr. Dr. Susilawati, S.P., M.Sc. Dr. Ir. Munandar, M.Agr. Dr. Ir. Mery Hasmeda, M. Sc. Fitra Gustiar, S.P., M.Si. Dr. Irmawati, S.P., M. Si., M. Sc Dr. Fikri Adriansyah, S. Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching Methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	8 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 180 minutes for laboratory practice, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits (2 credits theory and 1 practice)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. CP-STN8: Capable of internalizing academic values, norms and ethics Knowledge 1. CP-KIP1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources General Skill 1. CP-KBP1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise
Content	1. Introduction of agrochemical. 2. Atomic structure and electron configuration. 3. Chemical bond 4. Nutrients and types of fertilizers. 5. Structure and function of water. 6. Organic chemistry: nomenclature of organic

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	compounds & functional groups. 7. Acid, alkaline and salt. 8. pH, solution and indicator. 9. Structure and function of lipid and lipid acids. 10. Structure and function of carbohydrate and protein. 11. Concentration, ppm, %, molar concept, molarity, normality. 12. Hydroponic nutrient solution media and tissue culture. 13. Soil, nutrients and fertilization. 14. Pesticides and applications.
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1. Mido Y. and M. Satake. 1994. Chemistry for Agriculture and Ecology. Discovery Publishing House. 2. Timberlake, K.C. and W. Timberlake. 2014. Basic Chemistry. Pearson Education. 3. Roberts, T.R. 2000. Metabolism of Agrochemicals in Plants. John Willey and Sons. 4. Mansyur, N.I., E.H. Pudjiwati, A. Murtilaksono. 2021. Pupuk dan Pemupukan. Syiah Kuala University Press. 5. Anac, D., Matin-Prevel, P. 1999. Improved Crop Quality by Nutrient Management. Kluwer Academic Publishers. 6. Michael, F, Waxman. 1998. Agrochemical and Pesticide Safety Handbook. CRC Press. 7. Fageria, N.K. 2014. Nitrogen Management in Crop Production CRC Press. 8. Knowles, D.A. 1998. Chemistry and Technology of Agrochemical Formulations. Springer Dordrecht. 9. Prasad, M.N.V. 2020. Agrochemicals Detection, Treatment and Remediation. Elsevier. 10. Plimmer, J.R., Gammon, D., Nancy, N., Ragsdale. 2002. Encyclopedia of Agrochemicals. Wiley Online Library. 11. Cremlyn, R.J.W. 1991. Agrochemicals: Preparation and Mode of Action. Wiley; 2nd edition. 12. Goodwin., Mercer. 1988. Introduction to Plant Biochemistry. Pergamon Press. 13. Prasad, M.N.V., Strzalka, K. 2002. Physioloy and Biochemistry of Metal Toxicity and Tolerance in Plants. Kluwer Academic Publishers. 14. Khan, N.A. 2006. Ethylene Action in Plants. Springer.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Botany**
Code	PER 12116
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	Dr. Susilawati, S.P., M.Sc. Dr. Ir. Maria Fitriana, M. Sc. Dr. Ir. Marlina, M. Si. Ir. Teguh Achadi, M. P. Dr. Fikri Adriansyah, S. Si.
Language	Indonesian
Teaching methods	Contextual Learning, Cooperative learning, Project based Learning
Relation to curriculum	Compulsory Course
Workload (incl. Contact hours, self-study hours)	8 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 180 minutes for laboratory practice, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits (2 credits theory and 1 practice)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Capable of understanding, describing and explaining cell definition, developmental history and cell theory. 2. Capable of understanding, describing and explaining cell structure, organelles, and their functions. 3. Capable of understanding, describing and explaining mitosis and reproduction of plant cells. 4. Capable of understanding, describing and explaining relationships between cells and tissues. 5. Capable of understanding, describing and explaining functions of plant organs: leaves, stems, and roots. 6. Capable of understanding, describing and explaining formation, flower type and seed development. 7. Capable of understanding, describing and explaining history and principles of plant classification. 8. Capable of understanding, describing and explaining determination/identification and naming of plants. 9. Capable of understanding, describing and explaining flower organs and its functions.

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	10. Capable of understanding, describing and explaining fruit organs and its functions. 11. Capable of understanding, describing and explaining taxonomy and plant systematics. 12. Capable of understanding, describing and explaining plant nomenclature, plant identification and plant description.
Content	1. Introduction, Definition, history and theory of cells. 2. Structure, cell organela and function of plant cells. 3. Cell reproduction. 4. Relationships between cells and tissues. 5. Tissue according to the number of constituent cells, level of development and function. 6. Anatomy, morphology and function of leaves, stems. 7. Anatomy, morphology and function of roots. 8. Flower organ. 9. Fruit organ. 10. Taxonomy and plant systematics. 11. Plant nomenclature. 12. Plant identification. 13. Plant description.
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1. Elpel, T.J. 2013. Botany in a Day: The Patterns Method of Plant Identification. HOPS Press. 2. Mauseth, J.D. 1991. Botany: An Introduction to Plant Biology. Jones & Bartlett Learning. 3. Pollan, M. 2001. The Botany of Desire: A Plant's-Eye View of the World. Random House Trade Paperbacks. 4. Hodge, G. 2013. Practical Botany for Gardeners: Over 3,000 Botanical Terms Explained and Explored. University of Chicago Press. 5. Pollan, M. 2001. The Botany of Desire: A Plant's-Eye View of the World. Random House Publishing Group. 6. Wohlleben, P. 2015. The Hidden Life of Trees: What They Feel, How They Communicate – Discoveries from a Secret World. Greystone Books. 7. Erskine, W., Muehlbauer, F.J., Sarker, A., Sharma, B. 2009. The Lentil Botany, Producction and Uses. Icarda. 8. Heywood, V.H., Brummitt, R.K., Culham, A., Seberg, O. 1978. Flowering Plan Families of the World. Firefly Books.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Indonesian**
Code	UNI 10509
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	Dr. Zahra A., M.Pd. dan Indonesia Language Team Teaching
Language	Indonesian
Relation to curriculum	Compulsory Course
Type of teaching	Contextual Learning, Cooperative Learning, Case Based Learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	
Module objectives/intended learning outcomes	1. Able to explain the birth of Indonesia 2. Be able to explain the position, function, and legal force of the Indonesian language 3. Explain various academic texts; explain the characteristics of academic texts 4. Explain the structure of academic texts 5. Able to Use proper spelling and punctuation in academic texts 6. Able to Using effective sentences in academic texts 7. Understanding the essence of paragraphs; understand and use paragraph elements; understand and use paragraph types 8. Able to use quotes in writing 9. Able to use bibliography in writing 10. Understand the characteristics of an essay 11. Explain the structure of essay writing 12. Able to write essays 13. Able to present the resulting essay writing
Content	1. History of Indonesian Language Development 2. The position, function, and legal force of the Indonesian language 3. Characteristics of academic texts 4. Academic text structure 5. Spelling and punctuation in academic texts 6. The Nature of Effective Sentences; Characteristics of

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	Effective Sentences; Sentence Structure; Types of 7. The Nature of Paragraphs; Paragraph Forming Elements; Types of Paragraphs; Requirements for a Good Paragraph; Techniques and Patterns of Paragraph Development 8. Systematics of writing quotes 9. Systematics of writing a bibliography 10. Characteristics of an essay 11. Essay writing structure 12. Essay writing 13. Presentation of the resulting essay writing
Examination forms	1. Essays questions 2. Practical works 3. Oral presentation
Date of last amendment	30 June 2021

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Module Designation	**Pancasila**
Code	UNI 10509
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	Dr. Hudaidah, M.Pd and Pancasila Team Teaching
Language	Indonesian
Relation to curriculum	Compulsory Course
Type of teaching	Contextual Learning, Cooperative Learning, Case Based Learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Able to explain the concept and urgency of Pancasila education 2. Able to explain the dynamics and challenges of Pancasila education 3. Able to explain the concept and urgency of Pancasila in the current history of the Indonesian nation 4. Explaining the dynamics and challenges of Pancasila in the Study of the History of the Indonesian Nation 5. Able to explain the concept and urgency of Pancasila as the basis of the state 6. Able to Explaining the dynamics and challenges of Pancasila as the basis of the state 7. Able to explain the dynamics and challenges of Pancasila as the basis of the state 8. Able to explain the concept and urgency of Pancasila as a state ideology 9. Able to explain the dynamics and challenges of Pancasila as a state ideology 10. Explain the concept and urgency of Pancasila as a philosophical system 11. Explaining the dynamics and challenges of Pancasila as a philosophical system 12. Explain the concept and urgency of Pancasila as an ethical system

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	13. Explain the dynamics and challenges of Pancasilaas an ethical system 14. Explain the concept and urgency of Pancasila asthe basis for the value of developing science 15. Explaining the dynamics and challenges of Pancasila as the basis for the value of science development
Content	1. Explain the concept and urgency of Pancasila as a philosophical system 2. Explaining the dynamics and challenges of Pancasila as a philosophical system 3. Explain the concept and urgency of Pancasila as an ethical system 4. Explain the dynamics and challenges of Pancasila as an ethical system 5. Explain the concept and urgency of Pancasila as the basis for the value of developing science 6. Explaining the dynamics and challenges of Pancasila as the basis for the value of science development 7. Explain the concept and urgency of Pancasila as a philosophical system 8. Explaining the dynamics and challenges of Pancasila as a philosophical system 9. Explain the concept and urgency of Pancasila as an ethical system 10. Explain the dynamics and challenges of Pancasila as an ethical system 11. Explain the concept and urgency of Pancasila as the basis for the value of developing science 12. Explaining the dynamics and challenges of Pancasila as the basis for the value of science development
Examination forms	1. Essays questions 2. Pratical works
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Civic**
Code	UNI 10216
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	DR. LR Retno Susanti, M. Hum dan Team Teaching
Language	Indonesian
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Understand the important background, concepts, goals, vision, mission and foundation of Civic Education. 2. Able to describe the history of the formation of the Indonesian nation; able to formulate the characteristics of national identity; able to identify the factors causing the fading of national identity 3. Able to describe concepts, urgency, the nature of national integration and be able to identify the factors forming national integration 4. Have the ability to explain the meaning of the elements and goals of the State ; Definition, constitutional function; Outlining the constitution of the State of Indonesia; Explaining the amendment UUD 1945. 5. Able to understand the existing rules of the Indonesian constitution 6. Able to explain the obligations and rights of citizens 7. Able to analyze the rights and obligations of citizens in the life of society, nation and state 8. Able to explain the history of the growth and development of democratic ideas/thoughts; Able to analyze various influential variables in the development of democracy ; Analyze the foundation of democracy in Indonesia and describe the history of the development of democracy in Indonesia 9. Able to explain basic concepts/definitions *Rule of Law* and analyze problems *Rule of law*.

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	10. Able to explain the history of development HAM and describe various HAM as well as institutions HAM. 11. Able to explain the concept of geopolitics as a national insight 12. Describe the influence of regional and social aspects on existence and be able to analyze the problems of the archipelago's insight in facing the times 13. Able to explain the concept of Indonesian Geostrategy in the form of national resilience 14. Able to explain the background of the importance of national resilience and describe the main ideas and nature of national resilience in Pancasila and UUD 1945.
Content	1. Concept, Purpose, Vision, Mission and Background importance of Civid Education 2. National Identity 3. National Integration 4. The State and Constitution of Indonesia 5. The Constitution of Indonesia as a Nation-State 6. Rights and obligations of citizens 7. Indonesian Democracy 8. Law enforcement and HAM 9. Archipelago Insights/ Geopolitics. 10. Gestrategis Indonesia/ National Resilience
Examination forms	1. Essays questions 2. Pratical works 3. Oral presentation
Reading list	
Date of last amendment	28 April 2021

MODULE HANDBOOK

Module Designation	**PER 11209 Introduction to Agricultural Science**
Semester (s) in which the module is taught	1rd semester/1nd year
Person responsible for the module	1. Prof. Dr. Ir. Dedik Budianta, MS 2. Dr. Ir. A. Napoleon, MP 3. Dr. Ir, Warsito, MS 4. Dra. Dwi Probowati Sulistyani, MS
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain why agriculture is very important. 2. Students are able to explain the history and development of primitive to modern agriculture 3. Students are able to describe the role of agriculture on the development of civilization 4. Students are able to identify job opportunity in agricultural sector. 5. Students are able to appreciate people who have contributed their knowledge and skill to agriculture. 6. Students are aware about current issues on climate change related to agriculture 7. Students are aware about current issues on crisis of food and energy. 8. Students are able to explain the important of plant and crop in agricultural production 9. Students are able to explain the important of animal in agricultural production 10. Student are aware of pest and disease as limiting factor in agriculture 11. Students are able to describe the important of soil and water in agriculture 12. Students are able to describe the important of plant materials and culture technique in agriculture

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	13. Students are able to describe harvest and post-harvest handling to minimize yield losses. 14. Students are able to explain how biotechnology contribute significantly to agriculture
Content (14 meetings)	1. Importance of agriculture for human being 2. History and development of agriculture in the world 3. Factors influencing crop production (Soil, water/irrigation, nutrient/fertilizer, pest control, seed) 4. Soil fertility influencing land for agriculture and land division in the world (wetland and dryland) 5. Irrigation system for agriculture 6. Nutrient cycling 7. Pest control succeeding crop yield 8. Quality seeds for agriculture 9. Climate change threaten sustainable agriculture 10. Examination
Examination forms	1. Essays questions 2. Writing paper 3. Photographs collection on agricultural objects
Reading List	1. Erickson Cl. 1988. Raised field agriculture in the Lake Tricaca Basin: Putting Ancient Agriculture Back to Work. Expedition 30(3):8-16. 2. Guber, DL. The Grassroots of a Green Revolution: Polling America on the Environment. The MIT Press, Cambridge, England. 3. Cowan, CW and Watson, PJ. 2006. The Origin of Agriculture; An International Perspective. The University of Alabama Press, Tuscaloosa. 4. Horne, JE and McDermot, M. 2001 The Next Green Revolution; Essential Step to a Healthy Sustainable Agriculture. Food Products Press, New York. 5. Peng S., Incram KT, Neue HU and Ziska LH. 1995. Climate Change and Rice. Springer, Singapore. 6. Mulongoy, K anad R. Merckx. 1993. Soil organic matter dynamics and sustainable of tropical agriculture. KU. Leuven. Belgium
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Religion**
Code	UNI 10116
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	Dr. Nurhasan, M. Ag dan Religion Team Teaching
Language	Indonesian
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Describe, explain about the introduction of Islamic Religious Education 2. Explain the meaning, the philosophy of divinity in Islam, the history of human thought about God, God according to religion 3. Explain the meaning, the philosophy of divinity in Islam, the history of human thought about God, God according to religion 4. Describe and explain the implementation of Faith and Taqwa, Explaining Problems, challenges and risks in modern life the role of Faith and Taqwa in Answering the Challenges of Modern Life 5. Describe, explain about humans according to Islam 6. Describe, explain the concept of Law, HAM, and Democracy in Islam 7. Describe, explain the concept of Islamic law, the Contribution of Muslims in Indonesia 8. Describe, explain how to apply al-Karimah's morals in everyday life 9. Describe, explain the concept of science and technology and art in Islam 10. Describe, explain the concept of religious harmony 11. Describe, explain the concept of Civil Society 12. Describe, explain the concept of Islamic Economics 13. Describe, explain the concept of Islamic politics
Content	1. Introduction to Religious education 2. The Concept of God in Islam

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	3. The concept of faith and piety 4. Implementation of Faith and Taqwa in modern life 5. Human nature according to Islam 6. Law, HAM, and Democracy in Islam 7. Islamic Law, Contribution of Muslims in Indonesia 8. Moral and Moral Ethics 9. Science and technology and art in Islam 10. Inter-religious harmony 11. Civil Society 12. Islamic Economics 13. The concept of Islamic culture 14. Islamic political concept
Examination forms	1. Essays questions 2. Pratical works
Reading list	1.
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**PTN 10215 Introduction to Environmental Science**
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	Sabaruddin, Ph.D. Dr. Agus Hermawan
Language	Indonesian
Relation to curriculum	Optional Course
Teaching methods	Contextual Learning, Case-based Course
Workload (incl. Contact hours, self-study hours)	100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Capable of understanding, describing and explaining basic concept, and scope of Environmental Science and Environmental Sustainability 2. Capable of understanding, describing and explaining Environmental Concern Timeline 3. Capable of understanding, describing and explaining Ecosystems as Units of Sustainability. 4. Capable of understanding, describing and explaining Population Growth: Causes and Impacts. 5. Capable of understanding, describing and explaining the basic of climate change issues 6. Capable of understanding, describing and explaining to Environmental Ethics 7. Capable of understanding, describing and explaining Water, Water Cycle, and Water Management 8. Capable of understanding, describing and explaining Pollution and Hazardous Chemicals 9. Capable of understanding, describing and explaining Air Pollution and Atmospheric Change 10. Capable of understanding, describing and explaining Soil Erosion and Its Impact (Sedimentation and Eutrophication) 11. Capable of understanding, describing and explaining The Use of Pesticides and Their Residual Impacts 12. Capable of understanding, describing and explaining EIA and Strategic Environmental Assessment

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Content	1. Introduction: Course Description and Evaluation; Environmental Science and Environmental Sustainability 2. Environmental Concern Timeline: Global and National The world's and Indonesia's footprint in protecting the environment 3. Ecosystems as Units of Sustainability. 1. What is an ecosystem, 2. Ecosystem structure, 3. Why are ecosystems differents among regions and what are the impacts on humans? 4. Population Growth: Causes and Impacts. 1. Population Growth and its Causes, 2. Environmental and Social Impacts of Population Growth, 5. Introduction to Climate Change Issues: What is Climate Change, Causes of Climate Change, Impact of Climate Change, 6. Introduction to Environmental Ethics: Definition of Ethics, Morals, Ethic and Etiquette; Theories on Ethics, 7. Water, Water Cycle, and Water Management; Water Cycle, Human Impacts on the Water Cycle, Freshwater Sources and Utilization, Water Overdrawing, Getting More Water (Less use of water, and Utilization of sea/salt water/desalting). 8. Pollution and Hazardous Chemicals; Hazards and Potential of Waste, Waste Recycling Constraints, Chemical Properties (HAZMATS), Waste Management to Avoid Pollution. 9. Air Pollution and Atmospheric Change; Introduction to Atmospheric and Air Pollution;Air Pollutants and Their Impacts; Sources of Pollutants; Indoor Air Pollution; Air Pollution Control; Depletion of the ozone layer. 10. Soil Erosion and Its Impact (Sedimentation and Eutrophication); Eutrophication Process; Long Term Strategy to Overcome Eutrophication 11. The Use of Pesticides and Their Residual Impacts; Why Do we need pest control? Benefits and Problems of Chemicals Applications; Alternative Methods of Pest Management; Socio-economic Issues of Pest Management. 12. EIA and Strategic Environmental Assessment; What are EIA and Strategic Environmental Assessment; Why EIA and Strategic Environmental Assessment

	are important; How EIA and Strategic Environmental Assessment are carried out.
Examination forms	1. Examination (Essays), 2. Group Assignment.
Reading List	1. Nebel, B.J. and R.T. Wright. 1998. Environmental Science. 6th Edition. Prentice Hall. 2. Pierzynski, G.M., J.T. Sims, and G.F. Vance. 2005. Soils and 3. Environemntal Quality. 3rd Edition. Taylor & Francis. 4. Secretariat of the Convention on Biological Biodiversity. 2001. Global Biodiversity Outlook. CBD, Montreal, Canada 5. Keraf, A.S. 2002. Etika Lingkungan. Penerbit Buku Kompas. 6. Salim, E. 2010. Ratusan Bangsa Merusak Satu Bumi. Penerbit Buku Kompas. 7. Neolaka, A. 2008. Kesadaran Lingkungan. Penerbit Bineka Cipta 8. Murdiyarso, D. 2003. CDM: Mekanisme Pembangunan Bersih. Penerbit Buku Kompas
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**English**
Code	UNI 10416
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the modul	
Language	Indonesian and English
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students understand and ready to participate in the building of academic atmosphere in the campus 2. Students are able to express their feeling and idea verbally in English 3. Students are able to tell story about their experience related to agriculture 4. Students are able to catch information and knowledge from reading materials related to agriculture 5. Students are able to catch knowledge from reading materials related to plant pest and disease 6. Students are able to understand the content of video on agriculture and make written summary. 7. Students are able to understand the content of video on plant pest and disease and make written summary 8. Students are able to search literatures or articles which are related to agriculture from Internet 9. Students are able to write academic material with emphasis on grammatical aspect. 10. Students are able to write academic material with emphasis on vocabulary aspect. 11. Students are able to listen to audio material and write summary I. 12. Students are able to listen to audio material and write summary II.

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	13. Students are able to present academic material summarized from scientific articles I 14. Students are able to present academic material summarized from scientific articles II.
Content	1. Building conducive atmosphere academic 2. Speaking on agricultural aspects, free topic based on experience 3. Speaking on agricultural aspects, talk about personal experience related to agriculture 4. Reading and summarizing agricultural article related to agriculture 5. Reading and summarizing agricultural article related to plant disease 6. Watching and summarizing the content of video on agriculture. 7. Watching and summarizing the content of video on plant pests and diseases 8. Searching literatures or articles which are related to agriculture from internet. 9. Academic writing tutorial with emphasis on grammatical aspect. 10. Academic writing tutorial with emphasis on vocabulary aspect. 11. Academic listening tutorial: Listening and summarizing audio material I 12. Academic listening tutorial: Listening and summarizing audio material II 13. Academic speaking tutorial: presentation academic material summarized from scientific articles I 14. Academic speaking tutorial: presentation academic material summarized from scientific articles II
Examination forms	1. Essays questions 2. Pratical works
Reading list	1. Eastwood J..2002. Oxford guide to English grammar. Oxford University Press, Oxford. 2. Murphy, R. 2019. English Grammar in Use. Fifth Edition.Cambridge University Press, Cambridge. 3. Spears, RA.2005. Dictionary of American Idioms and Phrasal Verbs. McGraw-Hills, New York. 4. Zemach, DE and Rumisek LA. 2005. Academic writing: from paragraph to essay.Macmillan, Spain.
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**Introduction to Agriculture Economics**
Code	ABI 11216
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	Prof. Dr. Ir. Andy Mulyana, M.Si Dr. Agustina Bidarti, S.P., M.Si Dr. Erni Purbiyanti, S.P., M.Si. Eka Mulyana, S.P., M.Si
Language	Indonesian
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Workload (incl. Contact hours, self-study hours)	170 minutes x 3 credits = 6 hours and 20 minutes of total load, with details: 100 minutes of lectures; 160 minutes of assistance; 120 minutes of structured tasks and 120 minutes of group work.
Credit points	3 credits (2 credits theory and 1 practice)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	**STN5 :** Respecting the diversity of cultures, views, beliefs, and religions and the original opinions/findings of others **KIP 1:** Students able to understand the latest issues in the field of agribusiness both at the basic level and at the advanced level **KIP 2 :** Students able to understand knowledge and technology in the field of agribusiness including the development of professional practices through research studies to produce innovative work in the field of agribusiness tested **KIP 3 :** Students able to understand the fields of economics, management, business, entrepreneurship, institutional, sociology, extension and communication, as well as agricultural sciences for the development of sustainable agribusiness operating systems. **KBP 1:** Able to plan, implement and evaluate the allocation of natural, human, capital, and social resources to improve the operating efficiency of the agribusiness system, as well as being able to operate and develop innovative, accountable agribusiness business units, create added value by

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	prioritizing socio-economic principles of agriculture and quantitative and qualitative approaches to realize sustainable and efficient agribusiness to realize sustainable agribusiness and efficient.
Content	1. Indonesian Agricultural Economy 2. Agricultural Economic Problems 3. Institutional Factors of Agricultural Economic 4. Economic Principles in Agriculture 5. Soil in Agricultural Production 6. Modules in Agricultural Production 7. Labor in Agricultural Production 8. Demand and Supply of Agricultural Products 9. Agricultural Trad 10. Markets and Trade Policy 11. Trade Issues 12. Agricultural Development Theories 13. The Government's Role in Agricultural Development 14. Agricultural Economics Research
Examination forms	1. Essays questions 2. Writing Project Paper 3. Oral presentation
Reading list	1. Frank, R.H., Bernanke ,B.S. 2007. Principles of Macro Economis. McGraw- Hill. 2. Rita, H. 2020. Pengantar Ekonomi Pertanian. Penerbit Andi, Jakarta. 3. Yosi et al. 2012. Pengantar Ekonomi Pertanian. ITB Press. 4. Sharma, L. 2021. Principles of Agricultural Economics. Agrotech Publishing Academy. 5. Rosyidi, S. 1996. Pengantar Teori Ekonomi (Pendekatan Kepada Teori Ekonomi Mikro dan Makro).PT. Raja Grafindo Persada. 6. Husnan, S dan Suwarsono. 1994. Studi Kelayakan Proyek (Edisi ketiga). UPP AMP YKPN. 7. Gittenger, J/P/ 1986. Analisis Ekonomi Proyek-ptoyek Pertanian (Edisi kedua). UI-Press. 8. Kadariah, L. Karlina dan C Gray. 1999. Pengantar Evaluasi Proyek (Edisi Revisi). LPFE Universitas Indoensia. 9. Gray, C., Simanjuntak, P., Sabur, L.K., Maspaitell, R.C.G. Varley. 2005. Pengantar Evaluasi Proyek (edisi kedua). PT Gramedia Pustaka Utama
Date of last amendment	21 December 2021

MODULE HANDBOOK

Module Designation	Fundamentals of Management
Semester (s) in which the module is taught	1th semester/1nd year
Person responsible for the module	Ir. Fauzia Asyiek, M.A.,Ph.D Dr. Ir. Idham Alamsyah, M.Si Dr.Ir. Amruzi Minha, M.Si Ir. Yulius, MM Dwi Wulan Sari, S.P.,M.Si.,Ph.D Henny Malini,S.P.,M.Si Erni Purbiyanti, S.P.,M.Si Muhammad Arby, M.Si Thirtawati, S.P.,M.Si Elly Rosana, S.P.,M.Si
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative Learning, Case Based Learning
Workload (incl. Contact hours, self-study hours)	170 minutes x 2 credits = 5 hours and 6 minutes of total load, with details: 100 minutes of lectures; 100 minutes of assistance; 100 minutes of structured tasks and 46 minutes of group work.
Credit points	2 (2-0) credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	**1. Atitude** CP-STN 2 : Students have good morals, ethics and personality in completing their duties CP-STN 4: Studets able to work together and have high social sensitivity and concern for society and the environment. CP-STN 8: Students able to internalize the entrepreneurial spirit **2. Ability of the Field of Science** CP-KIP 3: Students able to understand the fields of economics, management, business, entrepreneurship, institutional, sociology, counseling and communication, as well as agricultural sciences for the development of sustainable agribusiness operating systems.
	3.Skill CP-KBP 6 : Students able to use methods and

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	formulate strategies for the use of resources to increase the capacity of themselves and the community in facing the challenges of agribusiness development in the future. CP-KBP 7 : Able to communicate business policy and agribusiness management for the benefit of empowering farmers. CP-KBP 11 : Able to manage and develop agribusiness businesses by implementing a management system that ensures quality output
Content	1. Introduction, and Development of Figures of Management 2. Planning Function 3. Organization Function 4. Deparmentation 5. Staff and Committee 6. Delegation 7. Acquiring Employees 8. Advancing Employees 9. Utilizing Employees 10. Dismissing Employees 11. Giving Ordes Function 12. Supervision Function 13. Human Resource Management 14. Presentation Of The Company's Case Review
Examination forms	1. Essays questions 2. Writing Case Paper 3. Oral presentation
Reading List	1. Hasibuan, Malayu. 2001. Management: Basics, Understanding and Problems. Earth Characters. Jakarta Manulang. 1998. 2. Management Basic. Ghalia Indonesia. Jakarta. 3. Rae, Leslie. 1993. 50 Activities to Develop Management Skills. Volume 1. Scripting. Jakarta. 4. Stoner, James. 2001. Management Volumes 1 and 2. Erlngga. Jakarta. Williams, Teresa. 1993. 50 Activities to Develop Management Skills. Volume 2. Scripting. Jakarta. Zandstra, 5. Jack. 1993. 50 Activities to Develop Management Skills. Volume 3. Scripting. Jakarta
Date of last amendment	28 April 2021

MODULE HANDBOOK

Module Designation	**Rural Sociology**
Semester (s) in which the module is taught	2nd semester/1nd year
Person responsible for the module	Ir. Fauzia Asyiek, M.A.,Ph.D Ir. Yulian Junaidi, M.Si Dr. Riswani, S.P., M,Si Dr. Yunita, S.P.,M.Si Dr. Agustina Bidarti, S.P.,M.Si Henny Malini,S.P.,M.Si Elly Rosana, S.P.,M.Si Eka Mulayana, S.P.,M.Si Indri Januarti, S.P., M.Si
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning,Case based Learning
Workload (incl. Contact hours, self-study hours)	Lectures = 1400 Practicum = 2040 Structured assignment =1440 Self-study = 1440 Exam = 220 Total : 6540 minutes = 109 hours = 4.36 ects
Credit points	3 (2-1) credits
Required and recommended prerequisite for joining the module	-
Module objectives/ intended learning outcomes	**1. Atitude** CP-STN 4: Able to work together and have high social sensitivity and concern for society and the environment. CP-STN 5: Able to manage and develop agribusiness businesses by implementing a management system that values cultural diversity, views, beliefs, and religions and the original opinions / findings of others **2. Ability of the Field of Science** CP-KIP 3: Able to understand the fields of economics, management, business, entrepreneurship, institutional, sociology, counseling and communication, as well as agricultural sciences for the development of sustainable agribusiness operating systems. **3.Skill**

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	CP-KBP 5 : Able to communicate and negotiate effectively with rural community stakeholders and in the development of agribinic operating systems by utilizing information technology in the field of agribusiness, to realize sustainable and efficient agribusiness CP-KBP 8 : Able to communicate and negotiate effectively with rural community stakeholders and in the development of agribisnist operating systems by utilizing information technology in the field of agribusiness, to realize agribusiness Able to motivate and empower the community in the field of agribusiness business development to improve the welfare of rural communities
Content	1. Understanding Rural Sociology 2. Social Interaction 3. Social Groups 4. Rural Social Institutions 5. Social System 6. Social Structure 7. Culture 8. Social Problems 9. Social Stratification 10. Social Change 11. Social Change in the Countryside 12. Village Development 13. Social Mobility 14. Modernization
Examination forms	1. Quiz (essay) 2. Doing practical works (report) 3. Structured assignment (essay and paper) 4. Midterm exam (essay) 5. Final exam (essay)

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Reading List	1. Cohen, Bruce J.; Simamora, Sahat, translator (Bina Aksara, 1983) Sociology an Introduction, Publisher Rineka Cipta. 2. Rahardjo.1999. Introduction to Rural Sociology and Agriculture. Yogyakarta: Gajah Mada University Press. 3. Soerjono Soekanto, 1985, Sociology of an Introduction, Jakarta: Rajawali Press. 4. Soekanto, Soejono. 2010. Sociology an Introduction. Jakarta: Raja Grafindo Persada. 5. Sugihen. 1996. Rural Sociology An Introduction. Jakarta: PT Raja Grafindo Persada.
Date of last amendment	21 December 2021

MODULE HANDBOOK

Module Designation	PTN 10115 **Introduction to Soil Science**
Semester (s) in which the module is taught	2&3rd semester/1&2nd year
Person responsible for the module	1. Prof. Dr. Ir. Dedik Budianta, MS 2. Dr. Ir. Warsito, MS 3. Dra. Dwi Probowati Sulistyani, MS 4. Ir, Marsi, MSc, PhD 5. Dr. Ir. Satria Jaya Priatna, MS 6. Dr. Ir. A. Napoleon, MP 7. Dr. Ir. Dwi Setyawan, MSc 8. Dr. Ir. Bambang Prayitno, MSc 9. Dr. Ir. Agus Hermawan, MS 10. Dr. Ir. Bakri, MS 11. Prof. Dr. Ir. Edi Armanto, MS 12. Prof. Dr. Ir. Nuni Gofar, MS 13. Dr. Ir. Madjid Rohim, MS 14. Dr. Ir. Momon Imanuddin, MS 15. Ir. Sabarudin, MSc. PhD 16. Ir. Siti Nurul Aidil Fitri, MS
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	8 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 180 minutes for laboratory practice, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits (2 credits theory and 1 practice)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain why soil is very important for agriculture. 2. Students are able to explain the definition and the soil genesis 3. Students are able to describe the factors soil forming and soil phases 4. Students are able to explain the soil components related to agriculture 5. Students are able to explain the soil (soil acidity, soil alkalinity, CEC, SOM, soil liming) 6. Students are able to explain the soil physics

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	(soil texture, soil structure, soil pores, soil bulk density, soil specific density, soil moisture). 7. Students are able to explain the soil biology (soil fauna and soil flora) 8. Students are knowing the soil distribution and soil classification in Indonesia.
Content (14 meetings) and two examinations	1. Introduction of soil for agriculture (definition, function, etc) 2. Soil genesis: factors affecting soil formation and soil phases 3. Soil morphology: factors affecting soil formation and soil phases 4. Soil components for agriculture 5. Soil chemistry (soil acidity, soil alkalinity, CEC) 6. Soil chemistry (SOM) 7. Soil chemistry (soil liming) 8. Soil physics (soil texture, soil structure, soil pores). 9. Soil physics (soil bulk density, soil specific density, soil moisture) 10. Soil biology (soil fauna and soil flora) 11. Soil development in Indonesia (Soil distribution and soil classification) 12. Examination
Examination forms	1. Essays questions 2. Writing paper 3. Photographs collection on agricultural objects
Reading List	1. Buckman, H.O. an N.C. Brady. 1982. Ilmu Tanah. Terjemahan Prof. Soegiman. Bhratara Karya Aksara Jakarta. 2. Huang, P.M., Li, Y. And Sumner, M.E. 2012. Handbook of Soil Sciences. Resource Management and Environmental Impacts. CRC Press. Taylor & Francis Group. New York.
Date of last amendment	21 December 2021

MODULE HANDBOOK

Module Designation	**PTN 12215 *Floating Agriculture***
Semester (s) in which the module is taught	2rd semester/1nd year
Person responsible for the module	1. Dr. Ir. Adipati Napoleon, M.P 2. Ir. Siti Nurul Aidil Fitri, M.Si
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	3 hours and 40 minutes of total workload: 50 minutes for Contact Study; 100 minutes for structured academic assignment and 100 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain the history of development and concept of floating farming system. 2. Students are able to explain the definition of floating farming system, types of floating farming and. Why do you need floating farming. 3. Students are able to explain the source/Material of floating raft, Types of floating raft, Stages of making a floating raft and Considerations and Uses of floating rafts. 4. Students are able to explain the growing media materials, Source of growing media, Types and properties of growing media and Use of growing media. 5. Students are able to explain the organic fertilizer ingredients, An organic fertilizer material and Types and properties of agricultural lime. 6. Understanding of organic and inorganic fertilizers 7. Understanding of organic fertilizer technology 8. Understanding of secondary macro fertilizers and micro fertilizers, Fe, Mn, Zn, Cu, B and Mo. 9. Understanding of compound fertilizer, Types of compound fertilizers, NPK ratio/grade in compound

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	fertilizers The role of nutrient evaluation. 10. Students are able to explain the soil test concept, Development of soil test, Correlation and calibration, Soil test method and soil sampling. 11. Students are able to explain the soil and plant characteristics, Plant tissue analysis methods, Plant parts analyzed and Treating plant tissue to beanalyzed. 12. Students are able to explain the general recommendations for fertilizing and liming Fertilizer and lime recommendations based on location Concept 5 is appropriate for applying fertilizer. 13. Students are able to explain the economic calculations and efficiency of fertilizer and lime application, Fertilizer procurement options, Advantages of using fertilizers and Fertilizer application efficiency
Content	1. Introduction and history of development and concept of floating farming system. 2. Definition of floating farming system, types of floating farming and. Why do you need floating farming. 3. Source/Material of floating raft, Types of floating raft, Stages of making a floating raft and Considerations and Uses of floating rafts. 4. Growing media materials, Source of growing media, Types and properties of growing media and Use of growing media. 5. Organic fertilizer ingredients, An organic fertilizer material and Types and properties of agricultural lime. 6. Understanding of organic and inorganic fertilizers 7. Understanding of organic fertilizer technology 8. Understanding of secondary macro fertilizers Calcium, Magnesium, Sulfur. 9. Understanding of micro fertilizers, Fe, Mn, Zn, Cu, B and Mo. 10. compound fertilizer, Types of compound fertilizers, NPK ratio/grade in compound fertilizers The role of nutrient evaluation. 11. Soil test concept, Development of soil test, Correlation and calibration, Soil test method and soil sampling.

	12. Soil and plant characteristics, Plant tissue analysis methods, Plant parts analyzed and Treating plant tissue to beanalyzed. 13. General recommendations for fertilizing and liming Fertilizer and lime recommendations based on location Concept 5 is appropriate for applying fertilizer. 14. Economic calculations and efficiency of fertilizer and lime application, Fertilizer procurement options, Advantages of using fertilizers and Fertilizer application efficiency
Examination forms	1. Essays questions 2. Writing paper 3. Oral Presentation
Reading List	1. Bernas, SM., Napoleon, A dan Fitri, SNA. 2019. Budidaya Tanaman Padi dan Hortikultura Secara Terapung. Unsri Prerss Palembang. 2. Hanafiah AK. 2016. Dasar-Dasar Ilmu Tanah. 3. Jones, J.B. 2012. Plant Nutrition and Soil Fertility Manual. 2nd Ed. CRC Press. Depok: Raja Grafindo Persada.
Date of last amendment	21 December 2021

MODULE HANDBOOK

Module Designation	Agricultural Extension
Semester (s) in which the module is taught	4rd semester/2nd year
Person responsible for the module	Dr. Yunita, S.P., M.Si Dr. Riswani, S.P., M.Si Prof. Dr. Ir. Sriati, M.S. Ir. Fauzia Asyik, M.A., PhD Henny Malini, S.P.,M.Si
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning, Cased Based Learning
Workload (incl. Contact hours, self-study hours)	170 minutes x 3 credits = 6 hours and 20 minutes of total load, with details: 100 minutes of lectures; 160 minutes of assistance; 120 minutes of structured tasks and 120 minutes of group work.
Credit points	3 (2-1) credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	**1. Attitude** STN 6 : Upholding law enforcement and having the spirit to put the interests of the nation and the wider community first. KIP 4 : Able to understand operationally the social, economic and technological principles that underlie the management of agricultural businesses and the agricultural industry and socio-cultural aspects in the countryside for decision making and problem solving in the field of agribusiness **2. Skills** **KBP 5 :** Able to communicate and negotiate effectively with stakeholders in the development of agribusiness operating systems by utilizing information technology in the field of agribusiness, to realize sustainable and efficient agribusiness 3. **Competency** **KBP 7 :** Able to communicate business policy and agribusiness management for farmer empowerment

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	KBP 8 : Able to motivate and empower the community in the field of agribusiness business development to improve community welfare
Content	1. Definition, and Scope of Agricultural Extension 2. Philosophy and Goals of Agricultural Extension 3. Agricultural Extension Method 4. Classification of Agricultural Extension Methods 5. Presentation of Materials and Group Discussion 6. Agricultural Extension Media 7. Agricultural Extension Materials 8. Agricultural Extension Institutions 9. Diffusion of Agricultural Innovation 10. Presentation of Materials and Group Discussion 11. Preparation of Agricultural Extension Planning 12. Revitalization of Agricultural Extension 13. Arrangement of Agricultural Extension System 14. Agricultural Extension in the Digital Age
Examination forms	1. Essays questions 2. Writing Project Paper 3. Oral presentation
Reading List	1. Van den Ban, A.W. and H. S Hawkins. 1999. Agricultural Extension. Kanisius, Yogyakarta. 2. Roger, E.M and F.F. Shoemaker.1971. Diffusion of Innovation. New York: Free Press. 3. Cees Leeuwis, 2010. Communication for Rural Innovation. Rethinking Agricultural Extension. Kasinius, Yogyakarta. 4. Nataliningsih. 2018. Participatory Counseling for Women Farmers Groups. C.V. Alphabet. Bandung. 5. Mardikanto, Totok. 2009. Agricultural Extension System. LPP and UPT Publishing and Printing. UNS.
Date of last amendment	23 November 2021

MODULE HANDBOOK

Module Designation	**Principles of plant protection**
Code	PPT 21116
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	Dr. Ir. Suparman SHK Prof. Dr. Ir. Siti Herlinda, M. Si. Ir. Bambang Gunawan, M. Si. Arsih, S. P., M. Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	Lectures = 1400 minutes Practicum = 1700 minutes Structured assignment = 1440 minutesSelf-study = 1440 minutes Exam = 220 minutes Total: 6200 minutes = 103.33 hours = 4,13 ECTS
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to accurately explain about scope of crop protection and able to recognize pests and damages they cause on crops. 2. Students are able identify mite and mice as crop pest and able to describe their biology, behavior, impact on crop, and control. 3. Students are able to identify pig, bird, and snailas pest of crops and able to describe their biology, behavior, impact on crop, and control. 4. Students are able to explain how to control insects using and biological control techniques. 5. Students are able to explain how to control insects by using resistant variety, and applyingphysical and mechanical control techniques. 6. Students are able to explain how to control insects by implementing plant quarantine, andhow to apply pesticide appropriately 7. Students are able to explain how to prepare and apply sterile male to control insect and adle to describe integrated pest management. 8. Students are able to describe the disturbance caused by microorganisms on crops and its impact on yield losses. 9. Students are able to describe various disease

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	symptoms caused by various pathogens 10. Students are able to describe general characteristics of plant pathogenic fungi, including their interaction with their host. 11. Students are able to describe general characteristics of plant pathogenic bacteria, including their interaction with their host. 12. Students are able to describe general characteristics of plant pathogenic viruses and nematodes, and their interaction with plant. 13. Students are able to explain how to control plant pathogens using exclusion, eradication physical and cultural techniques. 14. Students are able to explain how to apply pesticide correctly, effectively, efficiently, safelyand environmentally friendly.
Content	1. Scope of crop protection; insect as crop pest andthe impact of their attack to crops 2. Mite and mice as crop pest and the impact of their attack to crops 3. Wild pig, bird and snail as crop pest and the impact of their attack to crops 4. Cultural and biological techniques 5. Resistant variety, physical control and mechanical control techniques. 6. Plant quarantine and chemical control technique. 7. The use of sterile male and Integrated Pest Management. 8. Introducing plant disease: how pathogen cause disease on plants. 9. Plant disease symptoms 10. Fungi as plant pathogen 11. Bactria as plant pathogen 12. Virus and nematode as plant pathogen 13. Exclusion, eradication, physical and cultural techniques. 14. Chemical control of plant diseases

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Examination forms	1. Quiz (essay) 2. Doing practical works (report) 3. Structured assignment (essay and paper) 4. Midterm exam (essay) 5. Final exam (essay)
Reading list	1. Chandrasekaran B, Annadurai K and Somasundaram. 2010. A Textbook of Agronomy. New Age International Publishers New Delhi. 2. Pareek A, Sopory SK, Bohnert HJ, and Govindjee. 2010. Abiotic Stress in Plants. Springer, Dordrecht, Nederland. 3. Kethan SK. 2001. Microbial Pest Control. Markel Dekker, Inc. New York. 4. Levine MJ.2007. Pesticides; A toxic time bomb in our midst. Praeger, London. 5. Agrios GN. 2005. Plant Pathology 5th Ed. Elsevier Academic Press, New York. 6. Ebbels DL. 2003. Principles of Plant Health and Quarantine. CABI Publishing, Cambridge.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Fundamentals of Agronomy**
Code	PAG 202116
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	Dr. Ir. Yakup, M. S. Dr. Ir. Firdaus Sulaiman, M.Si. Dr. Ir. Zaidan Panji Negara, M.Sc. Fitra Gustiar, S.P., M.Si.
Language	Indonesian
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Workload (incl. Contact hours, self-study hours)	6 hours and 20 minutes of total workload: 100 minutes for Contact Study; 160 Minutes for practicum, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Capable of understanding, describing and explaining basic definition and scopes of agronomy. 2. Capable of understanding, describing and explaining the development of agricultural and the role of agronomy. 3. Capable of understanding, describing and explaining areas of origin and centers of crop production especially in Indonesia. 4. Capable of grouping the potential agronomic crops for certain agroecosystems. 5. Capable of understanding, describing and explaining the plant growth and development. 6. Capable of understanding, describing and explaining the effect of abiotic factors on plant growth and development and capable of providing solutions for each abiotic problems. 7. Capable of understanding, describing and explaining the effect of biotic factors on plant growth and development and capable of providing solutions for each biotic problems. 8. Capable of understanding, describing and explaining grouping and roles of growth regulator substances (GRS), enzymes, and vitamins. 9. Capable of understanding, describing and explaining

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	the roles and procedure of plant breeding. 10. Capable of understanding, describing and explaining the process of plant propagation (sexual and asexual), and tissue culture. 11. Capable of understanding, describing and explaining the preparation of dry land, swamp land, and micro land especially in Indonesia. 12. Capable of understanding, describing and explaining the process of nurseries, seeding, and planting. 13. Capable of understanding, describing and explaining the cropping patterns and crop diversification especially in Indonesia. 14. Capable of understanding, describing and explaining the agricultural intensification, and agricultural extensification. 15. Capable of describing, explaining and providing sustainability of land resources/conservation, and utilization of agricultural waste. 16. Capable of understanding, describing and explaining the agricultural production facilities.
Content	1. Basic definitions and scopes of agronomy. 2. Agricultural development and the role of agronomy. 3. Areas of origin and centers of crop production. 4. Agronomic plant grouping and examples 5. Plant growth and development 6. Effect of abiotic factors on plant growth and development 7. Effect of biotic factors on plant growth and development 8. Grouping and roles of growth regulator substances (GRS), enzymes, and vitamins 9. Plant breeding 10. Plant propagation (sexual and asexual), and tissue culture 11. Preparation of dry land, swamp land, and micro land 12. Nurseries, seeding, and planting 13. Cropping patterns and crop diversification 14. Agricultural intensification, and agricultural extensification 15. Sustainability of land resources/conservation, and utilization of agricultural waste 16. Agricultural production facilities
Examination forms	1. Essays questions 2. Pratical works

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Reading list	1. C.C. Webster & P.N. Wilson. 1998. Agriculture in The Tropics. Blackwell Science. 2. R.L. Arya. 2020. Fundamentals of Agronomy. Scientific Publishers. 3. Chandra de Gopal. 2019. Fundamentals of Agronomy. Oxford and Ibh Publishers. 4. Donald L. Sparks. 2021. Advances in Agronomy, Volume 167. Academic Press; 1st edition. 5. Chandrasekaran B, Annadurai K and Somasundaram. 2010. A Textbook of Agronomy. New Age International Publishers New Delhi. 6. Manoj Kumar Jhariya, Ram Swaroop Meena, Arnab Banerjee. 2021. Ecological Intensification of Natural Resources for Sustainable Agriculture. Springer; 1st ed. 2021 edition. 7. Victor Sadras, Daniel Calderini. 2020. Crop Physiology Case Histories for Major Crops. Academic Press; 1st edition.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Statistics**
Code	PER 21116
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	Prof. Dr. Ir. Nuni Gofar, M.S Dr. Ir. Dwi Setyawan, M.Sc
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	8 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 180 minutes for laboratory practice, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits (2 credits theory and 1 practice)
Required and recommended prerequisite for joining the module	Passed PER 21116
Module objectives/intended learning outcomes	1. Students are able to understanding of statistics; ilustration and examples to use statistics in agriculture research. 2. Students are able to understanding and relationship between population and sample; ilurstration dan examples to use in agruculture research. 3. Students are able to understanding several variablesl (quantitative-qualitative; discreat-continue; score; nominal,ordinal, categorical, rational) ilustration and examples in agriculture. 4. Students are able to understanding, illutration, calculation and application of several measurement of central tendency of agricultural data (arithmatic-harmonic-geometric mean; median, and modus). 5. Students are able to understanding, illustration, calculation and application examples on agricultural data, (minimum-maximum, rank, variance, standar deviation). 6. Students are able to understanding, illustration, calculation, and application examples of measurement of data position (percentile, quartile, etc.). 7. Students are able to explanating and examples of several techiques and methods in data presentation

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	in form of tables, graphics, and hystogram. 8. Students are able to understanding, illustration, relation, and calculation of probality and binomial distribution. 9. Students are able to understanding, ilustration, relation, and calculation probability and normal distribution and Z-table 10. Students are able to understanding, ilustration, relation, and calculation probability and T-Student distribution and T-table; T-test using Z-test and T-test. 11. Students are able to explanation and calculation of two sample comparionwise test in equal variance by using F-max ratio dan T-test 12. Students are able explanation, and introduction toward understanding of analysis variance (Anova) concept 13. Students are able to Simple explanation toward understanding and application several other methods in statistical analysis analisis (regression, correlation, covariance, and non-parametric method).
Content	1. General understanding of statistics; ilustration and examples to use statistics in agriculture research 2. Understanding and relationship between population and sample; ilurstration dan examples to use in agruculture research 3. Understanding several variablesl (quantitative-qualitative; discreat-continue; score; nominal,ordinal, categorical, rational) ilustration and examples in agriculture 4. Understanding, illutration, calculation and application of several measurement of central tendency of agricultural data (arithmatic-harmonic-geometric mean; median, and modus) 5. Understanding, illustration, calculation and application examples on agricultural data, (minimum-maximum, rank, variance, standar deviation) 6. Understanding, illustration, calculation, and application examples of measurement of data position (percentile, quartile, etc.) 7. Explanation and examples of several techiques and methods in data presentation in form of tables, graphics, and hystogram 8. Understanding, illustration, relation, and calculation of

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	probality and binomial distribution 9. Understanding, ilustration, relation, and calculation probability and normal distribution and Z-table 10. Understanding, ilustration, relation, and calculation probability and T-Student distribution and T-table 11. Explanation and calcution of one sample T-test using Z-test and T-test 12. Explanation and calculation of two sample comparionwise test in equal variance by using F-max ratio dan T-test 13. Explanation and calculation of two sample comparionwise test in un-equal variance by using F-max ratio dan T-test 14. Explanation, and introduction toward understanding of analysis variance (Anova) conceipt 15. Simple explanation toward understanding and application several other methods in statistical analysis analisis (regression, correlation, covariance, and non-parametric method)
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1. McDonald, J.H. 2014. Handbook of Biological Statistics (3rd ed.). Sparky House Publishing, Baltimore, Maryland.
Date of last amendment	4 Juni 2021

MODULE HANDBOOK

Module Designation	**PTN 23115 *Soil Biology***
Semester (s) in which the module is taught	3rd semester/2nd year
Person responsible for the module	1. Prof. Dr. Ir. Nuni Gofar, M.S. 2. Dr. Ir. A. Majid, M.S.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning, Project Based Learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain the soil habitat for the living media of soil organisms. 2. Students are able to explain the relationship between soil biology and land management actions 3. Students know the biodiversity of organisms in the soil. 4. Students are able to to explain the activities and soil macro-organisms and their influence on soil properties and plant growth and the environment. 5. Students are able to explain the activities and soil mesofauna and their influence on soil properties and plant growth and the environment. 6. Students are able to explain the activities and soil microflora and their influence on soil properties and plant growth and the environment 7. Students are understand the forms of interaction between microbes. 8. Students are able to explain the microbes that play a role in the carbohydrate cycle. 9. Students are able to explain microbes that play a role in the N cycle 10. Students are able to explain microbes that play a role in the P, K and S cycles. 11. Students are able to explain the role of organic matter and soil organic matter, decomposition of organic matter under aerobic and anaerobic conditions.

	12. Students are able to understand the correct ways of managing soil organisms 13. Students are able to explain explain how to use soil organisms in soil biotechnology
Content	1. Soil Habitat (Description of Physical, Chemical and Biological Characteristics of Soil; Definition of rhizosphere and characteristics of rhizosphere compared to non-rhizosphere 2. Soil Biology and Management Measures 3. Soil Biodiversity 4. Soil macrofauna and their role in the soil 5. Soil mesofauna and its role in the soil 6. Soil Microflora (Bacteria, Fungi, Algae, Protozoa, Actinomycetes, Viruses and Bacteriophages) 7. Interaction between microbes 8. Soil microbes and nutrient cycles: 1. Microbes and the Carbon Cycle 9. Soil microbes and nutrient cycles: 2. Microbes and the N . Cycle 10. Soil microbes and nutrient cycles: 3. Microbes and P, K and S cycles 11. Interactive discussion using video conference discussing material 9, 10, and 11 12. Organic Mater 13. Soil Organism Management 14. Basics Soil Biotechnology
Examination forms	1. Essays questions 2. Writing paper 3. Project based

MODULE HANDBOOK

Reading List	• Bardgett, R.D. 2008. The Biology of Soil: A community and ecosystem approach. Oxford Univ. Press. • Tate, R.L. 2021. Soil Microbiology. John Wiley and Sons, Inc. • Miessler, D. 2020. Grow Your Soil!: Harness the Power of the Soil Food Web to Create Your Best Garden Ever. Storey Publ., LLC. • Giri, B. and Varma, A. 2020. Soil Health. http://www.springer.com/series/5138 • Saraswati, R., E. Husen, dan RDM. Simanungkalit. 2007. Metode Analisis Biologi Tanah. Balai Besar Litbang Sumberdaya Pertanian, Balitbangtan, Departemen Pertanian. • Hanafiah, KA., I Anas, A. Napoleon, N Gofar. 2005. Biologi Tanah. Rajawali Press, Jakarta.
Date of last amendment	4 Juni 2021

MODULE HANDBOOK

Module Designation	**PTN 23215 *Soil Chemistry***
Semester (s) in which the module is taught	3rd semester/2nd year
Person responsible for the module	1. Dr. Ir. Marsi, M.Sc 2. Prof. Dr. Dedik Budianta, M.S. 3. Dr. Agus Hermawan, M.T. 4. Dr. A. Madjid Rohim, M.S.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to understanding the meaning and scope of Soil Chemistry. 2. Students are able to understand the basic principles of chemistry and solution chemistry 3. Students are able to understand the meaning of soil colloids and be able to distinguish between organic and inorganic colloids. 4. Students are able to recognize oxidation-reduction reactions and calculate oxidation number. 5. Students are able to distinguish actual acidity and potential acidity. 6. Students are able to understand the acid Sulfate Soil Chemistry 7. Students are able to understand the meaning of soil ion adsorption, soil CEC and soil AEC 8. Students are able to understand the role of soil chemistry in soil formation. 9. Students are able to understand about clay-metal-organic matter complex formation in the soil 10. Students are able to understand about soil Reaction in Soil Affected by Salt: Understanding Alkalinity and Salinity; Relationship between SAR and ESP; Chemistry Na 11. Students are able to understand about principles of Ion Adsorption by Soil Colloids, Cation and Anion

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	Exchange 12. Students are able to understand about chemical Processes involved in Weathering Minerals: Hydration, Hydrolysis, Oxidation-Reduction 13. Students are able to understand about chemical Processes Involved in Horizon Formation 14. Students are able to understand about formation of clay-metal-organic matter complexes
Content	1. Introduction: Understanding Soil Chemistry; Scope of Soil Chemistry; Sciences Related to Soil Chemistry 2. Basic Principles of Chemistry: Important chemical elements in soil and plants; chemical bonds; Chemical units and their interrelationships 3. Soil Solution Chemistry: The concept of concentration and activity; Acid base concept; Constanta solubility products and its relationship with mineral solubility 4. Inorganic Colloids (Clay) 5. Organic Colloids 6. Definition of Oxidation Reduction. Oxidation-reduction reactions in some important soil nutrients. Flooded Soil Chemistry 7. Acid Sulfate Soil Chemistry 8. Reaction on Acid Soil 9. Soil Reaction in Soil Affected by Salt: Understanding Alkalinity and Salinity; Relationship between SAR and ESP; Chemistry Na 10. Principles of Ion Adsorption by Soil Colloids 11. Cation and Anion Exchange 12. Chemical Processes involved in Weathering Minerals: Hydration, Hydrolysis, Oxidation-Reduction 13. Chemical Processes Involved in Horizon Formation 14. Formation of clay-metal-organic matter complexes
Examination forms	1. Essays questions 2. Writing paper 3. Presentation and Group Discussion on Soil Chemistry Related Topics.

MODULE HANDBOOK

Reading List	1. Sparks, D.L., 2003. Environmental Soil Chemistry. Second Edition. Academic Press. San Diego. California. 352 pp. 2. Evangelou, V.P. 1998. Environmental soil and water chemistry: Principles and applications. John Wiley and Sons. New York. 3. Sposito, G. 2008. The Chemistry of Soils. Oxford University Press. New York. 342 pp 4. Bohn, H.L., B.L. McNeal, and G.A. O'Connor. 2001. Soil Chemistry. 3 rd Edition. John Wiley and Sons. New York. 322 pp. 5. Essington, M.E. 2004. Soil and Water Chemistry. CRC Press. New York. 553 pp 6. Yu, T.R. 1997. Chemistry of Variable Charge Soils. Oxford University Press. Oxford. 518 pp 7. Tan, K.H. 1998. Principles of Soil Chemistry. 3rd Edition. Marcel Dekker. Inc. New York. 556 pp
Date of last amendment	4 July 2021

MODULE HANDBOOK

Module Designation	**PTN 23315 *Soil Physics***
Semester (s) in which the module is taught	3rd semester/2nd year
Person responsible for the module	1. Dr. Ir. Bakri, M.P 2. Dr. Ir. Satria Jaya Priatna, M.S. 3. Dr. Ir. Muh. Bambang Prayitno, M.Agr.Sc. 4. Dr. Momon Sodik Imanuddin, S.P., M.Agr.Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to understand about general characteristics of soil physics 2. Students are able to understand about soil as a dispersion system, phase properties and each component of soil material and particles (texture), properties and characteristics 3. Students are able to understand about manifestation of soil texture 4. Students are able to understand about soil structure, porosity, manifestation of soil structure 5. Students are able to understand about strength and compaction, rheology and soil plasticity 6. Students are able to understand about groundwater potential, energy and retention, groundwater characteristic curve 7. Continued discussion of sample questions 8. Students are able to understand about water flow in saturated and unsaturated soil (Examples of discussion of problems and calculations) 9. Students are able to understand about water flow in saturated and unsaturated soil (Examples of discussion of problems and calculations) 10. Students are able to understand about evaporation, infiltration, from ground level 11. Students are able to understand about

	groundwater extraction by plants (Water Availability and Amount of water absorbed by plants and their calculations) 12. Students are able to understand about uptake of groundwater by plants (Water Availability and Amount of water absorbed by plants and their calculations) 13. Students are able to understand about water and energy balance in farmland
Content	1. Introduction, general characteristics of soil physics 2. Soil as a dispersion system, phase properties and each component of soil material and particles (texture), properties and characteristics 3. Continued manifestation of soil texture 4. Soil structure, porosity, manifestation of soil structure 5. Strength and compaction, rheology and soil plasticity 6. Groundwater potential, energy and retention, groundwater characteristic curve 7. Continued discussion of sample questions 8. Water flow in saturated and unsaturated soil (Examples of discussion of problems and calculations) 9. Water flow in saturated and unsaturated soil (Examples of discussion of problems and calculations) 10. Evaporation, infiltration, from ground level 11. Groundwater extraction by plants (Water Availability and Amount of water absorbed by plants and their calculations) 12. (Continued) Uptake of groundwater by plants (Water Availability and Amount of water absorbed by plants and their calculations) 13. Water and energy balance in farmland 14. Continuation and General Conclusion
Examination forms	1. Essays questions 2. Writing paper 3. Jurnal review

MODULE HANDBOOK

Reading List	1. Daniel Hillel, 1982. Introduction To Soil Physics. Academic Press. New York. (buku Kedua) 2. Jury, A.W. and R. Horton, 2004. Soil Physics. John Wiley and Sons. New Jersey. 3. Klute, A. 1986. Methods Of Soil Analysis. Part 1 – Physical And Mineralogical Methods, Second Edition. Asa. Sssa. Wisconsin. USA. 4. Lal, R dan M.K. Shukla, 2004. Principles of soil physics. Marcel Dekker, New York.716p. (Buku Utama) 5. Balai Besar Litbang Sumberdaya Lahan Pertanian. Badan Penelitian dan Pengembangan Pertanian Departemen Pertanian 2016.
Date of last amendment	10 July 2021

MODULE HANDBOOK

Module Designation	**Agroclimatology**
Code	PAG 20116
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	Dr. Ir. Firdaus Sulaiman, M. Si. Dr. Ir. Yakup, M. S. Dr. Ir. Zaidan Panji Negara, M. Sc. Fitra Gustiar, S. P., M. Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	8 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 180 minutes for laboratory practice, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits (2 credits theory and 1 practice)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to understand about scope of agroclimatology 2. Students are able to understand about the role of climate for agriculture 3. Students are able to understand about Earth's atmosphere 4. Students are able to understand about solar radiation 5. Students are able to understand about air temperature 6. Students are able to understand about temperature and plant growth 7. Students are able to understand about air Pressure and Wind 8. Students are able to understand about humidity 9. Students are able to understand about hydrological cycle, clouds, and rain. 10. Students are able to understand about Climate classification, Tropical climate, Climate in Indonesia 11. Students are able to understand about global warming and climate change 12. Students are able to understand about the effect of climate on pests and plant diseases

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	13. Students are able to understand about adaptation to climate change
Content	1. Scope of agroclimatology 2. The role of climate for agriculture 3. Earth's atmosphere 4. Solar radiation and Air temperature 5. Temperature and plant growth 6. Air Pressure and Wind 7. Humidity 8. Hydrological cycle, clouds, and rain. 9. Climate classification 10. Tropical climate 11. Climate in Indonesia 12. Global warming and Climate change 13. The effect of climate on pests and plant diseases 14. Adaptation to climate change
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1. Hatfield, J.L., Sivakumar, M.V.K., Prueger, J.H. Agroclimatology (Agronomy Monographs) 1st Edition. ACSESS; 1st edition. 2. Balasubramanian, T.N. 2021. Agro-Climatology Advances and Challenges. New India Pub Agency Nipa. 3. Veeranjaneyulu., Mahapatra, R. 2011. Agro Climatology: Principles and Predictions. 4. Stigter, K. 2010. Applied Agrometeorology. Springer Berlin Heidelberg. 5. Sahu, D.D., Patel, H.R., Chopada, M.C. 2013. Fundamentals of Agricultural Climatology. Agrobios. 6. Mavi, H.S., Tupper, G.J. 2004. Agrometeorology Principles and Applications of Climate Studies in Agriculture. CRC Press. 7. Pritchard, S.G., Amthor, J.S. 1984. Crops and Environmental Change. Food Products Press.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Soil Fertility**
Code	PTN 20116
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	1. Prof. Dr. Ir. Dedik Budianta, MS. 2. Ir, Marsi, M.Sc, Ph.D. 3. Dr. Ir. A. Napoleon, M.P. 4. Dr. Ir. Agus Hermawan, M.S. 5. Prof. Dr. Ir. Nuni Gofar, M.S. 6. Dr. Ir. Madjid Rohim, M.S. 7. Ir. Sabarudin, MSc. Ph.D. 8. Ir. Siti Nurul Aidil Fitri, M.S. 9. Dr. Ir. Madjid Rohim, M.S.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	8 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 180 minutes for laboratory practice, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits (2 credits theory and 1 practice)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain why soil fertility is very important for agriculture. 2. Students are able to explain about factors affecting the plant growth and its measurements 3. Students are able to explain about factors affecting the soil nutrient availability for plant 4. Students are able to explain about principles of soil and plant relationship for plant growth 5. Students are able to explain about soil nutrients for agriculture (Macro elements and its role for plant growth) 6. Students are able to explain about soil nutrients for agriculture (micro elements and its role for plant growth) 7. Students are able to explain about soil nutrients for agriculture (beneficial elements and its role for plant

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	growth) 8. Students are able to explain about mechanisms nutrient uptake for plant growth 9. Students are able to explain about an efforts to improve soil fertility (Soil Organic Matter) 10. Students are able to explain about an efforts to improve soil fertility (Liming) 11. Students are able to explain about an efforts to improve soil fertility (Ameliorant) 12. Students are able to explain about soil fertility evaluation
Content	1. Introduction of soil fertility for agriculture (definition, function, history of soil fertility) 2. Factors affecting the plant growth and its measurements 3. Factors affecting the soil nutrient availability for plant 4. Principles of soil and plant relationship for plant growth 5. Soil nutrients for agriculture (Macro elements and its role for plant growth) 6. Soil nutrients for agriculture (micro elements and its role for plant growth) 7. Soil nutrients for agriculture (beneficial elements and its role for plant growth) 8. Mechanisms nutrient uptake for plant growth 9. Efforts to improve soil fertility (Soil Organic Matter) 10. Efforts to improve soil fertility (Liming) 11. Efforts to improve soil fertility (Ameliorant) 12. Soil fertility evaluation 13. Examination
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1. Adams, F. 1984. Soil Acidity and Liming. Soil Sci. Soc. Am. Inc. Madison. USA. 2. Marschner, H. 1986. Mineral nutrition in Higher Plants. Academic. Press Inc. London. 674. P. 3. Mengel, K. and E.A. Kirkby. 1987. Principles of plant nutrition. International Potash Institute. Bern, Switzerland. 687 p.

	4. Nyakpa, M.Y., A.M. Lubis, M.A. Pulung, A.G. Amrah, A. Munawar, N. Hakim and G.B. Hong. 1985. Kesuburan Tanah. BKS PTN. WUAE Project, Palembang. 5. Tisdale, S.L., W.L. Nelson, and J.D. Beaton. 1984. Soil Fertility and Fertilizer. Macmillan Pub. Co., New York. 6. Budianta, D and D. Ristiani. 2013. Pengelolaan Kesuburan Tanah. Unsri Press
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	PTN 24115 *Soil and Water Conservation*
Semester (s) in which the module is taught	4rd semester/2nd year
Person responsible for the module	Dr. Ir. Satria Jaya Priatna, M.S Dr.Ir. Bakri
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 Credits
Required and recommended prerequisite for joining the module	Students Have Received Lecture Materials: Soil Science Fundamentals Soil Physics Soil Chemistry
Module objectives/intended learning outcomes	1. Student have an understanding of the Definition of Soil and Water Conservation; 2. Student have an understanding of the erosion processes and mechanisms; 3. Student have an understanding and knowing the consequences caused by erosion and losses due to erosion; 4. Student have an understanding and ability about water cycles and equations as well as prediction and measurement of surface runoff; 5. Student have an understanding and ability to explain the factors that influence erosion such as rainfall, soil, slopes, and vegetation; 6. Student have an understanding and ability calculate and predict erosion; 7. Student have an understanding and ability about erosion control methods; 8. Student have an understanding about the causes of landslides and floods 9. Student have an understanding and ability about the mitigation actions that must be taken

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Content	1. Learning contract, RPS explanation, Scope of Soil and water conservation 2. Process and Mechanism of Erosion. The process of erosion occurs in 3 phases: erosion, transport and deposition; Erosion-causing agents: water and wind; Rainfall properties that affect erosion; Erosion forms; Erosion that can still be allowed 3. Water cycle; Water equation; Discharge measurement and surface runoff prediction 4. Factors Affecting Erosion. Climate factors (rainfall): the amount of CH, intensity, distribution, Soil factors: structure, organic matter, permeability, texture. Topographic factors: the length of the slope and the slope of the slope. Vegetation factors: plant roots, canopy and litter 5. Calculation of the amount of erosion: Calculation of erosion in the experimental plot 6. Erosion prediction (USLE and RUSLE); Erosion mapping (Iso erodent line) 7. Erosion Measurement in Watershed: Monitoring of erosion in the field and watershed 8. Soil Conservation Methods in Erosion Control. Soil Conservation Methods in Erosion Control: Mechanical methods: tillage, terraces, guluds, conservation channels, rorak, (making and measuring) 9. Soil Conservation Methods in Erosion Control. Vegetation methods: cropping according to contour, multiple cropping, cropping in STRIP, rotation, cover cropping. 10. Problems caused by erosion. In situ damage, Water body damage 11. Problems caused by erosion. Downstream damage, floods and landslides 12. Floods and Landslides. Causes and control of floods and landslides 13. Land capability class as the basis for conservation farming 14. Examples of erosion and flood damage in South Sumatra and Indonesia
Examination forms	1. Essays questions 2. Writing paper 3. Group discussion

MODULE HANDBOOK

Reading List	• Arsyad, S. 2010. Soil and Water Conservation. 2nd Edition. Bogor: IPB Press. • Barus, et al. 2011. Final Report Preparation of Criteria for Critical Land. Bogor: Central Regional Development Assessment (P4W) Bogor Agricultural University. • Frederick R. Troeh, J. Arthur Hobbs, Roy L. Donahue; 1980, Rev. ed. of: Soil and water conservation for productivity and environmental protection, by Prentice-Hall, Inc, Englewood Cliffs • Glenn O. Schwab et all, 1981. Soil and Water Coservation Engineering (Third edition); by Jhon and Willey & Sons . Inc
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	PTN 24215 *Soil Morphology and Classification*
Semester (s) in which the module is taught	4rd semester/2nd year
Person responsible for the module	1. Dr. Ir. Dwi Setyawan, M.Sc 2. Dr. Ir. Warsito, M.P
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are expected to have an understanding Soil Diversity, Morphology-genesis-soil classification trilogy, Definition and History of Classification, Purpose and Benefits of Soil Classification, Barriers and Opportunities for Development of Soil Classification 2. Students are expected to have an understanding and be able to describe the soil profile in the field 3. Students are expected to have an understanding and be able to explain and distinguish soil morphological characteristics 4. Students are expected to have an understanding and be able to explain the five soil forming factors 5. Students are expected to have an understanding and be able to explain four groups of soil formation processes (pedogenesis) 6. Students are expected to have an understanding and be able to explain taxa (category) in Soil Taxonomy; 7. Students are expected to have an understanding and be able to classify a soil profile correctly using the Soil Taxonomy system 8. Students are expected to have an understanding and be able to assess the potential of the main soils based on the soil classification 9. Students are expected to have an understanding about main lands in Indonesia: 1.Geographical distribution of the main lands in Indonesia, 2.Potentials, problems and utilization of various types of soil in Indonesia, 3. Applied aspects in surveys and land mapping

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Content	1. Introduction 1. Soil Diversity, 2. Morphology-genesis-soil classification trilogy, 3. Definition and History of Classification, 4. Purpose and Benefits of Soil Classification, 5. Barriers and Opportunities for Development of Soil Classification 2. Introduction of land in the field: 1.Soil profile: how to prepare, observe and interpret observations, 2. The composition of the main horizon, additional characterizing horizons, correlation of horizon characteristics, 3.Environmental factors of soil formation, 4. Correlation of laboratory data 3. Continued 4. Soil forming factors: 1.Effect of soil parent material 2.Topographic factors, 3. Contribution of biota and vegetation, 4.Climate influence, 5.The concept of time 5. Continued 6. Soil formation processes. 7. Continued 8. Introduction to Soil Classification System 9. USDA Land Taxonomy 10. USDA Land Taxonomy 11. FAO/ UNESCO system 12. PPT system 13. Main lands in Indonesia: 1.Geographical distribution of the main lands in Indonesia, 2.Potentials, problems and utilization of various types of soil in Indonesia, 3.Applied aspects in surveys and land mapping 14. Continued
Examination forms	1. Essays questions 2. Writing paper

MODULE HANDBOOK

Reading List	1. Luthfi Rayes. 2006. Deskripsi profil tanah di lapangan. UP Fakultas Pertanian Universitas Brawijaya, Malang. 2. Soil Survey Staff. 1999. Soil Taxonomy A Basic System of Soil Classification for Making and Interpreting Soil Surveys. Second Edition. AgricultureHandbook number 436. United States Department of Agriculture, Natural Resources Conservation Service. 3. Soil Survey Staff. 2010. Keys to Soil Taxonomy. Eleventh edition. United States Department of Agriculture, Natural Resources Conservation Service.
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**PTN 24315 *Geodetic Surveying and Cartography***
Semester (s) in which the module is taught	4rd semester/2nd year
Person responsible for the module	1. Dra. Dwi Probowati Sulistyani M.S. 2. Dr. Ir. Momon Sodik Imanudin M.Sc
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are expected to be able to explain the scope of soil geodetic surveying and cartography, the work carried out in soil surveying and its mapping for the purposes of land and land evaluation studies, planning, and as a basis for studying sciences related to soil and land in general. 2. Students understand and understand in writing the general and specific objectives of the Soil Surveying and Cartography course, mentioning the definition and function of measuring soil in agriculture and its mapping, mentioning factors that affect soil mapping and explaining the process of soil mapping as well as explaining the concept of mapping soil and soil types. 3. Students recognize and understand data sources from remote sensing images and can also recognize data directly in the field and digitally 4. Provide understanding in describing the meaning of symbols on the map, how to present them on a map, describing the relationship between reading and analyzing maps, explaining the meaning in map layouts. 5. Understand what map projection is and be able to explain the importance of map projection, and also understand the importance of map scale 6. Understand the correct measurement method, explain the use of simple soil measuring tools, explain the basics of measuring height differences,

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	profile planes and transverse flat properties, determine coordinates correctly 7. Understanding of the method of making detailed topographic maps using soil measuring instruments and students can find out, learn methods of making detailed soil maps using soil measuring instruments
Content	1. The general and specific objectives of Soil Surveying and Cartography courses 2. The factors in terms of mapping in accordance with the rules of soil cartography. 3. Definition of Cartography, Scope of Cartography Map Definition , Kinds of Maps and their Scope 4. Understanding Map Elements: 1. Definition of map elements 2. Map meaning and function 5. Understanding Lettering in Cartography Lettering type, Strengths and weaknesses of each Lettering Selection of the type of lettering and its depiction. Informative letter placement 6. Kinds of data sources, Data from Remote Sensing Data from direct measurement, Digital data, Data from existing maps. 7. Understanding symbolization in maps, dot symbol line symbol, Symbol area / area 8. Understanding Map Projections 9. Measurement Method 10. Simple measuring tools 11. measurement method under different conditions of height, profile and cross-sectional data 12. Coordinate point determination method 13. Making Topographic Maps as a result of measurements 14. Land Map Making and Result of measurement
Examination forms	1. Essays questions 2. Writing paper 3. Quiz
Reading List	1. Wongsocitro, 1994, Cartography, Kanisius Yogyakarta 2. Sutanto, 1986. Fundamentals of Remote Sensing 3. Umaryono, P., 1986, Soil Surveying Series C, Topographic Mapping Jur. Geodetic Engineering, FTSP, ITB
Date of last amendment	20 July 2021

MODULE HANDBOOK

Module Designation	**PTN 24515 Land Ecology**
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	1. Sabaruddin, Ph.D. 2. Dr. A. Napoleon
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning, Case-based learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explainWhat is Ecology, Land and Landscape, 2. Students are able to explain concepts on Landscape Ecology: Some Basic Concepts in Landscape Ecology 3. Students are able to explain the spatial Heterogeneity 4. Students are able to explain the landscape Heterogeneity 5. Students are able to explain the landscape Structure 6. Students are able to explain the landscape Pattern Quantification 7. Students are able to explain about Ecological Ethics 8. Students are able to explain about wetland Ecology: Riparian Swamp 9. Students are able to explain about wetland Ecology: Tidal Swamp 10. Students are able to explain about ecological Disturbances: Natural 11. Students are able to explain about ecological Disturbances: Anthropogenic
Content	1. Introduction: Explanation of Syllabus, Rules, Assessment, Reading Materials, Lecture Schedule; What is Ecology, Land and Landscape, 2. Ecology 3. Land and Landscape 4. Concepts on Landscape Ecology 5. Some Basic Concepts in Landscape Ecology 6. Spatial Heterogeneity

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	7. Landscape Heterogeneity 8. Landscape Structure 9. Landscape Pattern Quantification 10. Introduction to Ecological Ethics 11. Wetland Ecology: Riparian Swamp 12. Wetland Ecology: Tidal Swamp 13. Ecological Disturbances: Natural 14. Ecological Disturbances: Anthropogenic
Examination forms	1. Write essays 2. Field works 3. Group Assignment
Reading List	Baum, K. A., K. J. Haynes, F. P. Dillemuth, and J. T. DCronin. 2004. The matrix enhances the effectiveness of corridors and stepping stones. Ecology 85:2671-2676. Belisle, M. 2005. Measuring landscape connectivity: The challenge of behavioral landscape ecology. Ecology 86:1988-1995. Burrough, Peter A. and Rachael A. McDonnell. 1998. Errors and Quality Control. Chapter 9 in Principles of Geographical Information Systems. Oxford Univ. Press, Oxford. pp.220-240. Buyantuyev, A., and J. Wu. 2007. Effects of thematic resolution on landscape pattern analysis. Landscape Ecology 22:7-13. Cleary, D. F. R., M. J. Genner, T. J. B. Boyle, T. Setyawati, C. D. Angraeti, and S. B. Menken. 2005. Associations of bird species richness and community composition with local- and landscape-scale environmental factors in Borneo. Landscape Ecology 20:989-1001. FAO. 1977. A framework for land evaluation. ILRI. Ferraz, G., J. D. Nichols, J. E. Hines, P. C. Stouffer, R. O. Bierregaard, and T. E. Lovejoy. 2007. A large-scale deforestation experiment: Effects of patch area and isolation on Amazon birds. Science 315:238-241. Fortin, M.-J., M. R. T. Dale, and J. ver Hoef. 2002. Spatial analysis in ecology. Encyclopedia of Environmetrics 4:2051-2058. FOSTER,D. et al. 2003. The Importance of Land-Use Legacies to Ecology and Conservation. BioScience 53(1): 77-88. Gardner, R. H., B. T. Milne, M. G. Turner, and R. V. O'Neill. 1987. Neutral models for the analysis of broad-scale landscape pattern. Landscape Ecology 1:19-28.

Gardner, R. H., and D. L. Urban. 2007. Neutral models for testing landscape hypotheses. Landscape Ecology 22:15-29.

Gillson, L. 2004. Evidence of hierarchical patch dynamics in an East African savanna? Landscape Ecology 19:883-894.

Goodwin, B. J. 2003. Is landscape connectivity a dependent or independent variable? Landscape Ecology 18:687-699.

Hanski, I. 1998. Metapopulation dynamics. Nature 396:41-49.

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Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**PTN 23415 *Soil Microbiology***
Semester (s) in which the module is taught	3rd semester/2nd year
Person responsible for the module	1. Prof. Dr. Nuni Gofar 2. Dr. Ir. A. Majid, M.S.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain the scope of microbes and morphological classification, taxonomy, ecology, and the role of microbes as data providers 2. Students are able to explain the scope of soil microbiology 3. Students are able to explain the microbial cultivation 4. Students are able to explain the methods for Studying Soil Microbes 5. Students are able to explain the isolation and selection techniques 6. Students are able to measuring microbial activity in soil 7. Students are able to explain the techniques for isolation, selection, propagation, and application of nitrogen-fixing bacteria 8. Students are able to explain the techniques for isolation, selection, propagation, and application of phosphate and potassium solubilizing microbes 9. Students are able to explain the techniques for isolation, selection, propagation and application of aggregate-strengthening microbes 10. Students are able to explain the techniques for isolation, selection, propagation and application of decomposer microbes 11. Students are able to explain the microbiome, isolation techniques, selection, propagation and application of plant growth-promoting microbes 12. Students are able to explain the interactions between

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	microbes in the soil 13. Students are able to explain the interactions between soil microbes and plants
Content	1. Introduction 2. Morphological classification, taxonomy, ecology, and the role of microbes as data providers 3. Microbial Ecology 4. Microbial cultivation 5. Methods for Studying Soil Microbes 6. Isolation and selection techniques 7. Measuring microbial activity in soil 8. Techniques for isolation, selection, propagation, and application of nitrogen-fixing bacteria 9. Techniques for isolation, selection, propagation, and application of phosphate and potassium solubilizing microbes 10. Techniques for isolation, selection, propagation and application of aggregate-strengthening microbes 11. Techniques for isolation, selection, propagation and application of decomposer microbes 12. Microbiome, isolation techniques, selection, propagation and application of plant growth-promoting microbes 13. Interactions between microbes in the soil 14. Interactions between soil microbes and plants
Examination forms	1. Essays questions 2. Writing paper
Reading List	1. O'Flaherty, V. et al. 2010. Environmental Microbiology. John Wiley & Sons. 2. Bello, B.O. 2015. Soil Microbiology. Edition: First. Publisher: Lab Lambart Publishing, Acadmic Publising, OmniScriptum GmbH & Co, Kg, Deutschland, Germany. Editor: Prof S . Frazier. ISBN: 978-3-659-77893-3_ 3. Hanafiah, K.A., A. Napoleon, Nuni Gofar. 2015. Biologi Tanah, Ekologi dan Mikrobiologi Tanah. Rajawali Press.
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**Plant Physiology**
Code	PAG 114216
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	Prof. Dr. Ir. Rujito Agus Suwignyo, M. Agr. Dr. Irmawati, S. P., M. Si., M. Sc. Dr. Ir. Mery Hasmeda, M. Sc. Dr. Ir. Susilawati, M. Si. Dr. Ir. M. Umar Harun, M. S.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	Lectures = 1400 minutes Practicum = 2040 minutes Structured assignment = 1440 minutes Self-study = 1440 minutes Exam = 220 minutes Total: 6540 minutes = 109 hours = 4,36 ECTS
Credit points	3 credits (2 credits theory and 1 practice)
Required and recommended prerequisite for joining the module	Passed PAG 109116
Module objectives/intended learning outcomes	1. Capable of understanding, describing and explainingbasic concept, and scope of crop physiology. 2. Capable of understanding, describing and explaininganatomy, cell structure and plant tissue. 3. Capable of understanding, describing and explainingplant and water relationship. 4. Capable of understanding, describing and explainingphysiologial function of water in plants. 5. Capable of understanding, describing and explainingplant growth regulator. 6. Capable of understanding, describing and explainingphotosynthesis. 7. Capable of understanding, describing and explainingphotosynthesis and plant growth. 8. Capable of understanding, describing and explainingplant respiration. 9. Capable of understanding, describing and explainingfactors affected respiration and fotorespiration.

	10. Capable of understanding, describing and explainingenzyme 1. 11. Capable of understanding, describing and explainingenzyme 2. 12. Capable of understanding, describing and explaining plant growth and development. 13. Capable of understanding, describing and explainingplant growth analysis. 14. Capable of understanding, describing and explaining biomass, yield and yield components, harvest index.
Content	1. Introduction, basic concept, and scope of crop Physiology. 2. Anatomy, cell structure and plant tissue. 3. Plant and water relationship. 4. Physiologial function of water. 5. Plant growth regulator. 6. Photosynthesis. 7. Photosynthesis and plant growth. 8. Plant respiration. 9. Factors affected respiration and fotorespiration. 10. Enzyme 1. 11. Enzyme 2. 12. Plant growth and development. 13. Plant growth analysis. 14. Biomass, yield and yield components, harvest index.
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1. Fitter, A.H., Hay, R.K.M. 2002. Environmental Physiology of Plants. Academic Press. 2. Luttge, U. 2008. Physiological Ecology of Topical Plants. Springer. 3. Hay, R., Porter. 2006. The Physiology of Crop Yield. Blackwell Publishing. 4. Sadras, W.O., Calderini, D.F. 2009. Crop Physiology Applications for Genetic Improvement and Agronomy. Academic Press. 5. Wilkins, M.B. 1989. Advanced Plant Physiology. Longman Scientific and Technical. 6. Pessarkli, M. 2004. Handbook of Photosynthesis Second

	Edition. Taylor and Francis. 7. Rao, K.V.M., Raghavendra, A.S., Reddy, K.J. 2006. Physiology and Molecular Biology of Stress Tolerance in Plants. Springer. 8. Foster, G.D., Johansen, I.E., Hong, Y., Nagy, P.D. 2008. Plant Virology Protocols from Viral Sequence to Protein Function. Humana Press. 9. Hawkesford, M.J., Barraclough. 2011. The Molecular and Physiological Basis of Nutrient Use Efficency in Crops. 10. Khan, M.A., Weber, D.J. 2008. Ecophysiology of high Salinity Tolerant Plants. Springer. 11. VK Jain. 2017. Fundamentals of Plant Physiology. Schand. 12. Lambers, H., Chapin III, F.S. 2008. Plant Physiological Ecology. Springer. 13. Stewart, P., Globig, S. 2012. Plant Physiology. Apple Academic Press. 14. William, G.H., Norman., Honer, P.A- Introduction to Plant Physiology 15. Nobel, P. 2009. Physicochemical and Environmental Plant Physiology. Elsevier. 16. Scott, P. 2008. Physiology and Behavior of Plants. Wiley. 17. Burg, S.P. 2004. Postharvest Physiology and Hypobaric Storage of Fresh Produce. CABI Publishing.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**PTN 35615 Agricultural Waste Management**
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Sabaruddin, Ph.D. 2. Dr.Agus Hermawan 3. Dr. A. Napoleon
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain the scope of Agricultural Waste management; Agricultural History; Agriculture and Waste, 2. Students are able to explain the Agricultural Activities and Pollution Potential: Types of Agricultural Waste (Organic and Inorganic waste); Why is Agricultural Waste a Problem? (Case Study), 3. Students are able to explain the 3R-concept in Waste Management 4. Students are able to explain the Agricultural Waste Management Paradigm, From waste to Worth,Co-benefit Approach (Example of Implementation) 5. Students are able to explain the Value-added Agricultural Waste Management 6. Example of Value-added Agricultural Waste Management (case study) 7. Students are able to explain the Agricultural Waste Management System: Landfilling, 8. Students are able to explain the Agricultural Waste Management System: Composting 9. Students are able to explain the Agricultural Waste Management System: Land Application 10. Students are able to explain the Agricultural Waste Management System: Biogas Production 11. Students are able to explain the Agricultural Waste Management System: Mulching 12. Students are able to explain the Agricultural Waste

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	Management System: Biochar. 13. Students are able to explain the Legal Aspects of Waste Management in Indonesia,
Content	1. Introduction: Description of the Course; Scope of Agricultural Waste management; Agricultural History; Agriculture and Waste, 2. Agricultural Activities and Pollution Potential: Types of Agricultural Waste (Organic and Inorganic waste); Why is Agricultural Waste a Problem? (Case Study), 3. Introduction to Waste Management and The 3R-concept 4. Agricultural Waste Management Paradigm, From waste to Worth,Co-benefit Approach (Example of Implementation) 5. Value-added Agricultural Waste Management 6. Example of Value-added Agricultural Waste Management (case study) 7. Agricultural Waste Management System: Landfilling, 8. Agricultural Waste Management System: Composting 9. Agricultural Waste Management System: Land Application 10. Agricultural Waste Management System: Biogas Production 11. Agricultural Waste Management System: Mulching 12. Agricultural Waste Management System: Biochar. 13. Legal Aspects of Waste Management in Indonesia, 14. Field Trip and Discussion
Examination forms	1. Essays questions 2. Writing paper 3. Group Assignment
Reading List	1. Bajoriene, K., D. Jodaugiene, R. Pupaliene, A. Sinkeviciene. 2013. Effect of organic mulches on the content of organic carbon in the soil. Estonian J of Ecol, 62(2):100–106. 2. Bin Wang, Faqin Dong, Mengjun Chen, Jingping Zhu, Jiangyue Tan, Xinmei Fu, Youzhi Wang, 3. Shu Chen. 2016. Advances in recycling and utilization of agricultural wastes in China: Based on environmental risk, crucial pathways, influencing

factors, policy mechanisms. Procedia Environmental Sciences 31:12 – 17.
4. Cohen, E, and G. Yom Din. 2010. Agricultural Waste Management: Case Study of a Waste Treatment Plant for Animal Manure. SSRN Electronic Journal 1-17. Environmental Agency. 2001. Towards sustainable agricultural waste management. R&D
5. Technical Report P1-399/1, UK. FAO. 2015. The State of Food and Agriculture Social protection and agriculture: breaking the cycle of rural poverty. The Food and Agriculture Organization of the United Nations (FAO).
6. Giovannucci, D., S. Scherr, D. Nierenberg, C. Hebebrand, J. Shapiro, J. Milder, and K. Wheeler. 2012. Food and Agriculture: the future of sustainability. A strategic input to the Sustainable Development in the 21st Century (SD21) project. New York: United Nations Department of Economic and Social Affairs, Division for Sustainable Development.
7. Hoornweg, D. and P. Bhada-Tata. 2012. What a waste: A Global Review of Solid Waste Management. World Bank.
8. Hussain I., L. Raschid, M. A. Hanjra, F. Marikar, and W. van der Hoek. 2002. Wastewater use in agriculture: Review of impacts and methodological issues in valuing impacts. Working Paper 37. Colombo, Sri Lanka: International Water Management Institute.
9. Jacobs. The Best Management Practices for Agricultural Waste Management. The Canada-Prince
10. Edward Island Water. Framework Agreement for Environmental Cooperation in Atlantic Canada.
11. Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden. 2018. *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*. Urban Development Series. Washington, DC: World Bank. doi:10.1596/978-1-4648-1329-0. License: Creative Commons Attribution CC BY 3.0 IGO.
12. Obi, F. O., B. O. Ugwuishiwu, and J. N Nwakaire. 2016. Agricultural Waste Concept, Generation, Utilization, and Management. Nigerian Journal of Tech 35 (4): 957 – 964.

	13. Sarkar, N., S. K. Ghosh, S. Bannerjee, K. Aikat. 2012. Bioethanol production from agricultural wastes: An overview. Renewable Energy 37: 19-27. 14. Winpenny, J., I. Heinz, and S. Koo-Oshima. 2010. The wealth of waste: The economics of wastewater use in agriculture. FAO, Rome.
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**Experimental Design**
Code	PER 24116
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	Prof. Dr. Ir.ni Gofar Dr. Ir. Dwi Styawan, M. Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	8 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 180 minutes for laboratory practice, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits (2 credits theory and 1 practice)
Required and recommended prerequisite for joining the module	Passed PER 21115
Module objectives/intended learning outcomes	1. Students are able to identify basic concepts of experimental design, experimental components andtypes. 2. Students are able to design a randomized completedesign (RCD) experiment and analyze the data. 3. Students are able to design a randomized complete block design (RCBD) experiment and analyze the data. 4. Students are able to design an RCD and RCBD experiment with sub-sampling and analyze the data. 5. Students are able to design an RCD and RCBD experiment with repeated measurement and analyzethe data. 6. Students are able to test violations of the ANOVA assumptions, calculate the data transformation, andapply the new robust ANOVA for single factor experiment. 7. Students are able to perform the post-Hoc analyses ofsingle factor experiment and displaying the results of statistical analysis. 8. Students are able to design a factorial randomizedcomplete design and analyze the data.

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	9. Students are able to design a factorial randomizedcomplete block design and analyze the data. 10. Students are able to design an incomplete factorialdesign and analyze the data. 11. Students are able to design a split plot design and analyze the data. 12. Students are able to test the violations of the ANOVAassumptions, calculate the data transformation, and perform a new robust ANOVA for two factor experimental. 13. Students are able to perform the post-hoc analyses oftwo factor experimental design. 14. Students are able to report the results of statistical tests for two factor experiment.
Content	1. The basic concepts of experimental design, experimental components and types 2. Single factor experimental design –randomized complete design (RCD) (assumption, randomization,layout, linier model, and ANOVA) 3. Single factor experimental design –randomized complete block design (RCBD) assumption, randomization, layout, linier model, and ANOVA) 4. Single factor experimental design –RCD and RCBDwith sub-sampling (assumption, randomization, layout, linier model, and ANOVA) 5. Single factor experimental design –RCD and RCBDwith repeated measurement (assumption, randomization, layout, linier model, and ANOVA) 6. Violations of the ANOVA assumptions, data transformation, and new robust ANOVA for singlefactor experimental design 7. Post-Hoc analyses of single factor experiment anddisplaying results of statistical tests 8. Two factor experimental design – factorial randomized complete design (assumption, randomization, layout, linier model, and ANOVA) 9. Two factor experimental design – factorial

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	randomized complete block design (assumption, randomization, layout, linier model, and ANOVA) 10. Two factor experimental design – incomplete factorialdesign (assumption, randomization, layout, linier model, and ANOVA) 11. Two factor experimental design – split plot design (assumption, randomization, layout, linier model, andANOVA) 12. Violations of the ANOVA assumptions, data transformation, and new robust ANOVA for twofactor experimental design 13. Post-hoc analyses of two factor experimental design 14. Displaying results of statistical tests for two factorexperiment
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1. Kwanchai A. Gomez, Arturo A. Gomez. 1984. Statistical Procedures for Agricultural Research. AWiley-Interscience publication. 2. McDonald, J.H. 2014. Handbook of Biological Statistics(3rd ed.). Sparky House Publishing, Baltimore, Maryland.
Date of last amendment	14 Oktober 2021

MODULE HANDBOOK

Module Designation	**PTN 35115 *Agrohydrology***
Semester (s) in which the module is taught	5rd semester/3nd year
Person responsible for the module	1. Dr. Ir. Bakri, M.P 2. Dr. Ir. Satria Jaya Priatna, M.S. 3. Dr. Momon Sodik Imanudin, S.P., M.Sc. 4. Dr. Ir. Warsito, M.P.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to understanding and explain the cycle and availability of water in nature and 2. Students are able to understanding and explain the principles in water use and management, as well as 3. Students are able to understanding and explain various calculations related to water availability for agriculture in a broad sense. 4. Student are able to understanding Social Interests and Engineering Relationships; Water Equilibrium or Mass Equilibrium 5. Student are able to understanding Meteorology (Atmosphere, Water Vapor, Solar Energy, Wind, Temperature, Data Diversity) 6. Student are able to understanding Watersheds (DAS), Rain Formation, Rain Classification 7. Student are able to explain water balance in a watershed area 8. Student are able to explain Measurement Methods (Water Level, Flow Meter, Dissolution, Float, Indirect Method using Manning's equation, Hydrograph properties (Hydrograph notes, river type with river flow hydrograph analysis 9. Student are able to process Watershed Data, concentration time (Izzard Formula. Kerby Equation, Kirpich Equation)

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Content	1. INTRODUCTION 2. METEOROLOGY AND HYDROLOGICAL CYCLE 3. NATURE AND CHARACTERISTICS OF RIVER FLOW REGIONS (DAS) 4. RAIN 5. INFILTRATION AND EVAPOTRANSPIRATION 6. WATER BALANCE 7. FLOW MEASUREMENT 8. HYDROGRAPH 9. SYNTHETIC HYDROGRAPH 10. FLOW IDENTIFICATION 11. PROBABILITY AND STATISTICS FOR HYDROLOGY 12. GROUNDWATER HYDROLOGY 13. BIGGEST VOLUME AND DEBIT MANAGEMENT
Examination forms	1. Essays questions 2. Writing paper 3. Jurnal review
Reading List	
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	PTN 35215 *Soil Biotechnology*
Semester (s) in which the module is taught	5rd semester/3nd year
Person responsible for the module	1. Dr. Ir. Adipati Napoleon, M.P 2. Ir. Sabaruddin, M.Sc., Ph.D 3. Dr. Ir. Abdul Madjid R
Language	Indonesian and English
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are to gain knowledge and be able to understand the relationship between soil microbes and plants, 2. Students are to gain knowledge and be able to understand the role of soil microorganisms in agricultural systems 3. Students are to gain knowledge and be able to understand the symbiosis of soil microorganisms with plants 4. Students are to gain knowledge and be able to understand the pollution and its effects on soil organisms 5. Students are to gain knowledge and be able to understand the benefits of soil microbes as biological control agents, 6. Students are to gain knowledge and be able to understand the about soil bioremediation 7. Students are to gain knowledge and be able to understand biofertilizers (inoculants), 8. Students are to gain knowledge and be able to understand about composting technology, 9. Students are to gain knowledge and be able to understand about enzymes and microbial products in the soil, and 10. Students are to gain knowledge and be able to understand about microorganism engineering.

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Content	1. Introduction, Scope of Soil Biotechnology 2. Soil Biotechnology Development 3. Sapropit microorganisms, role in the decomposition process in soil 4. Soil Healthy 5. Saprophytic microorganisms, roles in nutrient cycling processes in soil 6. Enzymes in the soil 7. Symbiosis of soil microorganisms with plants 8. Soil Biodiversity (Soil Macrooganism) 9. Soil Biodiversity (Soil Microoganism) 10. The role of soil microorganisms in agricultural systems 11. Pollution and its effects on soil organisms 12. Soil bioremediation 13. Management of soil organisms 14. Organic Farming
Examination forms	1. Essays questions 2. Writing paper 3. Jurnal revew
Reading List	1. Bardgett, R.D. 2008. The Biology of Soil: A community and ecosystem approach. Oxford Univ. Press. 2. Tate, R.L. 2021. Soil Microbiology. John Wiley and Sons, Inc. 3. Lynch, J.M.,1982. Soil Biotechnology. Blackwell Scientific Publ. Oxfprd London.
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**PTN 35315 *Land Survey and Evaluation***
Semester (s) in which the module is taught	5rd semester/3nd year
Person responsible for the module	1. Dra. Dwi Probowati Sulistyani M.S. 2. Dr. Ir. Muh Bambang Prayitno M.Agr 3. Dr. Ir. Warsito, M.P
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are expected to have an understanding of the scope of Land Surveys and Land Evaluation, especially in Indonesia, 2. to be able to identify the basic concepts of land surveys and land evaluations, 3. to be able to explain the methods of land surveys and land evaluations, 4. to have an understanding and ability in general about land survey methods and land evaluation, land evaluation and its application in agriculture 5. Students are expected to have an understanding of the scope of Land Survey and Land Evaluation, especially in Indonesia. 6. Students are expected to have the ability to identify the basic concepts of land survey and land evaluation. 7. Students are expected to have the understanding and ability to explain the methods of land survey and land evaluation. 8. Students are expected to have an understanding and ability in general about soil survey methods and land evaluation and their application in agriculture. 9. Students can know and explain about Land Survey Planning. 10. Students can know and explain the basic concepts of land surveys, survey accuracy, survey stages.

	11. Students can explain the land potential analysis method. 12. Students can know and explain about land use planning methods based on the framework of land suitability assessment and land capability and spatial planning and its application in agriculture
Content	1. Introduction: definition and scope, aspects of the study, land survey and land evaluation 2. Land method land survey approach and evaluation 3. An understanding of the types of surveys, the scale, purpose, and level of precision of land surveys 4. An understanding of the stages that must be carried out in carrying out activities starting from preparation until the presentation of the results of land survey activities 5. Understanding of planning soil survey activities starting from the preparation of materials and tools, budget plan, time schedule, soil observation activities in the field, parameters observed in the field and in the laboratory, sampling, laboratory analysis and interpretation of data for planned activities 6. Understanding of basic concepts and frameworks for land evaluation for agriculture 7. Land evaluation system 8. Understanding of technical methods of land suitability assessment for agricultural commodities 9. Understanding of technical methods of land capability assessment 10. Implementation and case studies of planning for agricultural land survey and evaluation activities 11. Implementasi dan studi kasus perencanaan kegiatan survei dan evaluasi lahan dilahan rawa lebak 12. Implementation and planning case studies land survey and evaluation activities on tidal land 13. Implementation and case studies of planning for land survey and evaluation activities on dry land 14. Implementation and case studies of planning survey and evaluation activities on peatlands
Examination forms	1. Essays questions 2. Writing paper 3. Quiz

Reading List	1. Anonymous. 2012. Regulation of the Minister of Agriculture number: 05/Permentan/CT.140/8/2012 concerning: Guidelines for the Development of Agricultural Areas. 2. Beek, K.J., P.A. Burrough, and D.E McCormack. 1986. Quantified Land Evaluation Procedures. ITC Publication No. 6. 3. Pregnant, E.S. 1981. Assessments of the effects on yield of variations in climate and soil characteristics for twenty crops species. AGOF/INS/78/006, Technical Note No 12. Center for Soil research, Bogor, Indonesia 4. CSR/FAO. 1983. Reconnaissance Land Resource Survey 1:250.000 scale. Atlas Format Procedures. Land Resources Evaluation with Emphasis on Outer I Island Project. CSR/FAO Indonesia AGOFANS/78/006. Manual 4 version 1. 5. Djaenudin, D., Basuni, S. Hardjowigeno, H. Subagyo, M. Soekardi, Ismangun, Marsoedi Ds., N. Suharta, L. Hakim, Widagdo, J. Dai, V. Suwandi, S. Bachri, and E.R. Jordan. 1994. Land Suitability for Agricultural and Silvicultural Plants. wipe. Tech. No. 7 Ver.1.0. LREP-II Part C. CSAR, Bogor. 6. Djaenudin, D., Marwan H., Hidayatullah, K. Nugroho, E.R. Jordans, A.J.J. v.d. Eelaart, and D.G. rosters. 1997. Standard Procedures for Land Evaluation. Technical Report No. 18 Version 3.0 LREP-II Part C. CSAR, Bogor. 7. Djaenudin, D., Nata Suharta, Marwan, H., Anny M., and M. Soekardi. 1996. Terms of Reference for Evaluation of Land Resources to Support Regional Spatial Planning for Provinces at Level I Regions (RTRWPD I) Part. Pro. Research on Land Resources and Agroclimate. Puslittanak, version 1.0. 8. Djaenudin, D., Marwan, H., H. Subagyo, A. Mulyani, and Nata Suharta. 2000. Land Suitability Criteria for Agricultural Commodities. Version 3.0. September 2000. Research Center for Agricultural Research and Development Agency.

	9. Donald A Davidson. 1992. The Evaluation of Land Resources. Longman Scientific & Technical VS, New York. 10. Driessen. 1971. Parametric suitability of land. Soil Research Institute, Bogor. 11. FAO. 1976. A Framework for Land Evaluation. Soil Resources Management and Conservation Service Land and Water Development Division. FAO Soil Bulletin No. 32. FAO-UNO, Rome. 12. FAO. 1978. Guidelines for Soil Profile Description. FAO/UNESCO. Rome.
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**PTN 35415 *Soil, Water and Plant Analysis***
Semester (s) in which the module is taught	5rd semester/3nd year
Person responsible for the module	1. Dr. Ir. Marsi, M.Sc. 2. Prof. Dr. Dedik Budianta, M.S. 3. Dr. Agus Hermawan, M.T. 4. Dr. Ir. Abdul Madjid Rohim, M.S.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 50 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Student have knowledge and understanding and ability about the principles, methods, and procedures for analyzing soil, water, and plants, 2. Student have knowledge and understanding and ability to carrying out independent and group analyzes, 3. Student have knowledge and understanding and ability to interpreting the data from the analysis and 4. Student have knowledge and understanding and ability to calculating fertilization recommendation for plant cultivation.

MODULE HANDBOOK

Content	1. Introduction to *Soil, Water and Plant Analysis* 2. *Laboratory: Function, Organization, Safety and Equipment* 3. Chemical Principles: Reagents, Standard Solutions, Concentration 4. Principles of Soil, Water and Plant Sampling 5. Soil, Water and Plant Analysis: Total Elemental Analysis and Plant Ash 6. Soil, Water and Plant Analysis: Organic Matter and N 7. Soil, Water and Plant Analysis: P 8. Soil, Water and Plant Analysis: S 9. Soil, Water and Plant Analysis: pH, CEC 10. Soil, Water and Plant Analysis: SAR, EC 11. Soil, Water and Plant Analysis: H-exch., Al-exch., Al saturation 12. Soil, Water and Plant Analysis: K, Na, Ca, Mg 13. Data Interpretation 14. Recommendation
Examination forms	1. Essays questions 2. Writing paper 3. Presentation and Group Discussion
Reading List	1. FAO. 2020. Soil Testing Methods Manual. ISBN 978-92-5-131195-0 2. Moorberg, C.J. and Crouse, D.A. 2017. Soils Labor Soils Laboratory Manual. ISBN 978-1-944548-09-4. https://newprairiepress.org/ebooks/15/ 3. Kalra YP. 1998. Reference Methods for Plant Analysis. CRC Press. 4. Rosa Margesin and Franz Schinner. 2005. Manual for Soil Analysis –Monitoring and Assessing Soil Bioremediation. Springer. 5. M.R. Carter and E.G. Gregorich. 2006. Soil Sampling and Methods of Analysis. Canadian Society of Soil Science 6. Balai Penelitian Tanah. 2009. Petunjuk Teknis ANALISIS KIMIA TANAH, TANAMAN, AIR, DAN PUPUK. Edisi 2.
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**Research Methods**
Code	PER 31116
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	Prof. Dr. Ir. Nuni Gofar, M.S Dr. Ir. Dwi Setyawan, M. Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	After completing the course : 1. students will be able to understand the philosophy and general concepts of research methods course material 2. students will be able to understand on creativity and extraction of scientific resource information; scientific writing, ethic and plagiarism 3. students will be able to describe and apply the principle of scientific research proposal writing; scientific paper presentation; problem statement, hypothesis and frame of logical construct. 4. students will be able to understand and describe type of research, design and variable; data management, analysis and interpretation. 5. students will be able to understand and describe descriptive quantitative analysis research style; predictive and modelling research style. 6. students will be able to understand and describe research result discussion and conclusion; scientific report writing and author guideline
Content	1. Introduction 2. Creativity and Extraction of Scientific Resource Information 3. Scientific Writing, Ethic and Plagiarism 4. Scientific Paper Presentation 5. Principle of Scientific Research Proposal Writing 6. Problem Statement, Hypothesis and Frame of Logical Construct

MODULE HANDBOOK

	7. Presentation of Student Group Case Study-I 8. Type of Research, Design and Variable 9. Data Management, analysis and Interpretation 10. Descriptive Quantitative Analysis Research Style 11. Predictive and Modelling Research Style 12. Research Result Discussion and Conclusion 13. Scientific Report Writing and Author Guideline 14. Presentation of Student Group Case Study-I
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1.
Date of last amendment	14 Oktober 2021

MODULE HANDBOOK

Module Designation	**PTN 36115 *Landscape Analysis***
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dra. Dwi Probowati Sulistyani 2. Dr. Ir. Muh. Bambang Prayitno, M.Agr.Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are expected to have an understanding of geomorphology and the geomorphic processes that form it. 2. Students are expected to have the ability to identify basic concepts about landscapes. 3. Students are expected to have the understanding and ability to explain the landscape analysis method. 4. Students are expected to have an understanding and ability in general about the landscape analysis method and its application in agriculture. 5. Students can know and explain about the process of geomorphological processes for the formation of landscapes. 6. Students can know and explain the basic concepts of geomorphology, and its application in agriculture. 7. Students can know and explain about the landforms that are formed from the forces that form them 8. Students can explain the landscape analysis method

Content	1. Introduction, definition, scope, basic concepts of landscape analysis aspects of the study, spectrum of basic concepts of geomorphology 2. Geomorphological forces and processes for the formation of the earth's appearance 3. Landform Concepts and Classification 4. Land Forms of Anthropogenic Origin, divide the various types of land forms as a result of human power or activities. Landscape analysis of anthropogenic origin for agricultural activities and their management 5. Land Forms of Karst origin, dividing the various types of land forms as a result of the energy or activities of karst origin. Landscape analysis of karst origin for agricultural activities and their management 6. Landforms of Fluvial origin is the notion of fluvial energy, any fluvial origin that will cause the formation of landforms and divide the various types of landforms as a result of fluvials. Landscape analysis of fluvial origin for farming activities and their management 7. Land form of Structural origin, understanding of structural origin, what forces of structural origin will cause the formation of land forms, dividing various types of land forms as a result of structural. Landscape analysis of structural origin for agricultural activities and their management 8. Land form from Marine is the notion of marine, what kind of energy from marine will cause the formation of landforms and divide the various types of land forms as a result of marine. Landscape analysis of marine origin for activities and management 9. Land form of denudational origin, what is denudational force, divides the types of land forms as a result of denudational energy or activities. Landscape analysis of denudational origin for farming activities and their management 10. Land form from Aolin understanding of aolin, what kind of energy from aolin will cause the formation of land forms and dividing the various types of landforms as a result of aolin Landscape analysis from Aolin for farming activities and their management 11. Land Forms of Organic origin is the notion of organic,

MODULE HANDBOOK

	any energy of organic origin that will cause the formation of land forms and divide the various types of land forms as a result of organic. Landscape analysis of organic origin for farming activities and their management 12. Land form of Glacial origin is the notion of glacial, what kind of energy from glacial origin will cause the formation of land forms and divide the various types of land forms as a result of glacial. Landscape analysis of glacial origin for agricultural activities and their management 13. Land Forms of Volcanic origin is the notion of volcanic, any force of volcanic origin that will cause the formation of landforms and divide the various types of landforms as a result of volcanic activity. Landscape analysis of volcanic origin for agricultural activities and their management 14. Land Form of Alluvial origin is the notion of alluvial, any energy from alluvial origin that will cause the formation of land forms and divide the various types of land forms as a result of alluvial. Landscape analysis of alluvial origin for agricultural activities and their management
Examination forms	1. Essays questions 2. Writing paper 3. Quiz
Reading List	1. Lobeck, AK. (1939), Geomorphology, An Introduction to the study of Landscape, New York and London: McGraw-Hill Book Company. Inc. 2. Sukmantalya, I Nyoman K, Drs. M.Sc. (1995), Introduction to Geomorphology and Its Application through PJ for Inventorying Land Resources,Bakosurtanal. 3. Suprapto Dibyosaputro, Drs. M.Sc., (1997), Basic Geomorphology, Yogyakarta: Faculty of Geography UGM. 4. Sutikno (1987), Conceptual Geomorphology and Its Application “Paper”, Yogyakarta: Fac of Geography UGM. 5. Van Zuidam, R.A, and F.I. van Zuidam Cancelado, 1979. Terrain Analysis And Classification Using Aerial Photographs, International Institute for Aerial Survey and Earth Science (ITC) 350, Boulevard Al Enschede, The Netherlands
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**PTN 36215 *Fertilizer and Fertilization Technology***
Semester (s) in which the module is taught	6rd semester/3nd year
Person responsible for the module	1. Prof. Dr. Ir. Nuni Gofar, M.S. 2. Dr. Marsi 3. Dr. Sabarudin 4. Dr. Agus Hermawan 5. Dr. A. Napoleon 6. Ir. Siti Nurul Aidil Fitri
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to understand and explain about nutrients, fertilizers, development history and fertilization concepts 2. Students are able to understand and explain about meaning, availability of nutrients and the basic problems of fertilization, the history and concept of fertilization: 1. Definition of fertilizer, 2. types of fertilizer, 3. Why plants need to be fertilized 3. Students are able to understand and explain about the manufacture of N fertilizers, reactions in the soil: 4. Students are able to understand and explain about the manufacture, properties, reactions of P fertilizers 5. Students are able to understand and explain about the manufacture, properties and use of K fertilizer 6. Students are able to understand and explain about the importance of organic fertilizers and organic fertilizer technology: Understanding of organic and inorganic fertilizers and organic fertilizer technology 7. Students are able to understand and explain about the properties and reactions of fertilizers containing primary and secondary macro nutrients in the soil:

	Understanding of secondary macro fertilizers Ca, Mg, S 8. Students are able to understand and explain about the properties and reactions of micro fertilizers in the soil: 1.Understanding microfertilizers, 2.Fe fertilizers, 3.Mn fertilizers, 4.Zn fertilizers, 5.Cu fertilizers, 6.B and Mo fertilizers 9. Students are able to understand and explain about the manufacture, properties and reactions of compound fertilizers: Compound fertilizers,Types of compound fertilizers, NPK ratio/grade in compound fertilizers The role of nutrient evaluation 10. Students are able to understand and explain about the method of evaluating soil nutrient status 11. Students are able to understand and explain about the plant analysis method: 1. Soil and plant characteristics, 2. Plant tissue analysis method, 3. Plant parts analyzed, 4. Treat plant tissue to be analyzed 12. Students are able to understand and explain about the basics of applying fertilizer and recommendations for fertilizing/liming 13. Students are able to understand and explain about the basic economic considerations and the efficiency of fertilization and liming
Content	1. Nutrients, fertilizers, development history and fertilization concepts 2. Meaning, availability of nutrients and the basic problems of fertilization, the history and concept of fertilization: 1. Definition of fertilizer, 2. types of fertilizer, 3. Why plants need to be fertilized 3. The manufacture of N fertilizers, reactions in the soil: 4. The manufacture, properties, reactions of P fertilizers 5. The manufacture, properties and use of K fertilizer 6. The importance of organic fertilizers and organic fertilizer technology: Understanding of organic and inorganic fertilizers and organic fertilizer technology 7. Topics 1-6 Discussion 8. The properties and reactions of fertilizers containing primary and secondary macro nutrients in the soil: Understanding of secondary macro fertilizers Ca, Mg, S 9. The properties and reactions of micro fertilizers in

	the soil: 1.Understanding microfertilizers, 2.Fe fertilizers, 3.Mn fertilizers, 4.Zn fertilizers, 5.Cu fertilizers, 6.B and Mo fertilizers 10. The manufacture, properties and reactions of compound fertilizers: Compound fertilizers,Types of compound fertilizers, NPK ratio/grade in compound fertilizers The role of nutrient evaluation 11. The method of evaluating soil nutrient status 12. The plant analysis method: 1. Soil and plant characteristics, 2. Plant tissue analysis method, 3. Plant parts analyzed, 4. Treat plant tissue to be analyzed 13. The basics of applying fertilizer and recommendations for fertilizing/liming 14. The basic economic considerations and the efficiency of fertilization and liming
Examination forms	1. Essays questions 2. Writing paper
Reading List	1. Gofar, N. 2015. Teknologi Pupuk dan Pemupukan di Lahan Suboptimal. Polimedia Publishing, Jakarta. 2. Havlin, J.L, Tisdale, S.L., Nelson, W.L., Beaton, J.D. 2013. Soil Fertility and Fertilizers: an introcuction to nutrient management (6th Ed). Macmillan Publishing Company. New York, NY. 3. Jones, J.B. 2012. Plant Nutrition and Soil Fertility Manual. 2nd Ed. CRC Press.
Date of last amendment	11 November 2021

MODULE HANDBOOK

Module Designation	**PTN 36315 *Land Resource Information System***
Semester (s) in which the module is taught	6rd semester/3nd year
Person responsible for the module	1. Prof. Dr. Ir. M. Edi Armanto 2. Dr. Momon Sodik Imanudin, S.P., M.Sc
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-Fundamental of Soil Science, and Cartografic and Mapping
Module objectives/intended learning outcomes.	1. Students are expected to be able and explain the scope of soil surveying and cartography, the work carried out in soil surveying and its mapping for the purposes of land and land evaluation studies, planning, and as a basis for studying sciences related to soil and land in general. 2. Students are able to classify the kinds of data found in the field 3. Students are able to explain the relationship between graphic and tabular data in Arch GIS 4. Students are able to analyze land resources data and produce output in agriculture with Arch GIS 5. Student are able to explain the source of data that can used in Land Information System 6. Students are able to digitize maps by on schreen digitizer. 7. Student are able to explain the various of spatial analysis that exist 8. Students are able to perform spatial data analysisn eith ArcView GIS. 9. Student are expected to understand smart farming technology, that was involping the internet tehnology base which could help famer increase crop yields in quantity and quality.

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Content	1. Introduction: spatial information system; data presentation; Definition of land information system; supporting science; some of the advantages of using LRIS 2. Cartography basics 3. Map Scale and Projection: Understanding Scale; Definition of Latitude; Longitude; Definition of Map Projection and its Problems; Map Projection Classification; Map Projection Construction & Its Properties; Use of Computers for Projection Construction 4. Base Map and Thematic Map; Base Map; Thematic Maps 5. LRIS concept: software; hardware; users; data; method 6. Data source: graphic data source; attribute data source; Remote sensing as a graphical data source 7. LRIS Components: Sub system input; processing sub system; output sub-system, input sub-system: semi-manual; digitizing manuals; scanning; satellite data processing results 8. Database management system 9. Examples of applications for measurement, mapping, monitoring and modeling: 10. Meta data in LRIS 11. Sub system processing: data processing attributes 12. Sub system processing (Continuation) 13. Sub-system output: Attributes/table 14. Several obstacles to the use of LRIS
Examination forms	1. Essays questions 2. Writing paper 3. A Case study projet analysis

MODULE HANDBOOK

Reading List	1. Burrough, P.A. 1986. Principles of Geographical Information System. Clarendon Press Oxford 2. Burrough, P.A. 1986. Principles of Geographical Information System. Clarendon Press Oxford. 3. Charter. D. 2004. MapInfo Professional. Informatika Bandung. 4. Dawn J. Wright, and Christian Harder. 2020. GIS for Science Applying Mapping and Spatial Analisis. Esri press. 5. Goodchild, M. F., L. T. Steyaert, and B. O. Parks. 1996. GIS and Environment Modeling. John Wiley & Sons. 6. Jaya, I.N.S. 2002. Applied of Geographic Information System in Forestry. Bogor Agriculture Institute. 7. Molenaar. M.T.J. 1998. An Introductory to the Theory of Spatial Object Modelling for GIS. International Ltd, Padstow, Cornwall. 8. Nurpilihan, B. Dan Irfan, A. 2020. Smart Farming Internet Of Things base in Greenhouse. Unpad Press. 100p 9. Maria, Pangestika, Musraino, Hohary, Suprihati, Yohanes Hendro Agus, Nugraheni Widyawati, Maria Marina Herawati, Alfred Jansen Sutrisno, Yoga Aji Handoko, Liska Simamora, Damara Dinda N. Zebua, Hendrik J. Nadapdap, Tinjung Mary Prihtanti, Yuliawati, Bayu Nuswantara, Maria. 2020. Smart Farming: Agricuoture in Revolution Industries Era 4.0. Penerbit Andi. 256 p. 10. Suraj Kumar Singh, S. Kanga, Gowhar Meraj, Majid Farooq, Sudhanshu. 2021. Geographic Information Science for Land Resource Management. Scrivener Publishing LLC. DOI:10.1002/9781119786375 11. Ripple. W.J. 1989. GIS for Resource Management. Amer. Soc. for Photogrammetry and Remote Sensing. 12. Wadsworth, R. and J. Treweek. Longman. 1999. GIS for Ecology, an Introduction.
Date of last amendment	11 November 2021

MODULE HANDBOOK

Module Designation	**PTN 36415 *Soil and Water Management***
Semester (s) in which the module is taught	6rd semester/3nd year
Person responsible for the module	1. Dr. Ir. Satria Jaya Priatna, M.S 2. Dr. Ir. Warsito, M.P 3. Dr. Ir. Muh Bambang Prayitno, M.Agr.Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	Students Have Received Lecture Materials: Soil Science Fundamentals Soil Physics Soil Chemistry Soil Biology
Module objectives/intended learning outcomes	1. Students are expected to have an understanding of the definition of Soil and Water Management 2. Students are expected to be able and explain the Nature and Characteristics of Degraded Soil 3. Students are expected to be able and explain the Principles of Soil and Water Management 4. Students are expected to be able and explain the dry land management system 5. Students are expected to be able and explain the management of polluted soil and water 6. Students are expected to be able and explain the intensive and sustainable farming systems 7. Students are expected to be able and explain the management of soil that has experienced erosion 8. Students are expected to be able and explain the management system for acid sulphate soil and saline or sodic soil 9. Students are expected to be able and explain the peat and organic soil management systems 10. Students are expected to be able and explain the management system and land reclamation of paddy fields 11. Students are expected to be able and explain the agroforestry farming systems in wetlands

MODULE HANDBOOK

Content	1. Learning contract, RPS explanation, Scope of Soil and Water Management 2. Introduction Definition and Scope of Soil Management and Factors Affecting Its Decline Soil Quality 3. Characteristics of damaged soil and principles of soil and water management 4. Dry Land Management Management of Polluted Soil and Water (1) 5. Dry Land Management Management of Polluted Soil and Water (continued) 6. Intensive And Sustainable Agriculture 7. Management of Soil whose top soil has been eroded by erosion 8. Acid Sulfate Soil Management 9. Salinity and Sodic Soil Management 10. Management of Peat and Organic Soil Water (1) 11. Management of Peat and Organic Soil Water (continued) 12. Paddy Field Land Reclamation and Management 13. Paddy Field Land Reclamation and Management (continued) 14. Agroforestry Farming System In Wetlands
Examination forms	1. Essays questions 2. Writing paper (Independent paper) 3. Group discussion
Reading List	1. Arsyad, S. 2010. Soil and Water Conservation. 2nd Edition. Bogor: IPB Press. 2. Agus, F., and I.G. Subixa. 2008. Peatlands: potential for agriculture and environmental aspects. SRI. Agricultural Research and Development Agency. World Agroforestry Centre. Bogor. 3. Andriesse, J.P. 1992. Nature and Management of Tropical Peat Soils. FAO Soil Bulls. 59-165 p. 4. Arafah. 2009. Technical Guidelines for Rice Field-Based Fertility Improvement 5. Sanchez, A.P. 1993 Nature and Management of Tropical Soils; Publisher: Bandung : Publisher ITB., 1993; Physical Description. 2 ji., 302 p. 6. Suripin. 2004. Conservation of Soil and Water Resources; Yogyakarta : Andi Offset, ISBN 979-731-431-6
Date of last amendment	14 Oktober 2021

MODULE HANDBOOK

Module Designation	**PTN 36515 *Irrigation and Drainage***
Semester (s) in which the module is taught	6rd semester/3nd year
Person responsible for the module	1. Dr. Ir. Bakri, M.P. 2. Dr. Momon Sodik Imanudin, S.P., M.Sc. 3. Dr. Ir. Satria Jaya Priatna, M.S.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are expected to have an understanding of the definition of Irrigation and Drainage 2. Students are expected to be able and explain about Statistics of Groundwater Dynamics 3. Students are expected to be able and explain about irrigation water source / storage 4. Students are expected to be able and explain about irrigation water quality 5. Students are expected to be able and explain about plant water needs 6. Students are expected to be able and explain about irrigation water delivery method 7. Students are expected to be able and explain about planting and irrigation scheduling 8. Students are expected to be able and explain about preparation of irrigated land 9. Students are expected to be able and explain about operation & maintenance of irrigation network reclamation / drainage project planning phase identitification & feasibility study phase 10. Students are expected to be able and explain about drainage system plan / drainage reclamation to control water level 11. Students are expected to be able and explain about soil (general system, special system) project

	preparation, installation and maintenance (final project preparation and specifications, installation, operation and maintenance) 12. Students are expected to be able and explain about reclamation of lebak swamp and tides in Indonesia 13. Students are expected to be able and explain about equipment / construction of flowing irrigation/pumping water irrigation / irrigation efficiency water resources management / forestry and environment policy
Content	1. Introduction 2. Statistics / Groundwater Dynamics 3. Irrigation Water Source / Storage 4. Irrigation Water Quality 5. Plant Water Needs 6. Irrigation Water Delivery Method 7. Planting and Irrigation Scheduling 8. Preparation of Irrigated Land 9. Operation & Maintenance of Irrigation Network Reclamation / Drainage Project Planning Phase Identitification & Feasibility Study Phase 10. Drainage System Plan / Drainage Reclamation to Control Water Level 11. Soil (General System, Special System) Project Preparation, Installation and Maintenance (Final Project Preparation and Specifications, Installation, Operation and Maintenance) 12. Reclamation of Lebak Swamp and Tides in Indonesia 13. Equipment / Construction of Flowing Irrigation/Pumping Water Irrigation / Irrigation Efficiency 14. Water Resources Management / Forestry and Environment Policy
Examination forms	1. Essays questions 2. Writing paper 3. Jurnal revew

MODULE HANDBOOK

Reading List	1. Hansen, V. E., O. W. Israelsen, dan G.E. Stringham. 1986. Dasar-dasar dan Praktek Irigasi (terjemahan ke Bahasa Indonesia oleh E.P. Tachyan dan Soetjipto). Penerbit Air Langga. 2. Teknik Konservasi Tanah dan Air. 1997. Robiyanto H. Susanto dan Rahmad H. Purnomo (terjemahan : Soil and Water Concervation, Gleen O. Scwab dkk. 1990). 3. Ochs, W. J. dan B. G. Bishay. 1992. Drainage Guideline. World Bank Technical Paper No. 194. 4. Bardan, M. 2014. Irigasi. Graha Ilmu Yogyakarta. 5. Rosadi, R. A. B. 2015. Dasar-dasar Teknik Irigasi. Graha Ilmu Yogyakarta. 6. Sangsongko, D. 1985. Alih Bahasa. Ray. K. L. and Joseph. B. F. Teknik Sumber Daya Air. Penerbit Air Langga. 7. Mawardi, M. 2016. Irigasi Asas dan Praktek. Penerbit Bursa Ilmu.
Date of last amendment	14 Oktober 2021

MODULE HANDBOOK

Module Designation	**PTN 36615 Organic Farming System**
Semester (s) in which the module is taught	5^{d} semester/3nd year
Person responsible for the module	1. Prof. Dr. Ir. Dedik Budianta, MS 2. Ir. Sabaruddin, MSCs, PhD
Language	Indonesian
Relation to curriculum	Optional/elective Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain what is the organic farming. 2. Students are able to compare the organic farming and conventional farming 3. Students are expected to be able and explain about Organic farming for producing soil and food health 4. Students are able to apply organic farming 5. Students are expected to be able and explain about Utilization of local resources to support organic farming 6. Students are able to explain the models of organic farming 7. Students are expected to be able and explain about Regulation organic farming in Indonesia (Indonesia national standard) 8. Students are aware about the disadvantage of conventional farming 9. Students are expected to be able and explain aboutOrganic farming related with climate change

MODULE HANDBOOK

Content (14 meetings) dan two examinations	1. Introduction of organic farming (definition, characteristic of organic farming, etc) 2. Organic farming producing healthy food 3. Utilization of local resources to support organic farming 4. Regulation organic farming in Indonesia (Indonesia national standard) 5. Apply organic farming in farm level 6. Organic farming for producing soil and food health 7. Organic farming for improving soil properties 8. Organic farming related with climate change 9. Examination
Examination forms	1. Essays questions 2. Writing paper
Reading List	1. Sparling, G.; Schipper, L., Hewitt, A. 1988. Soil Quality Characteristric of Walareka and Wakanui Soils Under Cropping. New Zealand Soil Science Society Conference, 16-19 Nov. 1998. pp 153-154 2. Mulongoy, K anad R. Merckx. 1993. Soil organic matter dynamics and sustainable of tropical agriculture. KU. Leuven. Belgium 3. Rachman Sutanto. 2002. Penerapan Pertanian Organik. Pemasyarakatn dan Pengembangannya. Kanisius
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**PTN 36715 *Lowland Management***
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dr. Ir. Marsi, M.Sc 2. Dr. Ir. Moh. Bambang Prayitno 3. Dr. Momon Sodik Imanuddin, S.P., M.Sc. 4. Dr. Ir. Bakri, M.P.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to understand the meaning and scope of Lowland 2. Students are able to understand and differentiate tidal and freshwater swampland 3. Students are able to understand the typology of swampland based on soil hydro-topography and soil type 4. Students are able to understand the pyrite formation, oxidation and how to minimalize pyrite oxidation and its impact. 5. Students are able to understand soil salinity concept and its effect on soil characteristics and plant growth 6. Students are able to understand water management on tidal and freshwater swamplands 7. Students are able to understand peatland formation and its characteristics. 8. Students are able to understand management concept of peatland for agricultural and non-agricultural Uses 9. Students are able to understand peatland and coastal ecosystem restoration

MODULE HANDBOOK

Content	1. Introduction: Definition and scope of swampland; Conditions For the formation of swamp land. 2. Typology of Tidal Swamp land and its Soil Characteristics. 3. Typology of the Freshwater swamp land and its soil characteristics 4. Process of pyrite formation in tidal swamp land, pyrite oxidation and its management 5. Impact of pyrite oxidation on soil and water quality 6. Effect of salinity on soil and water characteristics and its management 7. Effect of height and duration of inundation on soil characteristics of freshwater swamp land. 8. Water Management of Tidal Swamp and Freshwater Swamp land 9. Formation of Peat Soil and its characteristics 10. Peatland management for agriculture 11. Peatland management for non-agricultural sector 12. Peat Ecosystem Restoration 13. Swamp and Coastal Ecosystem
Examination forms	1. Essays questions 2. Writing paper 3. Presentation and Group Discussion on Lowland Management Related Topics.

Reading List	1. Haryono. 2013. Lahan Rawa: Lumbung Pangan Masa Depan Indonesia. Badan Penelitian dan Pengembangan Pertanian Kementerian Pertanian. 2. Didi Ardi S., Undang Kurnia, Mamat H.S., Wiwik Hartatik, dan Diah Setyorini. 2006. Karakteristik Dan Pengelolaan Lahan Rawa. Balai Besar Penelitian Dan Pengembangan Sumberdaya Lahan Pertanian. Badan Penelitian dan Pengembangan Pertanian Departemen Pertanian. 3. Najiyati, S., Lili Muslihat dan I Nyoman N. Suryadiputra. 2005. Panduan pengelolaan lahan gambut untuk pertanian berkelanjutan Bogor: Wetlands International - xi + 231 hlm; ISBN: 979-97373-2-9 4. Reddy, K.R. and R.D. DeLaune. 2008. Biogeochemistry of Wetland: Science and Application. CRC Press. 806 pp. 5. Perillo, G.M.E., E. Wolanski, D.R. Cahoon, and M.M. Brinson (Eds). 2009. Coastal Wetlands: An Integrated Ecosystem Approach. Elsevier. 975 pp. 6. Richardson, J.J. and M.J. Vepraskas (Eds). 2001. Wetland Soils: Genesis, Hydrology, Landscapes and Classification. Lewis Publishers. 432 pp. 7. Corner, W.H., T.W. Doyle, K.W. Krauss (Eds). 2007. Ecology of Tidal Freshwater Forested Wetlands of the Southern United States. Springer. 508 pp 8. Kadlec, R.H. and S.D. Wallace. 2009. Treatment Wetland. 2nd Ed. CRC Press. 1048 pp.
Date of last amendment	14 Oktober 2021

MODULE HANDBOOK

Module Designation	**PTN 36815 *Practical of Lowland Management***
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dr. Ir. Muh Bambang Prayitno, M.Agr.Sc 2. Dr. Marsi
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to understanding the meaning and scope of Lowland Management (Tidal Lowland, Non Tidal Lowland and Peatland), 2. Students are able to understanding the Tidal Lowland : formation process, soil horizon, soil profile, 3. Students are able to understanding the Tidal Lowland : Observing the physical properties of the soil and its characteristics, 4. Students are able to understanding the Tidal Lowland : observing the chemical properties of the soil and its characteristics, 5. Students are able to understanding the Tidal Lowland : land and water management for agriculture 6. Students are able to understanding the Non Tidal Lowland : formation process, soil horizon, soil profile, 7. Students are able to understanding the Non Tidal Lowland : Observing the physical properties of the soil and its characteristics, 8. Students are able to understanding the Non Tidal Lowland : observing the chemical properties of the soil and its characteristics, 9. Students are able to understanding the Non Tidal Lowland : land and water management for agriculture 10. Students are able to understanding the Peatland : formation process, soil horizon, soil profile, 11. Students are able to understanding the Peatland :

	Observing the physical properties of the soil and its characteristics, 12. Students are able to understanding the Peatland : observing the chemical properties of the soil and its characteristics, 13. Students are able to understanding the Peatland : land and water management for agriculture,
Content	1. Introduction: definition of low land land (tidal lowland, Non Tidal Lowland and Peatland), Lowland Management, 2. Tidal Lowland 1: formation process, soil horizon, soil profile, 3. Tidal Lowland 2: Observing the physical properties of the soil and its characteristics, 4. Tidal Lowland 3: observing the chemical properties of the soil and its characteristics, 5. Tidal Lowland 4: land and water management for agriculture 6. Non Tidal Lowland 1: formation process, soil horizon, soil profile, 7. Non Tidal Lowland 2: Observing the physical properties of the soil and its characteristics, 8. Non Tidal Lowland 3: observing the chemical properties of the soil and its characteristics, 9. Midterm Examination 10. Non Tidal Lowland 4: land and water management for agriculture 11. Peatland 1: formation process, soil horizon, soil profile, 12. Peatland 2: Observing the physical properties of the soil and its characteristics, 13. Peatland 3: observing the chemical properties of the soil and its characteristics, 14. Peatland 4: land and water management for agriculture, 15. General discussion and evaluation: the first meeting to the end. 16. semester final exam
Examination forms	1. Essays questions 2. Writing paper 3. Presentation and Group Discussion on Related Topics.

MODULE HANDBOOK

Reading List:	1. Pedoman Pengamatan Tanah di Lapangan. Badan Penelitian dan Pengembangan Pertanian Kementerian Pertanian 2017. IAARD Press Badan Penelitian dan Pengembangan Pertanian Jalan Ragunan No. 29, Pasarminggu, Jakarta 12540 Telp. +62 21 7806202, Faks.: +62 21 7800644 ISBN 978-602-344-163-1 2. Petunujk Teknis. PEDOMAN PENILAIAN KESESUAIAN LAHAN UNTUK KOMODITAS PERTANIAN STRATEGIS Tingkat Semi Detail Skala 1:50.000. Wahyunto, Hikmatullah, Erna Suryani, Chendy Tafakresnanto, Sofyan Ritung, Anny Mulyani, Sukarman, Kusumo Nugroho, Yiyi Sulaeman, Yayan Apriyana, Suciantini, Aris Pramudia, Suparto, Rudi Eko Subandiono, Teddy Sutriadi, Dedi Nursyams. Balai Besar Litbang Sumberdaya Lahan Pertanian Badan Penelitian dan Pengembangan Pertanian Jl. Tentara Pelajar No. 12, Kampus Penelitian Pertanian, Cimanggu, Bogor 16114 E-mail: bbsdlp.litbang.pertanian.go.id; csar@indosat.net.id Website: http://bbsdlp.litbang.pertanian.go.id Pencetakan buku ini dibiayai DIPA BBSDLP TA 2016 Edisi April, 2016 ISBN 978-602-6759-16- 3. Petunjuk Teknis PEDOMAN SURVEI DAN PEMETAAN TANAH Tingkat Semi Detail Skala 1:50.000. Wahyunto, Hikmatullah, Erna Suryani, Chendy Tafakresnanto, Sofyan Ritung, Anny Mulyani, Sukarman, Kusumo Nugroho, Yiyi Sulaeman, Suparto, Rudi Eko Subandiono, Teddy Sutriadi, Dedi Nursyamsi. Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian Badan Penelitian dan Pengembangan Pertanian Jl. Tentara Pelajar No. 12, Kampus Penelitian Pertanian Cimanggu, Bogor 16114 E-mail: bbsdlp@litbang.pertanian.go.id; csar@indosat.net.id Website: http://bbsdlp.litbang.pertanian.go.id Pencetakan buku ini dibiayai DIPA BBSDLP TA 2016 Edisi April, 2016 ISBN 978-602-6759-14-6. 4. LOWLAND RICE CULTIVATION GUIDE. Tatsushi TSUBOI. Rice Technical Advisor. Promotion of Rice Development (PRiDe) Projec. 5. Study of Management Practices for Lowland Rice in Nepalese Context. ACTA SCIENTIFIC AGRICULTURE (ISSN: 2581-365X). Volume 3 Issue 10 October 2019 6. Growing lowland rice: a production handbook. Africe Rice Center (WARDA). Nwilene F.E., Oikeh S.O., Agunbiade T.A., Oladimeji O., Ajayi O., Sié M., Gregorio G.B., Togola

	A. and A.D. Touré. 7. Integrated management practices for lowland rice production. Article in Pesquisa Agropecuaria Brasileira · March 2009https://www.researchgate.net/publication/262430911 8. LAHAN GAMBUT INDONESIA Pembentukan, Karakteristik, dan Potensi Mendukung Ketahanan Pangan (Edisi Revisi). Fahmuddin Agus Markus Anda Ali Jamil Masganti. BADAN PENELITIAN DAN PENGEMBANGAN PERTANIAN KEMENTERIAN PERTANIAN 2016. 9. Petunjuk Teknis UNTUK KOMODITAS PERTANIAN. Sofyan Ritung Kusumo Nugroho Anny Mulyani Erna Suryani. Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian Badan Penelitian dan Pengembangan Pertanian, Kementerian Pertanian Kampus Penelitian Pertanian Jl. Tentara Pelajar No. 12, Bogor 16114 Telp. 62.0251.8323012, Fax. 62.0251.8311256 e-mail: csar@indosat.net.id, website: www.bbsdlp.litbang.deptan.go.id Edisi Pertama Tahun 2003 Edisi Revisi Tahun 2011 ISBN 978-602-8977-47-0.
Date of last amendment	14 Oktober 2021

MODULE HANDBOOK

Module Designation	**Entrepreneurship**
Code	PER 37109
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	Dr. Ir. Adipati Napoleon Ely Rosana, SP, M.Si
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to understanding the entrepreuneurship and techopreuneurship, and their role in economic development. 2. Students are able to understanding and explain the Best practices of several professional entreupreuneurship in agriculture created and managed by young generation. 3. UStudents are able to understanding and explain the role and source of inovation and creativity to build and improve entreupreuneurship 4. Students are able to understanding and explain the capita selecta in creaitivity and innovation developed by young generation 5. Students are able to understanding and explain the Entreupreuneurship creation, characters, steps, and challenges to develop entreupreuneurship in agriculture; Pre-proposal creation: Inspiration, innovation, and creativity to innitiate entreupreuneurship unit in agriculture 6. Students are able to understanding and explain the administration, organization, operational, and financial balance sheet in agriculture entreupreuneurship 7. Students are able to understanding and explain the procedures and documents required to built agricultural entreupreuneurship 8. Students are able to understanding and explain the best practices on innovation, creativity, and its characters to develop entreupreuneurship

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	9. Students are able to understanding and explain the bisnis proposal to develop agricultural entreupreuneurship to get financial support from the bank 10. Students are able to Practice, discussion, and report to make bisnis proposal; Intructional task to visit local entreupreuneurship unit 11. Students are able to Group discussion on innovation and creativity to improve visited entreupreuneurship unit 12. Students are able to make Report and presentation on innovation and creativity to improve visited entreupreuneurship unit
Content	1. Understanding entrepreuneurship and techopreuneurship, and their role in economic development. 2. Best practices of several professional entreupreuneurship in agriculture created and managed by young generation. 3. Understanding and definition of role and source of inovation and creativity to build and improve entreupreuneurship 4. Capita selecta in creaitivity and innovation developed by young generation 5. Entreupreuneurship creation, characters, steps, and challenges to develop entreupreuneurship in agriculture; Pre-proposal creation: Inspiration, innovation, and creativity to innitiate entreupreuneurship unit in agriculture 6. Explanation and example on administration, organization, operational, and financial balance sheet in agriculture entreupreuneurship 7. Explanation and example of procedures and documents required to built agricultural entreupreuneurship 8. Explanation best practices on innovation, creativity, and its characters to develop entreupreuneurship 9. Explanation and examples of bisnis proposal to develop agricultural entreupreuneurship to get financial support from the bank 10. Practice, discussion, and report to make bisnis proposal; Intructional task to visit local entreupreuneurship unit 11. Group discussion on innovation and creativity to improve visited entreupreuneurship unit 12. Report and presentation on innovation and creativity to improve visited entreupreuneurship unit (1)

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	13. Report and presentation on innovation and creativity to improve visited entreupreuneurship unit (2).
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**PTN 47115 *Regional Planning and Development***
Semester (s) in which the module is taught	7rd semester/4nd year
Person responsible for the module	1. Dra. Dwi Probowati Sulistyani, M.S 2. Dr. Ir Muh Bambang Prayitno M.Agr 3. Dr Ir. Warsito MP
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to understanding and explain and scope, aspects of the study, spectrum of the Regional Planning and Development system and regional concepts 2. Students are able to understanding and explain the basic concepts of area and spatial planning include: concept and history of PPW, concepts, policies and strategies and strategic issues of spatial planning. 3. Students are able to understanding and explain the Development Theory and Planning. Region. 4. Students are able to understanding and explain the Regional potential analysis method 5. Students are able to understanding and explain the Area potential analysis method 6. Students are able to understanding and explain the Agricultural Area Development Concept 7. Students are able to understanding and explain the Agricultural Land Use Planning in Indonesia 8. Students are able to understanding and explain the Implementation of agricultural area development 9. Students are able to understanding and explain the Application of the Planning Method for the case study area of agropolitan and paddy fields 10. Students are able to understanding and explain the

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	Application of regional planning methods, sub-topics of SWOT analysis methods, analysis of internal factors, external factors 11. Students are able to understanding and explain the Regional planning method application. sub-topics of SWOT analysis application guidelines, formation of working groups, collection of internal and external data, determination of strengths, weaknesses, opportunities and threats 12. Students are able to understanding and explain the Basic understanding, general principles, patterns of spatial use in the area of spatial use structure, spatial planning in agropolitan areas, reviews and views on future agropolitan areas 13. Students are able to understanding and explain the Spatial planning method
Content	1. Introduction: understanding and scope, aspects of the study, spectrum of the Regional Planning and Development system and regional concepts 2. The basic concepts of area and spatial planning include: concept and history of PPW, concepts, policies and strategies and strategic issues of spatial planning. 3. Development Theory and Planning. Region. The sub-topics are: the purpose of planning, planning methods and why planning is important, planning strategies, planning approaches and planning stages 4. Regional potential analysis method, sub-topics Population analysis design, Population by age, Population by gender, Population by livelihood, Population by income level, Population by education, Population by religion, and Population by labor force 5. Area potential analysis method, sub-topics Population analysis design, Population by age, Population by gender, Population by livelihood 6. Agricultural Area Development Concept, sub-topics: understanding and boundaries, basic patterns, approaches, strategies and policies for developing agricultural areas 7. Agricultural Land Use Planning in Indonesia

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	8. Implementation of agricultural area development 9. Application of the Planning Method for the case study area of agropolitan and paddy fields 10. Application of regional planning methods, sub-topics of SWOT analysis methods, analysis of internal factors, external factors 11. Regional planning method application. sub-topics of SWOT analysis application guidelines, formation of working groups, collection of internal and external data, determination of strengths, weaknesses, opportunities and threats 12. Basic understanding, general principles, patterns of spatial use in the area of spatial use structure, spatial planning in agropolitan areas, reviews and views on future agropolitan areas 13. Spatial planning method, sub subject. understanding, aims and objectives, conflicts, problems, deviations, linkages, principles, scope and spatial policies 14. Spatial planning methods, sub-topics of development impacts on land, land and space, ecological, technical, industrial, socio-economic functions and disturbed land components due to development programs 15. Spatial planning methods, sub-topics of development impacts on land, land and space, ecological, technical, industrial, socio-economic functions and disturbed land components due to development programs
Examination forms	1. Essays questions 2. Writing paper 3. Quiz
Reading List	1. Rustiadi, E; Sunsun, S and Dyah R. P. 2011. Regional Development Planning. Crestpent Press and the Indonesian Obor Library Foundation. Jakarta 2. Dardak, H, A in Arsyad, S. et al. 2008. Land use based on spatial planning as an effort to realize a comfortable, productive and sustainable living space. Crestpent Press and the Indonesian Obor Library Foundation. Jakarta

	3. Anonymous. 2012. Regulation of the Minister of Agriculture number: 05/Permentan/CT.140/8/ 2012 concerning: Guidelines for the Development of Agricultural Areas
Date of last amendment	11 November 2021

MODULE HANDBOOK

Module Designation	**PTN 47115 Watershed Management**
Semester (s) in which the module is taught	3rd semester/2nd year
Person responsible for the module	1. Dr. Ir. Satria Jaya Priatna, M.S 2. Dr.Ir. Bakri, MP
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	3 hours and 40 minutes of total workload: 90 minutes for Contact Study; 120 minutes for structured academic
Credit points	2 Credits
Required and recommended prerequisite for joining the module	Students Have Received Lecture Materials: Soil Science Fundamentals Soil Physics Soil Chemistry Soil Biology
Module objectives/intended learning outcomes	1. Students are able to understand the scope of the subject of watershed management courses; 2. Students are able to understand the meaning of watershed, the meaning and purpose of watershed management; 3. Students are able to understand the morphometry and characteristics of the watershed; 4. Students are able to understand and explain water processes in the watershed; 5. Students are able to understand and explain the type of rain, rain parameters, measurement & determination of rain area; 6. Students are able to understand and explain the infiltration process in the watershed; 7. Students are able to understand surface runoff & river characteristics; 8. Students are able to understand and analyze river discharge & hydrograph ; 9. Students are able to understand and explain flood-drought events & water quality; 10. Students are able to understand and recognize hydrological models for watershed management; 11. Students are able to explain watershed management strategies and 12. Students are able to understand and explain integrated watershed management

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Content	1. Learning contract, RPS explanation, Scope of watershed management 2. Definition of watershed and Watershed Management; Nomenclature hierarchy watershed; Management objectives watershed 3. Watershed Morphometry: watershed shape, area watershed, long river, center point watershed, slope watershed, network rivers and more 4. watershed as a system; Processes hydrology in the watershed: interception,infiltration, evapotranspiration, runoff surface, and other 5. Rain type ;Rain parameter ; Rain measurement; Area determinationRain 6. Forms and properties of flow surface; Flow component surface; flow. 7. River characteristics 8. debit and discharge measurement; Hydrograph 9. erosion process; The factors that influence erosion 10. Sedimentation Proces 11. Hydrological model watershed; Multiple models watershed hydrology 12. Simulation and evaluation watershed management 13. Definition of strategy watershed management; Strategy technical/biophysical; 14. Social strategy economics and culture; Strategy policy/institution
Examination forms	1. Essays questions 2. Writing paper 3. Group discussion

Reading List	• Asdak, Chay. 2007. Hidrologi dan pengelolaan Daerah Aliran Sungai; Yogjakarta : Gadjah Mada University Press • Arsyad, S. 2010. Soil and Water Conservation. 2nd Edition. Bogor: IPB Press. • Farida et al. 2005. Hydrological Rapid Assessment: An Integrated Approach to Assessing Watershed Functions (DAS). Bogor: Rewarding Upland Poor for Environmental Services (RUPES) Program World Agroforestry Center (ICRAF) • Fuady, Z and Azizah, C. 2008. Overview of Watersheds as Ecology and Watershed Management. Lantern: Vol.6. • Notohadiprawiro. Q. 2006. Watershed Management and Programs Greening. Faculty of Agriculture. Gadjah Mada University. Yogyakarta.
Date of last amendment	14 November 2021

MODULE HANDBOOK

Module Designation	PTN 47315 *Spatial Planning and Land Use*
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	1. Prof. Dr. Ir. M. Edi Armanto 2. Dr. Ir. Warsito, M.P
Language	Indonesian
Relation to curriculum	Elective course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Be able to explain and understand the meaning and function of space and land 2. Be able to explain the meaning of land use 3. Be able to explain about sustainable spatial planning 4. Be able to explain the impact of development on land, space, and ecosystems 5. Able to understand and classify spatial and land resource information systems 6. Able to carry out the zoning and zoning conception process 7. Able to understand about Thematic Mapping 8. Be able to understand GIS in Spatial and Land Planning (Introduction) 9. Able to do thematic mapping using GIS, GPS and Drones in Spatial and Land Planning 10. Understand the concept and use of GIS, GPS and drones in spatial and land planning. Benefits from government support in the use of spatial planning and land use 11. Able to Operate Drones and GPS in Spatial and Land Planning 12. Be able to understand case studies in agropolitan

	areas 13. Be able to understand case studies in the Coastal area 14. Able to understand case studies in the peatlands area
Content	1. Lecture Framework (RPS); Definition of Space and Land; Land Function; The definition of space and land management; Why space and land matter 2. Definition of Land Use; Principles in land use; Why integrated?; Sustainable land use 3. What is needed in sustainable spatial planning?; Why are spatial planning issues important; Sensitivity to climate change; Climate change impacts; Mitigation and adaptation 4. Natural resources and agricultural development; Potential and distribution of land resources; Basic approach to utilization; Natural Resource utilization strategy 5. Understanding and application of Land and Space Resource Information System (SISDAL) 6. Territory Concept; Territory Definition; Territory Division; Zoning Function; Definition of Zoning Management; Why Zoning matters 7. Mapping governance; Definition/concept of thematic mapping; Spatial data and attributes; Digital and temporal mapping concept 8. Do you need GIS, GPS and drones?; Why are GIS, GPS and Drones important?; GIS, GPS and Drone sensitivity; Impact of G GIS, GPS and Drones; GIS Management Theory, GPS and Drones 9. SDL thematic mapping using GIS, GPS and drones 10. Reliable GIS, GPS and Drone concepts in Spatial and Land Planning; Satellite and GPS connection; Use of GPS in spatial and land planning; Precision farming; Agroforestry, Agrosilvofishery and Agropastural; The role of local policies in spatial and land governance; Integration of environmental aspects in land use plans; The importance of policy support 11. Integration of Drones with GPS and GIS in Spatial and Land Planning 12. What is the agropolitan layout?; Why is agropolitan

	important in management?; Basic land use planning in agropolitan; participatory mapping; Information system strengthening; The importance of strengthening human resources; Adaptive technology development 13. Spatial Planning and Land Use of the Coastal area 14. Peatlands Spatial Planning and Use
Examination forms	1. Write essays 2. Doing practical works 3. Individual Assgnment
Reading List	
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**PTN 47415 Land Degradation and Reclamation**
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	1. Sabaruddin, Ph.D. 2. Dr. Dwi Setyawan
Language	Indonesian
Relation to curriculum	Optional Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	15. Students are able to understand and explain the scope of course description, scope of land degradation and reclamation 16. Students are able to understand and explain about climate and land degradation: global climate change, climate change and land degradation, future perspectives 17. Students are able to understand and explain about Why is soil degradation information important: how much land is available? impact of human dominance on soil, global and indonesian distribution of soil degradation, land degradation and agricultural productivity 18. Students are able to understand and explain about forms of land degradation: soil erosion, structural damage due to compaction, inundation/submergence, decrease in soil fertility, salinization, pollution, vegetation loss 19. Students are able to understand and explain about land degradation assessment: what are indicators? qualitative assessment of land degradation, quantitative assessment of land degradation 20. Students are able to understand and explain about land damage due to forest fires: ecological and economic impact of fire, peat and its problems, recovery of burnt soil

	21. Students are able to understand and explain about watershed degradation: watershed boundaries, watershed functions, watershed degradation, forest functions in watershed protection, 22. Students are able to understand and explain about soil and water pollution: what is a pollutant, types of pollutants, agriculture and soil pollution, remediation principles, remediation technology 23. Students are able to understand and explain about desertification: definitions of desertification, causes of desertification, impact of desertification, prevention and recovery of desertification 24. Students are able to understand and explain about Land degradation and agricultural productivity: evaluation of the impact of soil degradation on food security, footprint of soil degradation, soil degradation and the future of food security, policy and research priorities 25. Students are able to understand and explain about reclamation of degraded land: definition of rehabilitation and reclamation, why are rehabilitation and reclamation important? what is land conservation? strategies to overcome land degradation 26. Students are able to understand and explain about sustainable land management approach: what is sustainable management, economic approach, institutional approach, technological approach.
Content	15. Introduction: Course Description, Scope of land Degradation and Reclamation 16. Climate and Land Degradation: Global Climate Change, Climate Change and Land Degradation, Future Perspectives 17. Why is Soil Degradation Information Important: How Much Land Is Available? Impact of Human Dominance on Soil, Global and Indonesian Distribution of Soil Degradation, Land Degradation and Agricultural Productivity 18. Forms of Land Degradation: Soil Erosion, Structural Damage Due to Compaction, Inundation/Submergence, Decrease in Soil Fertility,

	Salinization, Pollution, Vegetation Loss 19. Land Degradation Assessment: What Are Indicators? Qualitative Assessment of Land Degradation, Quantitative Assessment of Land Degradation 20. Land Damage Due to Forest Fires: Ecological and Economic Impact of Fire, Peat and its Problems, Recovery of Burnt Soil 21. Watershed Degradation: Watershed Boundaries, Watershed Functions, Watershed Degradation, Forest Functions in Watershed Protection, 22. Soil and Water Pollution: What is a Pollutant, Types of Pollutants, Agriculture and Soil Pollution, Remediation Principles, Remediation Technology 23. Desertification: Definitions of Desertification, Causes of Desertification, Impact of Desertification, Prevention and Recovery of Desertification 24. Land Degradation and Agricultural Productivity: Evaluation of the impact of Soil Degradation on Food Security, Footprint of Soil Degradation, Soil Degradation and the Future of Food Security, Policy and Research Priorities 25. Reclamation of Degraded Land: Definition of Rehabilitation and Reclamation, Why are Rehabilitation and Reclamation Important? What is Land Conservation? Strategies to Overcome Land Degradation 26. Sustainable Land Management Approach: What is Sustainable Management, Economic Approach, Institutional Approach, Technological Approach.
Examination forms	4. Write essays 5. Doing practical works 6. Individual Assgnment
Reading List	1. Adriano, D.C., J.M. Bollag, W.T. Frankenberger, Jr., & R.C. Sims. 1999. Bioremediation of contaminated soils. Agronomy, Madison, Wisconsin, USA. 2. Goldammer, J.G. 1990. Fire in the tropical biota. Springer-Verlag, New York. 3. van de Born, G.J., B.J. de Haan, D.W. Pearce, & A. Howarth. 2000. Technical report on soil degradation. RIVM, EFTEC, NTUA, and IIASA in association with TME and TNO under contract with the Environment

	Directorate-General of the European Commission 4. FAO & ISRIC. 2000. Soveur guidelines for the assessment of soil degradation. FAO, Rome Italy. 5. Europe Environment: The third assessment. 6. Stocking, M. & N. Murnaghan. 2000. Land degradation – Guideline for field assessment. UNEP, UNU, PLEC, DFIED, ODG/UEA & Ministry of Foreign Affair of the Royal Government of Norway. 7. Ekha, I. 1993. Dilema pestisida: Revolusi hijau. Penerbit Kanisius, Yogyakarta. 8. Green, M.B., G.S. Hartley & J.T. West. 1979. Chemical for crop protection and pest control. Pergamon Press, Ltd., Oxford, England. 9. Hartley, G.S. 1964. Pesticide in soil. John Wiley & Sons Inc., New York. 10. Metting, F.B. 1993. Soil microbial ecology: Applications in agricultural and environmental management. Marcel Dekker Inc., New York. 11. Troeh, F.R., J.A. Hobbs, & R.L. Donahue. 1980. Soil and water conservation for productivity and environmental protection. Prentice-Hall, New Jersey. 12. Dregne, H.E. Desertification of arid lands. 13. Glants, M.N. and Orlovsky, N. Desertrification: A review of the concept. 14. Zhendla, Zhu. Trends of desertification and its rehabilitation in China. 15. William, J., Walker, G.R. and Hatton, T.J. Dryland salinization : a challenge for land and water management in the Australian landscape. 16. FAO. 2001. Guidelines for the qualitative assessment of land resources and degradastion 17. FAO. 2004. Guiding principles for the quantitative assessment of soil degradation. 18. WMO. 2005. Climate and Land Degradation. 19. Wetland Indonesia. 2015. Pengelolaan Lahan Gambut Berbasis Masyarakat di Indonesia 20. IPS. 2010. Strategy for Responsible Peatland management. 21. FAO. 2014. Toward Climate-Responsible Peatlands Management.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Land and Agrarian Law**
Semester (s) in which the module is taught	7th semester/Fourth year
Person responsible for the module	Dr. Ir. Dwi Setyawan, M.Sc Prof. Dr. M. Edi Armanto
Language	Indonesian
Relation to curriculum	Elective course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-studyhours)	lectures = 1400 structured assignment =1440 self-study = 1440 exam = 220 total : 4500 minutes = 75 hours = 3 ects
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learningoutcomes	1. Students are expected to have an understanding and be able to: 2. Understanding the importance of land lawin the lives of individuals, society, nation and state; 3. Understand the importance of knowing the applicable land law in the period before andafter independence as well as in the present; 4. Knowing the general concept of agrarian law and understanding the principles and concepts as well as knowing the sources ofagrarian law; 5. Knowing land rights according to law and the UUPA and how to obtain them for eachland right, and being able to behave and apply as citizens in daily life; 6. Understanding the concept of the state andthe principle of land reform, as well as knowing and understanding the provisions of alternative land for maximum and minimum land limits 7. Understand land problems/conflicts and beable to find the background of land problems/conflicts that occur in the surrounding community.
Content	1. The definition and scope of land law, both in the curriculum and in land law science; 2. History of Land through the search for Land Politics, namely during the period of customary law communities, kingdoms and colonialism (the

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	Netherlands and Japan) and the efforts made after AgrarianReform 3. Positive Agrarian Law includes an overview, principles, concepts and sourcesof Agrarian law 4. Land rights according to the history of Agrarian law and UUPA 5. Land reform and absente land as well as minimum and maximum land limits 6. Registration of Land Rights 7. Land issues/conflicts
Examination forms	1. Essays questions 2. Writing paper
Reading List	1. Boedi Harsono. Hukum Agraria Indonesia: Sejarah dan Pembentukan Undang-Undang danpenjelannya 2. Saleh Adiwinata, Hukum Perdatadan Tanah, buku I & II 3. G.Kartasapoetra. Hak-hak dan Jaminan Atas tanah 4. Irawan Soerodjo, Kepastian HukumAtas Tanah 5. AP. Parlindungan, PendaftaranTanah di Indonesia 6. Karl.J. Pelzer, Sengketa Agraria, 7. Noer Fauzi, Otoda dan sengketa Tanah
Date of last amendment	30 June 2021

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Module Designation	**PTN 47615 Soil *Organic Matter Management***
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	1. Prof. Dr. Ir. Dedik Budianta, MS 2. Dr. Ir. A. Napoleon, MP
Language	Indonesian
Relation to curriculum	Optional/elective Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain what is the soil organic matter 2. Students are able to explain the function of soil organic matter for soil improvement 3. Students are able to explain the tharacteristic and properties of soil organic matter 4. Students are able to explain the function of soil organic matter for soil improvement 5. Student ae able to explain the role of organic matter for plant growth 6. Students are able to explain the soil organic matter decomposition 7. Students are able to explain the factors inhibiting organic matter decomposition 8. Students are able to explain the soil organic matter transformation 9. Students know the source of soil organic matter 10. Students are able to explain about Humus forming and characterization 11. Students are able to explain about dynamic of soil organic mater 12. Students know the role of organic matter for chelating agent 13. Students are able to explain the efforts to

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	supply organic matter
Content (14 meetings) and two examinations	1. Introduction and definition of soil organic matter 2. Characteristic and properties of soil organic matter 3. Function of soil organic matter for soil improvement 4. The role of organic matter for plant growth 5. Organic matter for nutrient sources 6. The source of soil organic matter 7. Decomposition process of organic matter 8. Factors inhibiting organic matter decomposition 9. Soil organic matter transformation 10. Humus forming and characterization 11. Dynamic of soil organic mater 12. Functional groups for chelating process 13. Efforts to supply organic matter
Examination forms	1. Essays questions 2. Writing paper
Reading List	1. Stevenson, F.J. 1994. Humus Chemistry:Gensis, composition and reaction. 2nd edition. Wiley.
Date of last amendment	30 June 2021

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Module Designation	**PTN 47715 Land Resource and Environmental Managment**
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	1. Sabaruddin, Ph.D. 2. Dr. Warsito
Language	Indonesian
Relation to curriculum	Optional Course
Teaching methods	Contextual Learning, Cooperative learning
Workload (incl. Contact hours, self-study hours)	5 hours and 40 minutes of total workload: 100 minutes for Contact Study; 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	2 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Students are expected to understand the scope of Natural Resources and Environment, Management Definitions, Classification of Natural Resources, Why Natural Resources are Important, 2. Students are expected to understand the Central Issue in Natural Resource Management: Can Natural Resources be Managed? Human Dominance over Natural Resources, Resource Flows, 3. Students are expected to understand the Impact of Human Domination on Natural Resources, What is the role of Natural Resource Management? Natural Resources Management System (System Approach, Institutional Framework), 4. Students are expected to understand the Sustainable Natural Resource Management: Sustainability Constraints and Issues, Framework Structure, Monitoring and Evaluation Framework, Monitoring and Evaluation Indicators, 5. Students are expected to understand the Causes of Environmental Problems: Natural Events, Population Growth, Over-exploitation of Natural Resources, Industrialization and Transportation, Solid, Liquid, and Gas Waste, 6. Students are expected to understand about the Studying Alternatives: Different Perspectives Can Affect the Study, Benefit-Cost Analysis, Impact Analysis Techniques, EIA in Indonesia,

	7. Students are expected to understand the Local Knowledge System: What is Local Knowledge, Co-management, Local Knowledge for Natural Resources Management, 8. Students are expected to understand the Complexity, Uncertainty and Shock: Shock, Chaos, Managing Changes, Complexity and Uncertainty, Various Approaches to Conflict Resolution, Alternative Conflict Resolution, Conditions for Conflict Resolution, Implementation of Alternative Conflict Resolution, 9. Students are expected to understand the Forest Resources: Forest Functions and Formation, Causes of Forest Degradation, Impact of Forest Degradation, Management of Degraded Forest, 10. Students are expected to understand the Land Resources: Conservation of Land Productivity Through Land Management, Land Carrying Capacity, Land for Agriculture, Land Degradation, 11. Students are expected to understand the Water Resources: Water for Life, Water Classification and Designation, Water Quality Parameters, Water Pollution Control, 12. Students are expected to understand the Atmosphere: Air Pollution Sources, Global Environmental Problems.

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Content	1. Introduction: Syllabus Explanation, What are Natural Resources and Environment, Management Definitions, Classification of Natural Resources, Why Natural Resources are Important, 2. Central Issue in Natural Resource Management: Can Natural Resources be Managed? Human Dominance over Natural Resources, Resource Flows, 3. Impact of Human Domination on Natural Resources, What is the role of Natural Resource Management? Natural Resources Management System (System Approach, Institutional Framework), 4. Sustainable Natural Resource Management: Sustainability Constraints and Issues, Framework Structure, Monitoring and Evaluation Framework, Monitoring and Evaluation Indicators, 5. Causes of Environmental Problems: Natural Events, Population Growth, Over-exploitation of Natural Resources, Industrialization and Transportation, Solid, Liquid, and Gas Waste, 6. Studying Alternatives: Different Perspectives Can Affect the Study, Benefit-Cost Analysis, Impact Analysis Techniques, EIA in Indonesia, 7. Local Knowledge System: What is Local Knowledge, Co-management, Local Knowledge for Natural Resources Management, 8. Complexity, Uncertainty and Shock: Shock, Chaos, Managing Changes, Complexity and Uncertainty, Various Approaches to Conflict Resolution, Alternative Conflict Resolution, Conditions for Conflict Resolution, Implementation of Alternative Conflict Resolution, 9. Forest Resources: Forest Functions and Formation, Causes of Forest Degradation, Impact of Forest Degradation, Management of Degraded Forest, 10. Land Resources: Conservation of Land Productivity Through Land Management, Land Carrying Capacity, Land for Agriculture, Land Degradation, 11. Water Resources: Water for Life, Water Classification and Designation, Water Quality Parameters, Water Pollution Control, 12. Atmosphere: Air Pollution Sources, Global Environmental Problems (Acid Rain, Global Warming, Ozone Layer Damage), Important Air Quality Parameters.

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Examination forms	1. Write essays 2. Assignment 3. Examination
Reading List	Carroll, B. and Turpin T. 2009. Environmental impact assessment handbook, Second edition. Thomas Telford Ltd, ISBN 978-0-7277- 3509-6 . Chafid Fandeli. 2011. Analisis Mengenai Dampak Lingkungan Pembangunan Pelabuhan. 979-420-760-8. Penerbit GMUP. Chafid fandeli. 1995. Analisis mengenai dampak lingkungan prinsip dasar dan pemapanannya dalam pembangunan. Penerbit : liberty. offset. Yogyakarta . Edisi : 2, cet.1. Kolasi : xvii, 365 hlm, ilus, 23 cm. Ditjen Pengembangan Perkotaan. 2000. Analisis Dampak Lingkungan. Penerbit Ditjen Kotdes. Glasson, J; Therivel, R; Chadwick A. 2005. Introduction to Environmental Impact Assessment. Routledge, London Hanna, K. 2009. Environmental Impact Assessment: Practice and Participation". Second edition, Oxford.
Date of last amendment	30 July 2021

MODULE HANDBOOK

Module Designation	**Community Service Program**
Code	UNI 40109
Semester (s) in which the module is taught	6rd semester/3nd year
Person responsible for the module	Academic Committee of Plant Protection Study
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Project-Based Learning
Workload (incl. Contact hours, self-study hours)	Lectures = 200 minutes Practicum = 5100minutes Structured assignment = 720 minutes Self-study = 720 minutes Exam = 220 minutes Total: 6960 minutes = 116 hours = 4.64 ECTS
Credit points	4 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	1. Debriefing for students at KKN. 2. KKN students are introduced to the neighborhood where KKN is located. 3. Research the village's potential as a site for the KKN Village in order to create a work schedule. 4. Schedule tasks or activities, including general and professional programs (professional programs are programs carried out according to the study program of students who take part in community service and general programs are programs that are carried out together outside the professional program). 5. Seminars that are held to assist KKN initiatives, includingboth specialized and general initiatives. 6. Create a schedule of professional and general work programs. 7. Execution of tasks in accordance with professional and general work programs. 8. Evaluation of activities carried out during KKN both professional programs and general programs. 9. Preparation of Community Service Reports. 10. Reviewing and gathering of reports.
Content	1. Preparation for departure, condition of community service locations, professional and general

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	professional programs and report generation. 2. Introduction of community service students to the community, community leaders and village officials. 3. Assessing the potential of the village to support professional program activities and general programs. 4. Arrange professional program activities that are tailored to the community service student study program and general programs carried out jointly by groups of KKN students. 5. Seminars are held by inviting speakers depending on therequest of the community at the KKN location. 6. Prepare a plan of activities carried out during KKN for all KKN students, both professional programs and general programs. 7. Carry out activities that have been arranged according to professional programs and general programs. 8. Evaluation of activities carried out and professional programs and general programs. 9. Preparation of KKN reports in accordance with the activities carried out with the field supervisor. 5. Report consultation, report improvement and KKN report collection.
Examination forms	1. Field activity 2. Reports
Reading list	1. Suparman. 2017. Scientific Paper Writing Guide-Book.Faculty of Agriculture, Sriwijaya University. 90 p. 2. Final Academic Completion Guidance. Department ofPlant Protection. Faculty of Agriculture, Sriwijaya University. 23 p.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Field Practice**
Code	PER 49209
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	Advisor Lecturer
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Contextual Learning, Cooperative learning and assignment
Workload (incl. Contact hours, self-study hours)	8 hours and 40 minutes of total workload/week consisted of 100 minutes for Contact Study; 180 minutes for laboratory practice, 120 minutes for structured academic assignment and 120 minutes for self-study per week
Credit points	3 credits
Required and recommended prerequisite for joining the module	Passed PER 31116
Module objectives/intended learning outcomes	1. Capable to understand the problems of plant cultivation in the field. 2. Capable to analyze data and information on plant cultivation well. 3. Capable to make the right decisions for solving plant cultivation problems. 4. Capable to carry out plant cultivation practices based on scientific knowledge. 5. Capable to work with teams that have backgrounds in various related disciplines. 6. Capable to conduct studies to generate specific plant cultivation ideas or recommendations. 7. Capable to think analytically and synthetically to respond the plant cultivation problems that arise from time to time in the field. 8. Capable to adapt physically to environmental conditions in the field.

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Content	1. Choose of field practice crop commodities (annual crops, or perennial crops). 2. Get the location of field practice activities (agricultural/plantation institutions, agro-industrial companies, agrochemical companies, or the location of certain plant cultivation). 3. Choose the aspects of plant cultivation that will become the topic of field practice activities. 4. Preparation of proposals for the implementation of field practice activities. 5. Collect early data and information related to the topic of field practice activities. 6. Conducting interviews with competent respondents on the topic of field practice activities. 7. Following hands-on practice in the field regarding the topic of field practice activities. 8. Collect and analyze data and information, interview results, and documentation of field practice activities. 9. Preparation of reports on field practice activities 10. Completion of field practice activity reports.
Examination forms	1. Essays questions 2. Pratical works 3. Writing Case Paper 4. Oral presentation
Reading list	1. Danelo, D. J. 2017. The Field Researcher's Handbook : A Guide to The Art and Science of Professional Fieldwork. Georgetown University Press. 144 p. 2. Dris, R., I.A. Khan and R. Niskanen. 2002. Environment and Crop Production. CRC Press. 360 p. 3. Jones, Jr., J. B. 2003. Agronomic Handbook, Management of Crops, Soils, and Their Fertility. CRC Press. 450 p. 4. Krishnaprabu, S. 2020. Agronomic Management Practices for Field Crop Production. Satish Serial Publishing House. 436 p. 5. Pratley, J. 2003. Principles of Field Crop Production. 4th Edition. Oxford University Press. 576 p. 6. Singh, S. S. and R. Singh. 2015. Principles and Practices of Agronomy. Kalyani Publishers. 348 p. 7. Rana, S. S. and S. C. Negi. 2018. Practical Guide to

	Farming System and Sustainable Agriculture. Department of Agronomy, College of Agriculture, CSK HPKV, Palampur, India. 82 p. 8. Vero, S. E. 2021. Fieldwork Ready, An Introductory Guide to Field Research for Agriculture, Environment, and Soil Scientists. Wiley. 272 p.
Date of last amendment	30 June 2021

MODULE HANDBOOK

Module Designation	**Research Project**
Code	PER 49209
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	Academic Committee of Soil Science Study Program
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	Project-Based Learning
Workload (incl. Contact hours, self-study hours)	Practical works: 24480 minutes =408 hours Equal to 16.32 ECTS
Credit points	6 credits
Required and recommended prerequisite for joining the module	-
Module objectives/intended learningoutcomes	1. Students will understand concepts and apply methods of researches in Soil Science Study Program and acknowledge them in a thesis proposal. 2. Students will able to present a research plan in a study program committee. 3. Students will able to perform independence research in the laboratory and fields experiments. 4. Students will able to analyze experiment data and write the results in a seminar paper and thesis. 5. Students will able to develop the effective communicative skills to present a final research seminar in a study program committee. 6. Student will able to write and produce a thesis according to the thesis university format and rule. 7. Students will able to effectively present and defend the thesis orally in a defense thesis meeting.
Content	1. Writing the thesis proposal based on concepts and various research techniques in Soil Science Study Program under guidance of the supervisors. 2. Preparing a presentation under guidance of the supervisors and presenting the thesis proposal.

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	3. Performing the independence research on pSoil Science Study Program in the laboratory and fields under guidance of the supervisors. 4. Analyzing the experiment data and write the results in a seminar paper and thesis under guidance of the supervisors. 5. Presenting a final research seminar using the effective communicative skills to present in a study program committee. 6. Writing the thesis according to the thesis university format and rule under guidance of the supervisors. 7. Presenting and defending thesis orally in a defense thesis meeting.
Examination forms	1. Thesis assessment
Reading list	1. Suparman. 2017. Scientific Paper Writing Guide-Book. Faculty of Agriculture, SriwijayaUniversity. 90 p. 2. Final Academic Completion Guidance. Department of Soil Science. Faculty of Agriculture, Sriwijaya University. 23 p.
Date of last amendment	10 Oktober 2021

MODULE HANDBOOK

Module Designation	**Seminar**
Code	PER 49309
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	Supervisor
Language	Indonesian
Type of teaching	Presentation based on research
Relation to curriculum	Compulsory Course
Workload (incl. Contact hours, self-study hours)	Writing and discussion = 4080 minutes = 68 hours = 2.72 ECTS
Credit points	1 credits
Required and recommended prerequisite for joining the module	Passed PER 31116
Module objectives/intended learning outcomes	1. Students will be able to prepare information sources, such as articles, textbooks, and proceedings, in Soil Science which correlate for research writing paper 2. Students will be able to collect information from sources. 3. Students will be able to compile raw data prior to data analysis 4. Students will be able to order raw data obtained from the research they conduct. 5. Students will be able to figure out statistical method based on design they use. 6. Students will be able to analyze data 7. Students will be able to interpret data 8. Students will be able to figure out interpreted data and to couple those data with knowledge they know 9. Students will be able to conclude information and

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	statement. 10. Students will be able to give suggestion for next researcher for further experiment 11. Students will be able to obtain new paradigm and to improve their understanding from discussion with supervisor.
Content	1. Information sources, e.g. articles, textbooks, and proceedings. 2. Collecting Information 3. Compiling Raw Data 4. Organizing Raw data 5. Design for research 6. Data analysis 7. Data interpretation 8. Figuring out and coupling data 9. Writing conclusion 10. Proposing suggestion 11. Discussing with supervisor on paper draft written
Reading list	1. Suparman SHK. Main Author, 2017. Scientific Writing Guidebook. Faculty of Agriculture, Universitas Sriwijaya, Indralaya. 2. Anonymous 2017. Final Project Procedure Guidelines. Soil Science Study Program,Faculty of Agriculture, Universitas Sriwijaya, Indralaya.
Date of last amendment	10 Oktober 2021

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